ECONOMIC SYSTEMS & INDIAN ECONOMIC POLICIES

Before we proceed further into Indian Economics, let us briefly understand, in a very generalised way, the three existing economic systems:

Capitalism: (Connotation: possession or ownership of "capital")

An economic system that is based on private ownership of capital goods & means of production, & the creation of products for profit. Elements central to capitalism include capital accumulation, competitive markets & a price system.

Merits:

i) in accordance with Adam Smith's "Law of Invisible Hand", as each individual protects his own interest, by trying to make profit margin, according to his or her own capabilities, the economy on the whole tends towards prosperity & equilibrium.

ii) profit margin becomes the driving force & hence, efficiency of people tends to be high.

Demerits:

i) society gets divided into 'rich' & 'poor'. The unequal distribution of wealth leads to 'differentiation' of class.

ii) without any Government intervention or regulations, adoption of unfair means (to earn more profit) might lead to exorbitant price rise. A tendency towards monopoly is undeniable.

iii) leads to different forms of economic & cultural exploitation, repression of workers leading to social alienation, unemployment and economic instability.

Socialism:

An economic system characterised by social ownership of the means of production and co-operative management of the economy. 'social ownership' may refer to - cooperative enterprises, common ownership, state ownership or citizen ownership of equity. It consists of a system of production & distribution organized to directly satisfy economic demands & human needs, so that goods & services are produced directly for use instead of for private profit, driven by capital accumulation (in capitalism).

Merits:

i) leads to 'uniform' or 'equal' distribution of money, wealth & resources & thus eliminates the 'class' division & problems associated with it such as exploitation & social alienation.

ii) as 'profit' is not motive, prices are mere reflection of supply & demand forces and no exorbitant component extra.

iii) tries to revert back or control the cycle in which 'the poor become poorer & rich become richer'.

Demerits:

i) as there is a lack of 'incentive' or 'profit', the efficiency of state firms is considerably less than the capitalist firms, & thus leading to reduced economic welfare for society.

ii) a lack of 'competition' discourages firms from research & development that erstwhile often leads to technological advancement, which, in turn results in higher efficiency, better output, lower prices.

Mixed Economy:

Mixed economy is an economic system in which both the state & private sector direct the economy, reflecting characteristics of both - market economy (capitalism) and planned economy (socialism). The private firms operate with strong regulatory oversight along with a variety of Govt. run enterprises.

The Govt. yields considerable indirect influence over the economy through fiscal & monetary measures designed to counteract economic downturns & capitalism's tendency toward financial crises & unemployment.

In contrast to a laissez-faire bystander role in Capitalist system, or the absolute power in the Socialist approach, here the Govt. becomes a watchdog over the market, & with the help of indicative economic planning it provides

i.) environmental protection

ii.) ~~maintenance of~~ maintenance of employment standards.

iii.) a standardized welfare system

iv.) maintenance of competition.

True to its etymology, in a generalised way, it can be exemplified that a mixed economy involves 'assimilation of strengths/goodness) of both - capitalism & socialism, while at the same time, eliminating the negative implications, & thereby inheriting none of the weaknesses of ~~none~~ either."

After India gained independence, our idealist leaders decided to go for a 'mixed economy' and since then, we have had a mixed economy, till present. Although the extent of Govt. intervention has changed over time, the approach, in whole, has always been that of a mixed economy.

It cannot be denied that "Industry" forms the backbone an economy. Thus, the need for an "industrial policy" is justified. which covers all those procedures, principles, policies, rules & gulations that would shape the pattern of industrialisation. In liz. the first step towards it was the Industrial Policy solution, 1948.

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The IPR of April, 1948 contemplated a mixed economy, reserving sphere for the private sector and another for public sector. e industries were divided into four categories:

) manufacture of arms and ammunitions, production & control of atomic energy, & the ownership & management of railway transport were to be the exclusive monopoly of the Central Govt.

) the second category covered coal, iron & steel, aircraft manufacture, ship-building, manufacture of telephone, telegraphs & wireless apparatus etc. New undertakings in these industries could henceforth be undertaken only by the state.

c) the third category was made up of industries of such basic importance that the Central Govt. would plan & regulate them.

) the fourth category, comprising the 'remainder of the industrial field' was left open to private enterprise, individual as well as co-operative.

After the completion of First Five Year Plan (1951-56), the need for fresh statement of Industrial Policy was felt. Thus, a second IPR was adopted in April, 1956.

—The World Bank in its World Development Report (2010) classified the various economies (countries) on the basis of Gross National Income (GNI) per capita, into:

i) Low Income Countries : GNI per capita $\leq$ \$936

ii) Middle Income Countries : GNI per capita $\in$ [\$936, \$11455]

Upper Middle Income Countries

Lower Middle Income Countries ← position of India at the upper margin of Lower Middle Income Countries.

iii) High Income Countries : GNI per capita $\geq$ \$11456

Analogous to this classification, the Low Income Countries are said to be Underveloped Economies, the Middle Income Countries are termed as Under-developed or Developing economies while the High Income Nations are said to possess Developed economies. Thus, at the time of independence, India started as an 'undeveloped' economy, and at present we are a 'developing' one.

Basic Characteristics of an Under-developed Economy:

Mass Poverty:

Result of the low resource base of the poor who own a very small portion of the total assets in the form of land, capital etc. This also inhibits them from giving education & training to their children. As a result, their children, by large, are either engaged in unskilled or semi-skilled occupations. They earn meagre wages & thus perpetuate poverty. This 'vicious cycle of poverty' widens the unequal distribution of income, opportunities, wealth & thus, forms one of the most disastrous development traps, owing which, an underdeveloped economy remains underdeloped, for significant period of time.

Large Primary Producing Sector:

A very high proportion of the working population is engaged in agriculture, forestry. Lack of education increases the unskilled or semi-skilled labour force and the pressure of which is felt by the primary producing sector. It should be noted that the cause of depression is not due to poor natural resources, but rather, the decreased productivity per person engaged in it.

Foreign Exchange Crisis:

Several factors such as underutilisation of resources, poor quality of human capital, prevalence of low level of technology lead to exorbitant amount of imports & minimalistic exports. Thus, savings are meagre but the need for investment is more. Therefore, there exists a scarcity of money at all times.

Demographic & Socio-economic characteristics:

Rural areas are centres of superposition, social taboos & conservatism. Acceptance of misery as a part of life & belief in a pre-destined order become the common thought. The expenditure on education, skill formation, research & improvements in health is minimal. Average life expectancy & infant mortality rates are high.

It cannot be denied that "Industry" forms the backbone of an economy. Thus, the need for an "industrial policy" to frame which covers all those procedures, principles, policies, rules & regulations that would shape the pattern of industrialisation in India, the first step towards it was the Industrial Policy Resolution, 1948.

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Industrial Policy Resolution, 1956:

A "New Classification of Industries" into three categ

a) Schedule A: those which were to be an exclusive responsibi of the state.

b) Schedule B: those which were to be progressively state-owned & in which the state would ~~generate~~ set up new enterprises but in which private enterprises would supplement the effort of the state.

c) Schedule C: all the remaining industries & their future development would, in general, be left to the initiative & enterprise of the private sector.

The other important provisions were:

i) For a fair & non-discriminatory treatment for the private sector the state was to facilitate & encourage the development of industries in the private sector by ensuring development of transport, power etc & by appropriate fiscal & other measur

ii) Encouragement to village & small-scale enterprises.

iii) Reducing the regional disparities in levels of development order that industrialisation may benefit the country as a whole.

iv) the Govt recognised the need for securing the participation of foreign capital & enterprise to foster the pace of industrialisa of the Indian economy. However, the Resolution made it amply clear, "that as a rule, the major interest in ownership & effective control, should always be in Indian hands. In all cases, however, the training of suitable Indian personnel for the purpose of eventually replacing foreign experts will be insisted upon."

Five Year Plans of India:

The Indian Economy is based on planning through its 5 year plans, which are developed, executed & monitored by the Planning Commission of India (established in 1950). As of now, the Seventh plan completed its term in March, 2012 & the twelfth plan is currently underway. To study the establishment of the Indian economy as a whole, we need to study the various 5-year plans, their objectives, achievements & shortcomings.

1st Five Year Plan (1951-1956):

Here, India was faced with three problems -

i) influx of refugees
ii) severe food shortage
iii) mounting inflation

The country also needed to correct the disequilibrium in the economy caused by Second World War & Partition.

Thus, the Plan emphasised, as its immediate objectives, the rehabilitation of refugees, rapid agricultural development so as to achieve food self-sufficiency in the shortest possible time & control of inflation.

The First Plan was a great success. The target growth rate was 2.1% annual Gross Domestic Product growth; the achieved growth rate was 3.6%. The monsoon was good & there were relatively high crop yields, boosting exchange reserves & per capita income, & the prices also reduced by 17%.

2nd Five Year Plan (1956-1961):

By the end of 1st 5 yr plan, the economic atmosphere had become stable. Agricultural targets fixed in the First Plan had been achieved.

economy had reached a stage where agriculture could be assigned a lower priority and a forward thrust could be made in terms of industry.

Thus, the 2nd 5 yr plan aimed at rapid industrialisation with particular emphasis on the development of basic & heavy industries such as iron & steel, chemicals, heavy engineering & machine building industries.

The plan followed the Mahalanobis Model of Economic Growth, (developed by statistician Prasanta Chandra Mahalanobis of ISI, Kolkata) which attempted to determine the optimal allocation of investment between productive sectors in order to maximise long-run economic growth.

However, the more ambitious 2nd plan could not be implemented fully because of the acute shortage of foreign exchange. The targeted growth was 4.5% GDP growth, but only 4.0% was achieved. Thus, the 2nd Plan was only moderately successful.

3rd Five Year Plan (1961 - 1966):

By the beginning of the Third Plan, it was felt that the Indian Economy had entered the "Take-off stage" and that the first two plans had generated an institutional structure needed for rapid economic development. Consequently, the Third Plan set its goal initially, the establishment of a self-reliant & self-generating economy. But the partial failure of 2nd Plan had showed that the rate of growth of agricultural production was the main limiting factor in India's economic development. Thus, the Third Plan gave top priority to agriculture, but also laid emphasis on basic industries.

The effect was visible in the improvement in production of wheat

However, the brief Sino-Indian War of 1962 exposed the weaknesses & shifted the focus towards Defence industry. In 1965-66, India fought another war with Pakistan. The country also suffered from one of the most severe famines in a hundred years, in ~~1966~~ 1965-1966.

The Targeted Growth was 5.6%, and the achieved GDP growth rate was a meagre 2.4%. Thus, the Third Plan may be dubbed as a complete failure.

The failure of the Third Plan led to suspension & postponement of the Fourth Plan by three years (1966-1969). These years had Annual Plans. Therefore, this period is often sarcastically dubbed as "Plan Holiday".

4th Five Year Plan (1969-1974):

Two Principal Objectives:
- Growth with stability.
- Progressive achievement of self reliance.
- targeted growth rate: 5.5%

The first two years were quite promising, with record food grain production & equally rising industrial production.

However, the next three years proved a great disappointment with:

i) successive failure of monsoons.
ii) decline in food grain production.
iii) failure on the industrial front due to power breakdowns, load shedding, transport bottlenecks, industrial unrest etc.

These all led to exorbitant & alarming levels of price rise [10% in 72-73 & 24% in 1973-74].

* Additional burden of the huge influx of refugees from Bangladesh & Indo-Pak War of 1972.

* The 4th Plan achieved a growth rate of only 3.4% growth instead of target rate. In general, therefore, it was a complete failure.

5th Five Year Plan (1974-1979):

* introduced at the time when the country was reeling under a veritable economic crisis arising out of a run-away inflation, fuelled by the hike in oil prices since September, 1973, due to the proclamation of an oil embargo by the OAPEC (Organization of Arab Petroleum Exporting Countries, consisting of the Arab members of OPEC plus Egypt, Syria & Tunisia), and failure of the Govt. take-over of whole-sale trade in wheat. (27% inflation).

* the objectives included:
  - 'Garibi Hatao' or removal of poverty
  - growth with social justice.
  - attainment of self reliance.

* However, the scenario became that of a 'stagflation', a dangerous combination of stagnation & inflation.

* the anarchy & increasing unrest led to declaration of a state of Emergency (26 June 1975) & the relegation of the 5 year plan to the background.

* After the termination of emergency, the Indian General Elections of 1977 rained the Janata Party to power. For the first time in history, the Congress lost its rule & Morarji Desai became the first non-Congress Prime Minister of India. With Chowdhary Charan Singh as the Finance Minister, the newly formed Govt. terminated the Fifth Plan in 1978.

It was felt that the Five Year Plan system & approach was not beneficial to the extent it was meant to. & hence, the concept of Rolling Plan was adopted.

An approach where a five-year plan is drafted out, every year. In this way, the ever changing scenarios, needs of the economy could be met. & at the same time, without compromising the focus on long term effects. It can be visualised as a 'continuous' plan that 'rolls over' the other, thereby providing the space for flexibility & change.

Thus, the Janata Party led Govt. formulated a Rolling Plan in 1978, for the period 1978-1982. & in 1979, it formed another 5 year plan from 1979-1983 that got superimposed over the former.

However, in 1979 elections, the Janata Party lost & power was back in the hands of the Congress, which abolished the concept of 'Rolling Plan'.

In this period of drastic changes, however, we achieved a growth rate of 5.0%, higher than the targeted growth.

6th Five Year Plan (1980-1985):

The 6th plan, marked the beginning of economic liberalization. Price controls were lifted. This led to an increase in cost of living & moderate increase in food prices. Family Planning was also expanded in order to prevent overpopulation.

As predicted, the steps taken proved to be fruitful, & the 6th plan proved to be successful. The Target was 5.2% & we achieved a rate of 5.4% respectively.

7th Five Year Plan (1985-1990):

It sought to emphasise policies & programmes which would

(i) accelerate growth in foodgrains production.

(ii) increase employment opportunities & raise productivity.

(iii) improve industrial productivity by technological upgradation.

Thus, the focus of 7th Plan was on "Food, Work & Productivity".

* The 7th plan was a great success. We witnessed a creditable annual rate of growth of 5.7% as against the average of 3.5% in the previous plans. The Indian Economy, finally crossed ~~what~~ the barrier of what Professor Raj Krishna called sarcastically, "the Hindu Rate of Growth".

Economic Reform in India

Most of the us might have read in earlier classes in schools
out the massive reforms or 'changes' that took place in the 1990s.
it is not that such changes were dramatic or one of a
'. There were several attempts earlier, & some of them are
isted below:

lier attempts:

post independence, reforms in the agricultural sector, land reforms such
abolition of zamindari system, tenancy reforms, regulation on the
ize of holdings.

few Industrial Policies in 1948, 1956, 1980 and continuous amendments
the same.

st attempt to liberalize economy in 1966. It was reversed in 1967
a stronger version of socialism was adopted.

econd major attempt was in 1985 by Prime Minister Rajiv Gandhi.
he process came to a halt in 1987, but 1966 type reversal did not
ake place.

he remarkable characteristics of the Indian Economy:

In the pre-reform period, policies always tended towards protectionism,
th a strong emphasis on import substitution, industrialisation under
te monitoring, state intervention at the micro level in all
inesses especially in labour and financial markets, a large public
tor, business regulation and central planning.

ost of the industries remained nationalised.

laborate licenses, regulations and the accompanying red tape, commonly
ferred to as License Raj, were required to set up business in India
tween 1947 and 1980.

Necessity of the New Economic Policy :

India started having balance of payments problems since 1985, and by the end of 1990, it was on the verge of a serious economic crisis.

* The nation's external debt had tripled to $69.3 billion, and the Govt was close to default.
* Severe foreign exchange crisis and the reserves had fallen to almost $1 billion.
* Inflationary pressure stood at 17%.
* fiscal deficit was very high and had become unsustainable.
* loss of faith on Indian economy by the foreign investors led to even more acute financial shortage.
* decline in the share of world trade.
* rising problem of unemployment.

With all these bottlenecks closing in, along with their economic compulsions the call for a complete overhauling of our economic policies and programs was inevitable.

New Economic Policy of 1991 :

This broadly refers to the series of reforms undertaken, aimed at making the economy more efficient. Following the recommendation of the IMF and World Bank, Narasimha Rao Government (1991-1996) introduced a series of monetary, fiscal and trade policy reforms in the Indian economy. Dr. Manmohan Singh, the then Finance Minister announced the free market reforms popularly known as LPG model, aimed at making the Indian economy a fast growing, globally competitive economy that brought us back from a 'nearly bankrupt nation' to a 'growing one'.

Monetary Policy:

The process by which the monetary authority of a country controls the supply of money, often targeting a rate of interest for the purpose of promoting economic growth & stability. The objectives usually include relatively stable prices and low employment. In general.

Monetary Policy

Expansionary

- increases the total supply of money in the economy more rapidly than usual.
- used to try to combat unemployment in a recession by lowering interest rates in the hope that easy credit will entice businesses into expanding.

Contractionary

- → an expansionary policy that expands the money supply more slowly than usual or even shrinks it!
- → used to slow down inflation in order to avoid the resulting distortions and deterioratrons of asset values.

Thus, in general, control of { i) supply of money. ii) demand or requirement of money. iii) cost of money or rate of interest } is achieved.

monetary policy uses several tools to control both of these, to influence economic outcomes such as economic growth, inflation, exchange rates with other currencies & unemployment. Some of these tools are:

Monetary Base: Central Bank uses open market operations to change the size of the monetary base. The central bank buys or sells reserve assets (usually financial instruments such as bonds) in exchange for money on deposit at the central bank, which can be converted to currency if required.

Reserve requirements: changing the proportion of total assets that banks must hold in reserve with the central bank, helps in regulation. Banks only maintain a small portion of their assets as cash available for immediate withdrawal; the rest is invested in illiquid assets like mortgages and loans. By changing the proportion of total assets to be held as liquid cash, the Central Bank changes the availability of loanable funds, which in turn, indirectly, acts as a controlling factor of money supply.

Discount Window lending: Central Bank offers a discount window, where commercial banks can borrow reserves to meet temporary shortages of liquidity caused by internal or external disruptions. This creates a stable financial environment, allowing the growth of the economy as a whole.

Interest Rates: The monetary authority is able to mandate specific interest rates on loans, savings account and other financial assets. By raising the rates, the monetary authority contracts the money supply, because higher interest rates encourage savings and discourage borrowing. Both of these effects reduce the size of money supply.

d.

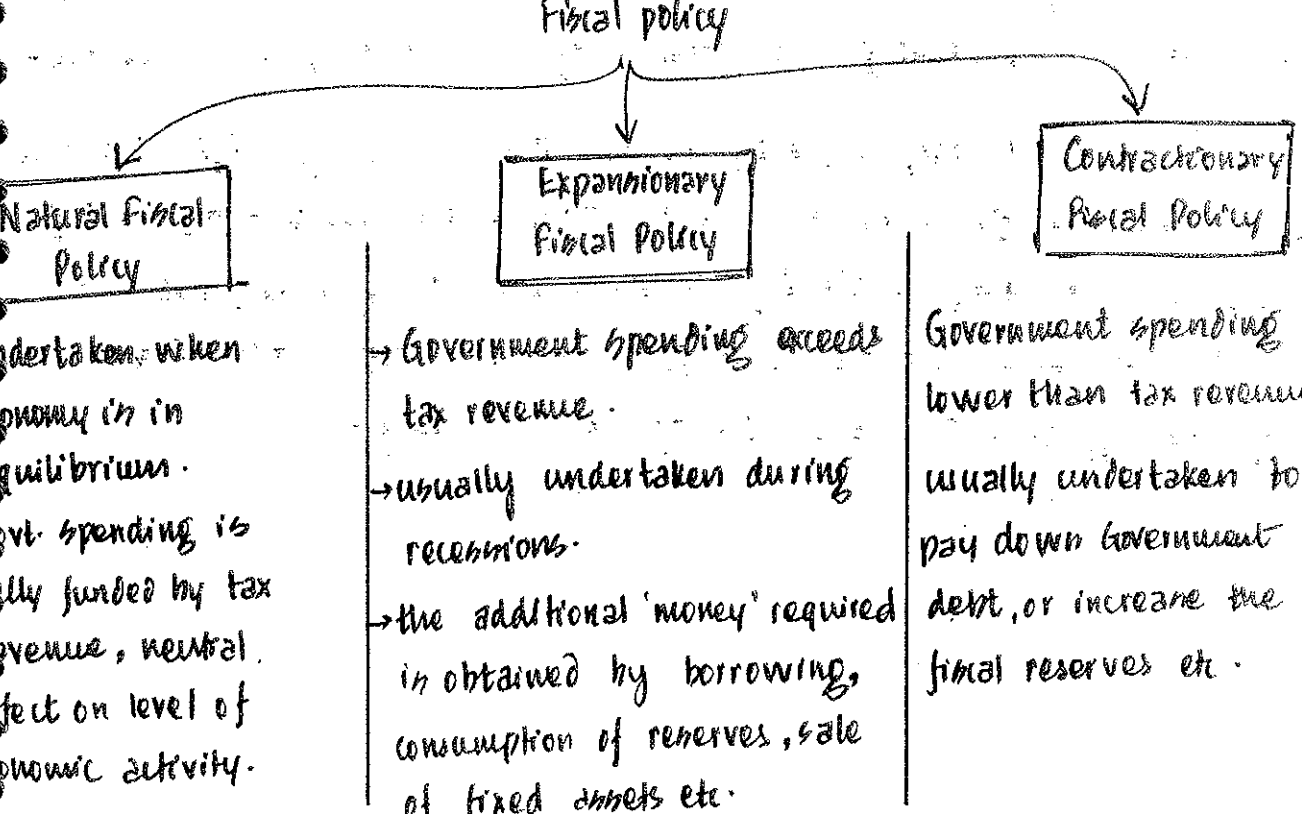
Fiscal Policy:

It refers to the use of government revenue collection (taxation) and expenditure (spending) to influence the economy. Thus, changes in the level taxation and government spending in various sectors affects the following variables in an economy:

i.) aggregate demand and the level of economic activity.

ii) distribution of income.

iii) pattern of resource allocation within the Government sector and relative to the private sector.



→ The best strategy is to increase Govt. spending and decrease tax rates to stimulate aggregate demand, and then, decrease spending & increase tax rates after the onset of economic boom.

In times of recession or low economic activity, such a strategy would build the framework for strong economic growth, work towards full employment, & the resulting deficits would be paid for by an expanded economy during the boom that would follow.

→ In addition, government can use the budget surplus to do things:

* slow the pace of strong economic growth.
* stabilize the prices when inflation is too high.

Commercial Policy:

It refers to the trade policy, or a set of rules and regulations with respect to trade and business transactions, with an objective, such as

i) to appreciate trade with other nations.

ii) to protect the domestic market prevailing in the country.

iii) to increase the export which will help in expanding the domestic market.

iv) to prevent import of certain goods for giving protection to infant industries or developing key industry or saving foreign exchange etc.

v) to encourage import of capital goods for speeding up the economic development of the country.

vi) to avoid unfavourable balance of payments.

vii) to assist or prevent the export or import of goods and services for achieving the desired rate of exchange.

viii) to enter into trade agreements with foreign nations for stabilising foreign trade.

Components of New Economic Policy:

Liberalisation, Privatisation and Globalisation.

* integrating the Indian economy with the world economy.
* Financial stability.
* Short term goals (immediate stabilisation)
  - → correcting the disequilibrium in foreign exchange market through demand reduction.
  - → reform in trade policy.
  - → reduction in fiscal deficit.
  - → dismantling the barriers to permit free flow of capital.
* Medium term goals and adjustments
  - → fixed exchange rate to be maintained.
  - → well suited monetary, fiscal and trade policies.
  - → higher growth rate.

* The three tools with which all these aspects, ideas, goals were associated are- Liberalisation (L), Globalisation (G) & Privatisation (P).

Liberalisation: Except 18 industries relating to security, strategic and social concerns, all industrial licensing was abolished. Subsequently the list was reduced to just five, including alcohol, cigarettes, electronics, industrial explosives and hazardous chemicals.

Several amendments in the Monopolistic and Restrictive Trade Practices Act, 1969 (MRTP Act) were made, aiming to 'open up' the market.

Privatisation: Disinvestment (selling of Govt. equity partially or wholly to private parties), mergers and acquisitions of public sector, thereby allowing private sector to play a major role in the upliftment of the economy. Now, only 3 ~~sectors are~~ industries are reserved for public sector — defence, atomic energy and railway transport.

Globalisation:

* devaluation of Indian currency by 18-19% against the major currencies in the international foreign exchange market.
* removal of restriction on Foreign Direct Investment (FDI), thus promoting free movement of capital among different countries.
* encouraging outsourcing and free flow of technology.

Measures of National Income and Output

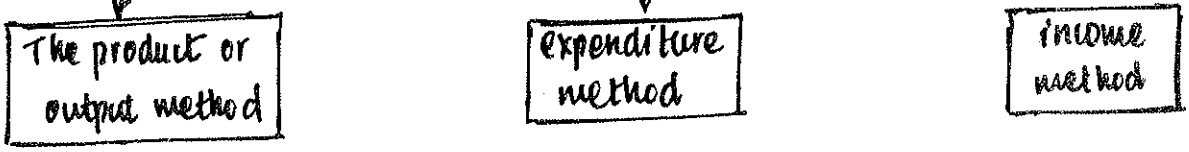
A variety of measures of national income and output are used in economics to estimate total economic activity in a country or region, including Gross Domestic Product (GDP), Gross National Product (GNP), Net National Income (NNI). However, all these parameters have one thing in common. All are specially concerned with "measuring the total amount of goods and services produced within some "boundary"". This 'boundary' usually defined by 'geography' or 'citizenship', and may also restrict the goods and services that are counted.

In order to count a good or service, it is necessary to assign value to it.

→ The value that the measures of national income assign to a good or service is its market value — the price it fetches when bought or sold.

→ The actual usefulness of a product (its use value) is not measured — assuming the use-value to be any different from its market value

Three strategies have been used to obtain the market values of all the goods and services produced.



The Output Approach:

* focuses on finding the total output of a nation by directly finding the total value of all goods and services a nation produces.

* Because of the complication involved in the 'multiple' stages of production of a good or service, only the final value of a good or service is included in the total output.

* an issue often called 'double counting', wherein the total

value of a good is included several times in national output, by counting it repeatedly in several stages of production.

EXAMPLE:

In the example of meat production, the value of the good from the farm-farm may be ₹10, then ₹20 from the butchers, and then ₹60 from the supermarket.

The value that should be included in final national output should be ₹60, and not the sum of all those numbers, ₹90. The values added at each stage of production over the previous stage are respectively ₹10, ₹20 and ₹30. Their sum gives an alternative way of calculating the value of final output.

Mathematically,

GDP at market price = value of output in an economy in the particular year − intermediate consumption

NNP at factor cost = GDP at market price − depreciation + NFIA (Net Factor Income from Abroad) − net indirect taxes

The Income Approach:

* equates the total output of a nation to the total factor income received by residents or citizens of the nation. The main types of factor income are −

→ Employee compensation (cost of fringe benefits, including unemployment, health & retirement benefits).

→ interest received net of interest paid.

→ Rental income (use of real estate) net expenses of landlords.

→ Royalties paid for the use of intellectual property and extractable

All remaining value added generated by firms is called the residual profit. If a firm has stockholders, they own the residual, some which they receive as dividends. Profit includes income of the entrepreneur — the businessman who combines factor inputs to produce good or service.

NDP at factor cost	=	Compensation of employees	+ Net interest	+ Rental & Royalty Income	+ Profit of incorporated & unincorporated	NDP at factor cost

The Expenditure Approach:

focuses on finding the total output of a nation by finding the total amount of money spent.

It seems an idea legit enough because the total value of all goods is equal to the total amount of money spent on goods.

$$GDP = C + I + G + (X - M)$$

C : household or personal consumption expenditures.

I = industrial investment in capital projects.

G : net Government spending or expenditures.

X : Gross exports of goods and services. } (X-M) : Net exports

M : Gross imports of goods and services. }

Definitions:

The names of the measures consist of one of the words "Gross" or "Net", followed by one of the words "National" or "Domestic", followed by one of the words "Product", "Income" or "Expenditure". Each of these terms can be explained separately.

Gross: means total product, regardless of the use to which it is subsequently put.

Net: means "Gross" minus the amount that must be used to offset depreciation. It gives an indication of how much product is actually available for consumption or new investment.

Domestic: means the boundary is geographical: we are counting all goods and services produced ~~by the nationals of the country~~ within the country's borders, regardless of by whom.

National: means the boundary is defined by citizenship (nationality). We count all goods and services produced by the nationals of the country (or businesses owned by them) regardless of where that production physically takes place.

For instance, the output of a Japanese-owned vehicle factory in India counts as part of the Domestic figures of India, but the ~~Japanese~~ National figures of Japan.

Product, Income & Expenditure refer to the three counting methodologies explained earlier.

Product is the general term, often used when any of the three approaches was actually used.

Income specifically means that the income approach was used.

Expenditure specifically means that the expenditure approach was used.

All three counting methods should in theory, give the same final figure. However, in practice minor differences are obtained from the three methods for several reasons, including changes in inventory levels and errors in statistics.

One problem for instance is that goods in inventory have been produced

Expenditure).

Similarly timing issues can also cause a slight discrepancy between the value of goods produced (Product) and the payments to the factors that produced the goods (Income), particularly if inputs are purchased on credit, and also because wages are collected often after a period of production.

GDP deflator:

Consider a simple small economy in which only bread and butter are the two final products produced and sold. The data is as shown:

	Price in 2011	Quantity in 2011	$P_i \times Q_i$
Bread	₹ 3	100	₹ 300
Butter	₹ 2	50	₹ 100
			₹ 400 ← GDP_{2011}

	Price in 2012	Quantity in 2012	$P_i \times Q_i$
Bread	₹ 4	125	₹ 500
Butter	₹ 2.50	60	₹ 150
			₹ 650 ← GDP_{2012}

Now, % change in GDP = $\frac{650 - 400}{400} \times 100\% = 62.5\%$

However, does this value actually denote economic growth or industrial prowess or better productivity?

The answer is 'no', because this 'increase in GDP' is a result of increase in prices in 2012, compared to 2011, and partly due to increase in quantity or output.

Thus, somehow, we need to 'isolate' the 'price effect' & 'output effect'

We assume a representative year called Base Year and all other years data are to be compared with respect to this year. Now, we define two terms.

Nominal GDP: $\sum_{i=1}^{n} (P_{i\,current} \times Q_{i\,current})$

The GDP calculated using the current market prices & quantities.

Real GDP: $\sum_{i=1}^{n} (P_{i\,Base} \times Q_{i\,current})$

The GDP calculated using the prices of the 'base year' & current quantities. This is erstwhile termed as constant rupee GDP, because this value of GDP will not be affected by change of prices (because the base year's price is used for calculation).

(Base Year = 2011)

Final Good	2011 Price	2011 Quantity	2012 Price	2012 Quantity	Nominal GDP Contribution		Real GDP Contribution	
					2011	2012	2011	2012
Bread	₹ 3	100	₹ 4	125	₹ 300	₹ 500	₹ 300	₹ 375
Butter	₹ 2	50	₹ 2·50	60	₹ 100	₹ 150	₹ 100	₹ 120
					₹ 400	₹ 650	₹ 400	₹ 495

* In base year, Nominal GDP = Real GDP.

* As seen above, Nominal GDP in 2012 is greater than real GDP of 2012.

* In 2012,

% change in Nominal GDP = $\frac{650-400}{400}$ = 62·5 %

% change in Real GDP = $\frac{495-400}{400}$ = 23·75 %

Now, we define GDP Deflator as

$$\text{GDP Deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100\%$$

Sometimes, economists want to focus on what happens to an aggregate level of prices from one year to other. Here, they use GDP deflator as follows:

Nominal GDP = $P \times Y$ → P: some measure of aggregate price level; Y: real output

Real GDP = Y

Then, we get GDP Deflator = $\frac{P \times Y}{Y} \times 100\ \%$

or $\boxed{\text{GDP Deflator} = P \times 100}$

Conversely, $P = \frac{\text{GDP deflator}}{100}$

We can use the GDP numbers calculated in the previous example to think about GDP deflator.

Nominal GDP		Real GDP		GDP Deflator	
2011	2012	2011	2012	2011	2012
₹400	₹650	₹400	₹495	100	131

As Nominal GDP = Real GDP in Base Year, the Base Year's GDP deflator will always be 100!

Now, if we are thinking about GDP deflator as an index of aggregate price level, then, bigger levels of GDP deflator means prices are increasing in the average. Similarly, a smaller number than that of base year, would imply diminishing prices.

* Thus, as its name suggests, the GDP deflator is used to take the inflation out of GDP, i.e., to deflate the GDP. Hence,

$$\text{Real GDP} = \frac{\text{Nominal GDP}}{\text{GDP deflator}} \times 100$$

Also,

$$\text{Inflation from year 1 to year 2} = \text{\% change in GDP deflator} = \frac{\text{GDP Deflator}_{\text{year 2}} - \text{GDP Deflator}_{\text{year 1}}}{\text{GDP Deflator}_{\text{year 1}}}$$

Using the example we have been working with.

$$\text{Inflation from 2011 to 2012} = \frac{131 - 100}{100} \times 100 = \underline{\underline{31\%}}$$

Can National Income measures, as mentioned earlier, be used to estimate the economic growth of a country?

The absolute increase in GDP is not an indicative of economic growth, because the effect of inflation creeps in. However, by applying GDP deflator & other such tools, can one say that the changes in inflation-adjusted terms be used to indicate 'economic growth'?

Consider an instance when real GDP grows by say, 2% but population of the country grows by 3%. Then, obviously, the economic growth & its effects are buffered & over-compensated by boom in population.

So, now, to rectify & filter, this effect, one can say that we use per capita GDP as a measure of growth.

$$\text{Per Capita GDP} = \frac{\text{GDP}}{\text{Total Population}}$$

We can say that the annual percent change of per capita GDP is good enough to measure economic growth.

But then again, do these theoretical numbers, actually, measure development and welfare? Establishment of massive industries, huge capital investments can boost the GDP, but do they reflect the standard of living & economic health of a nation? Definitely not. In fact, they cannot comment on the extent of inequality in the distribution of assets and accessibility of resources.

Also,

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Hence other measures such as Human Development Index, Mortality rates, literacy rates, etc have to be used to measure the development in economic welfare of the people.

To quote Prof. Amartya Sen, "though economic growth is one desirable aspect of the process of economic development, it however, would not be misunderstood as the sufficient condition, it is just necessary plausibility, more of a pre-requisite."

One might think this as the end of the story. But is it? The way we world is zeroing in to the inescapable fact of ever-depleting resources, the thought & concept of economic sustainability or sustainable development is of increasing importance.

INCOME DETERMINATION & FLUCTUATIONS

Before we get into hardcore economics, in view of the present economic perspective of the globe as a whole, let us learn a few basic points first.

Nowadays, there is quite a hype and talk about recession. So let us throw some light on it.

Recession:

Description: It is a business cycle contraction, a general slowdown in economic activity. ~~Macrono~~ Macroeconomic indicators such as GDP, employment, investment spending, capacity utilization, household income, business profits fall, while bankruptcies and unemployment rate rise.

Reasons:

Generally occur when there is a widespread drop in spending (an adverse demand shock). This may be triggered by various events, such as financial crisis, an external trade shock, an adverse supply shock or the bursting of an economic bubble.

Counter Measures:

Governments usually respond to recessions by adopting expansionary macroeconomic policies, such as increasing money supply, increasing government spending, decreasing taxation and rendering out "bail-out" packages.

Definition:

"a period of two down consecutive quarters of GDP."

"a significant decline in economic activity spread across the

PI: In a first rate overview, it may seem that recession, more depression. But, it is NOT so. There are often many instances where recession occurs with a marginal variation, rather than depression.

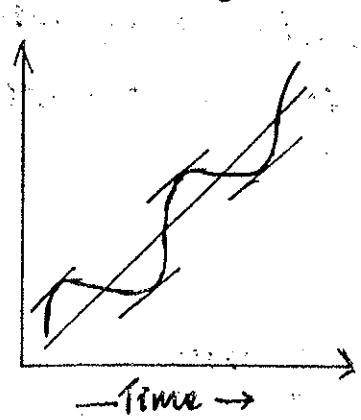
IE: The terms recession and depression are not synonymous. If a recession continues for a longer period, say, about more than a years, then it is referred to as a depression.

If we are to speak in terms of Demand and supply, then, if Aggregate Demand falls short of Aggregate Supply, the economy is said to be in recession.

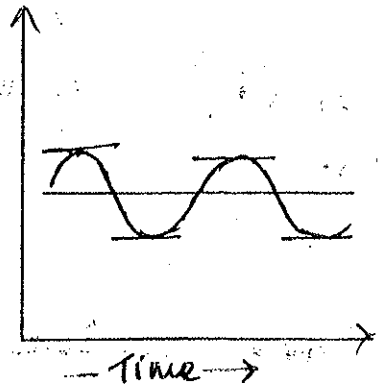
) AD equals AS, then the economy is in equilibrium, or, in other words equilibrium income is said to have been attained.

:) AD is greater than AS, then the economy is said to be in prosperity.

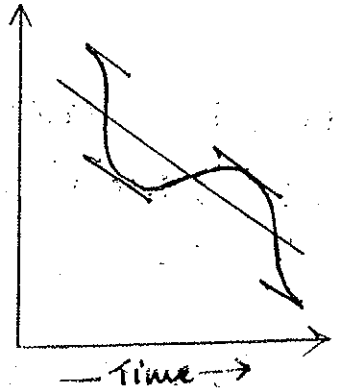
PI: If we plot any macroeconomic parameter of an economy versus time, we will see that an economy moves in a spiral, it never moves straight.



Trendline of a progressing economy in the long run



Trendline of a stagnant economy



Trendline of a receding economy in the long run

The sketches tell us an important thing. A progressing economy (indicative in the long run) is not actually 'growing' all the time. As is shown, it grows, reaches a ceiling and then has a phase of regression and then after a lower ceiling, it exhibits growth again.

The Great Depression of the 1930s, was a setback for many. But, another way of viewing it, would be that it had a bright side. It broke the ice and paved the way for, what is known as Keynesian economics that became the harbinger that brought us out of the Great Depression. It challenged and questioned, the then existent and predominant theories of Classical Economics and the glowing except briefly encapsulates the ideologies behind both of them.

Keynesian Economics:

The macroeconomic school of thought based on ideas of 20th-century economist John Maynard Keynes. Keynesian economists believe that, in the short run, productive activity is influenced by aggregate demand and that aggregate demand is not necessarily equal to aggregate supply. Instead, it is influenced by a host of factors and sometimes behaves erratically, affecting production, employment and inflation.

Advocates of Keynesian economics argue that private sector decisions sometimes lead to inefficient macroeconomic outcomes which require active policy responses by the public sector, particularly monetary policy actions by the central bank and fiscal policy actions by the government to stabilize output over the business cycle.

...ines, was the result of a structural inadequacy in the ...nomic system. He argued that because there was no ... ...et the goods that individuals produce would be met with ...nand, unemployment was an obvious consequence.

Keynesian economics therefore, advocates a mixed economy, with ...ole for Government intervention during recessions and this ...roach was the most significant and fruitful in curing Great Depression.

Classical Economics:

The first modern school of economic thought. Its major ...elopers include Adam Smith, Jean-Baptiste Say, David Ricardo, ...mas Malthus & John Stuart Mill.

Classical economists claimed that free markets regulate ...mselves, even if they are free of any intervention. Adam Smith ...erred to as so-called 'invisible hand', which will move markets ...ards their natural equilibrium, without requiring any outside ...ervention.

The striking point of this school of thought was a laissez-...ire (French for "let them do" or "let it be" or "let them do as they ...ll") economic environment in which private parties are free ...om tariffs, government subsidies, with only enough regulations ...fficient to protect property rights against theft and aggression.

Before we delve into deeper concepts like equilibrium income, and all we should understand that to understand Keynessian economics, we need to know the entire output of an economy, i.e. the output of a nation, say. The total output (Y) can be expressed mathematically as:

can be considered as the GDP by expenditure approach.

$$Y = C + I + G + (X - M)$$

C: Consumer spending. It consists of private (household final consumption expenditure) in the economy. They can include durable goods, non-durable goods and services. Examples include food, gasoline, FMCG, & medical expenses and all. It is normally the largest GDP component in the economy.

I: includes industrial investment in capital projects. Examples include construction of a new mine, purchase of software, equipment for a factory and all. Spending by households (not Govt.) on new homes is also included in here. However, it does not include purchases of financial products such as bonds, shares, mutual funds, saving certificates etc.

G: "Govt. spending" is the sum of government expenditures on final goods and services. It includes salaries of public servants, purchase of weapons for the military and any investment expenditure by the Govt.

X: Exports represents the Gross Exports.

M: Imports represents the Gross Imports. This is subtracted, since imported goods will be included in the terms G, I or C, and must

Under conditions of equilibrium, if we assume that the entire income of the economy was equal to the market value of all officially recognized final goods and services produced within a country in a given period of time, then, as GDP calculated earlier, would equal the net income (Y).

In practical cases, it is observed that C and I are relatively larger and more important, compared to other factors. Hence, as a generalized, limiting case for analysis, we presume

$$Y = C + I$$

Consumption Spending:

What determines the aggregate amount of goods purchased by consumers in any time period? In the elementary Keynesian model, the real income of households is the answer.

A rise in real income will lead households to increase the amount of goods purchased and vice versa.

Therefore, though there are other factors and determinants of real consumer spending, here, the assumption is that the aggregate amount of consumer goods purchased or the aggregate amount of real consumer spending is determined exclusively by the real disposable personal income.

The Consumption Function:

To consider how consumption varies with disposable income, we may begin by thinking that consumption expenditures vary directly with disposable income. By how

Keynes' Fundamental Psychological Law:

"Men are disposed, as a rule and on the average, to increase their consumption as their income increases, but not by as much as the increase in their income."

In other words, as income increases, consumers will spend part but not by as much as the increase in their income. Therefore, the total increase in income will be accounted for by the sum of the increase in consumption expenditures & the increase in personal savings, if we simplify by assuming that all consumer income goes into these two uses. Thus, to analyse mathematically, we need to devise two mathematical functions, the consumption function and a saving function.

The consumption function is used to calculate the amount of total consumption in an economy.

- autonomous consumption → not influenced by current income
- induced consumption → influenced by the economy's income level.

Thus, the simple consumption function can be written as:

$$C = a + bY_d$$

where,

C = total consumption (or: absolute consumption)

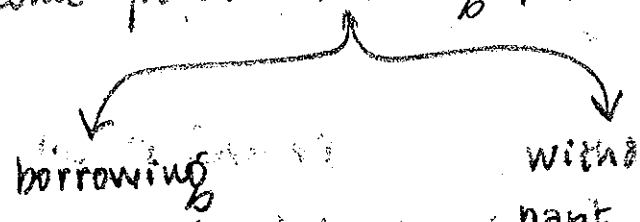
a = autonomous consumption

bY_d together, regarded as the induced consumption

Y_d = disposable personal income

We notice that 'a' is the autonomous consumption and $C = a$, when Y_d is zero, i.e. autonomous consumption is the consumption made at zero level of disposable income. This is a positive term.

The concept of autonomous consumption should not seem like alien or strange. Suppose a man loses his job today & henceforth, being jobless, his net disposable income becomes zero. Therefore, he may not go to shopping malls or restaurants (gives the notion of consumption that depends on income), but however, to just live, he will consume food. He will have basic needs and expenses. This is 'autonomous consumption'. From where does it come from? Dis-savings, is the answer!



Y	0	40	80	120	160
C	20	50	80	110	140
S	-20	-10	0	10	20

This is a schedule of a certain individual, say, of his net disposable income Y, his total consumption C and his total savings S, for say, different periods of time.

As stated earlier in our assumption, that a consumer's entire income goes into two uses — consumption or savings. This can be verified at every point in the schedule that $Y = C + S$ ↔ simply says, "all that is not consumed, is

Now, if we plot the relation $C = a + bY_d$, between C & Y, we will get a linear relationship with 'a' as a vertical intercept. Further analysis will show that 'b' is the slope of the curve.

Thus, $b = \frac{dC}{dY}$ → this defines 'b' as the "change in consumption from unit change in income"

This is otherwise called the Marginal Propensity to Consume or MPC.

We now define another ratio called Average Propensity to Consume or APC. It equals the ratio C/Y for different levels of Y.

Properties of The Keynesian Consumption Function:

i) Keynesian economics is 'short-run' economics. Thus, over a short run, MPC is constant. The implication of this is the fact that it maintains the relationship between C and Y linear.

ii) Value of the MPC is in the range : $0 < MPC < 1$

$MPC = 0 \Rightarrow$ nil consumption, all savings } LIMITING CASES
$MPC = 1 \Rightarrow$ all consumed, no savings } NOT POSSIBLE

iii) a higher MPC is an indicative of a good or progressing economy that has not saturated yet.

iv) the APC is infinity at zero level of income & then declines, but remains above MPC, i.e. APC > MPC.

The General equation for APC can be written as

Now, before we proceed further with saving function, we need a little bit and throw light on Keynes hypotheses. We have already mentioned Keynes Fundamental Psychological law. Then, Keynes argued that a smaller proportion of income will be consumed (or a larger proportion of income will be saved) as income increases.

If this is true, not only will the absolute amount of saving increase with increase in income, but the ratio of saving to income will become greater with increase in income.

Keynes felt that this was to be expected, because despite the fact that "the satisfaction of the immediate primary needs of a man and his family is usually a stronger motive than the motives toward accumulation" the latter "acquire effective sway when a margin of comfort has been established."

The Saving Function:

It is the counterpart of consumption function. It is clear from the fact that $Y = C + S$, i.e., all that is not consumed is saved. The saving counterpart to the APC is the average propensity to save or the APS. It is defined mathematically as

$$APS = \frac{S}{Y}$$

We have assumed $Y = C + S$.

Dividing throughout by Y, we get

$$\frac{C}{Y} + \frac{S}{Y} = 1, \text{ or } \boxed{APC + APS = 1}$$

There is also a saving counterpart to the MPC. It is called the

$Y = C + S$. Now, because ΔY must be devoted to either ΔC or ΔS, the two ratios $\Delta C/\Delta Y$ and $\Delta S/\Delta Y$ must add up to 1. Thus,

$$MPC + MPS = 1$$

* Furthermore, if the APC decreases steadily as income rises, then the APS must increase steadily as income rises, because these two ratios must add up to 1 at all levels of income.

* If the APC is always greater than the MPC, it follows that the APS is always less than the MPS.

* Thus, the simple savings function can be written as:

$$S = -a + (1-b)Y$$

S = total or absolute savings

a = autonomous consumption, thus $(-a)$ represents the dis-savings that meet the basic needs & expenses of consumer, at zero level of income.

b = MPC, thus, $1-b$ = MPS

Y = disposable personal income.

Equilibrium Income & Output

We can define the equilibrium level of income as that one particular level at which aggregate spending just equals aggregate output.

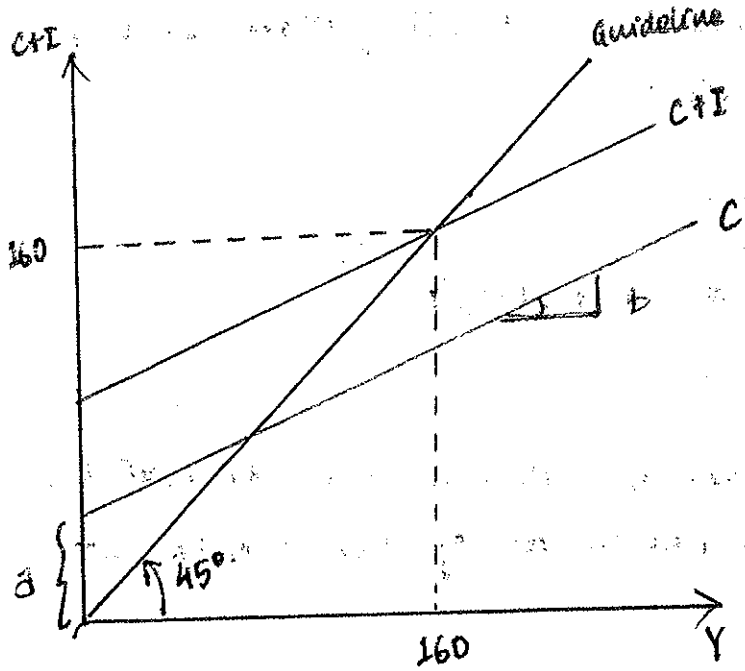
It may also be defined as that level of output at which planned savings equals planned investment.

The exact point may be obtained by solving the equations:

$Y = C + I$ $\quad C = a + bY$ $\quad I$ = constant

here all equations can be concisely framed into a statement:

Given that the rupee amount of income generated during a time period is equal to the rupee amount of goods and services produced during that time period, it follows that aggregate spending will have to be equal to that aggregate output of goods and services for the period if each ~~dollar~~ rupee of that period's income that is saved or not spent on consumption is matched by a rupee spent on investment."



Hypothetically, say

$Y = C + I$

$C = 20 + \left(\frac{3}{4}\right) Y$

& $I = 20$

Solving this, we get that equilibrium income is 160.

Disequilibrium Income & Output

In the case above shown, suppose the output is 200. With an output of 200, disposable income will also be 200. The consumption function indicates that the income receivers will now spend 170 on consumption. Adding planned investment of 20, we have an aggregate spending of 190 when output & income are 200. Aggregate spending is clearly insufficient to buy the amount of goods business people expect to ~~spend~~ sell.

At this level of output, there is also necessarily disequilibrium between planned saving and planned investment; planned saving is 30 and planned investment is still the unvarying 20.

The combination of an aggregate output of 200 and aggregate spending of 190 means, business as a whole finds its inventories of goods 10 greater than it had planned. Thus, business people will experience an unplanned or involuntary addition of 10 to inventories in each period.

Sooner or later, in order to get inventories down to a lower, desired level, business people will lay off workers & cut back output. This, in turn will cause income to fall as fast as output. Once output is reduced to 160, equilibrium will be restored; aggregate spending will equal aggregate output, & planned saving will equal planned investment.

Now, suppose output turns out to be only 120. Hence, disposable income would be 120; if income is 120, planned consumption will be 110. Assuming an unvarying 20 of planned investment, aggregate spending will be 110+20 or 130, 10 in excess of aggregate output at 120.

Thus, in each period during which output remains at 120 & spending at 130, there must be an unplanned decrease of 10 in inventories held by business people.

Sooner or later, in order to stop this unplanned drain of inventories, business people will hire more workers & expand output. If they raise output to the 160 level, equilibrium will be restored.

Investment - Planned Versus Realized:

Consider the 3 cases as mentioned in the earlier excerpt. $Y = 160$, $Y = 200$ and $Y = 120$. The Consumption Function can be $C = 20 + (\frac{3}{4})Y$, The saving function would be $S = -20 + (\frac{1}{4})Y$.

Case	Planned $C + S = Y = C + I$	Planned $S = I$	Realized $S \equiv I$
1	$140 + 20 = 160 = 140 + 20$	$20 = 20$	$20 = 20$
2	$170 + 30 = 200 > 170 + 20$	$30 > 20$	$30 = 30$
3	$110 + 10 = 120 < 110 + 20$	$10 < 20$	$10 = 10$

The data could also be explained as:

Case	Planned Investment	+	Unplanned Investment	=	Realized Investment	=	Realized Saving
1	20	+	0	=	20	=	20
2	20	+	10	=	30	=	30
3	20	+	(−10)	=	10	=	10

Unplanned Investment may be defined as the difference between realized investment & planned investment.

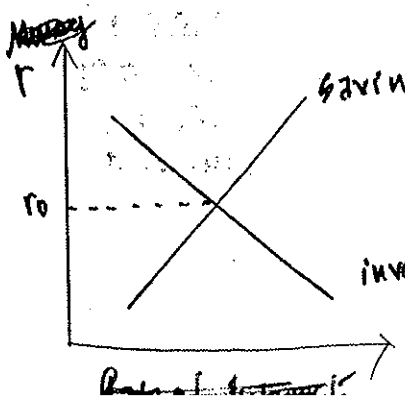
If there is any unplanned investment, planned investment will not equal realized investment & the economy will therefore be at a dis-equilibrium level of output

Key differences in Classical & Keynesian Economics:

While classical economics suggests that Consumption is driven by the market equilibrium of supply & demand & that the economy involuntarily moves towards equilibrium, such that there is no excess of output, no deficiency of products, operation at full employment & "all that is produced is demanded & vice-versa", Keynesian economics refers to consumption as a linear function of income with a vertical intercept.

Whilst ~~the~~ Classical Economics denies the presence or occurrence of unemployment, & thus recession, Keynesian economics overlays the fact that the MPC decreases, i.e., consumption does not increase at the same rate of increase in income, which, in turn exemplifies the fact that unless all that is saved is not invested, thus, leading to recession & unemployment. This supports and justifies the postulation that with increasing income, the chance of recession is also on a rise.

In classical economy, savings was considered a direct function of Rate of Interest, Investment is considered an inverse function of Rate of Interest & the intersection of the savings curve (implying "supply" of money) & the Investment Curve (implying "demand" for money) yields an equilibrium rate of interest. Due to probable reasons, if the rate of interest becomes greater than r_0, there is an excess supply of money (people tend to have more), but due to less demand by investors, subsequent competition among savers to get investors, the rate of interest comes



therefore pulls the rate of interest up. Thus hypothetically, it would be a stable equilibrium. ☆

However in the Keynesian approach, Savings is a function of income (as shown earlier). & Investment is a function of rate of interest, but ~~not~~ not Rate of Interest alone.

Keynesian Investment Function.

$$I = I(MEC, r)$$

- I → Investment Function
- MEC → Marginal Efficiency of Capital
- r → Rate of Interest

Marginal Efficiency of Capital is that rate of discount which matches the present value of the prospective yields with the initial amount of capital invested.

Mathematically,

$$\sum_{i}^{1} \frac{R_t}{(1+i)^t} - C_0 = 0 \quad \text{or} \quad \left[\frac{R_1}{(1+i)} + \frac{R_2}{(1+i)^2} + \frac{R_3}{(1+i)^3} + \cdots + \frac{R_n}{(1+i)^n}\right] - C_0 = 0$$

- $\left[\frac{R_1}{(1+i)} + \frac{R_2}{(1+i)^2} + \frac{R_3}{(1+i)^3} + \cdots + \frac{R_n}{(1+i)^n}\right]$ → present value of prospective yields
- C_0 → initial amount of capital invested

R_t = return or prospective yield in ~~th~~ t^{th} period

i = MEC.

One can & should plausibly ask, what is the need for MEC? or rather, isn't it plausible to say

The fact is, the value of money decreases with time! Inflation & Rate of Interest are bearers of the fact that the money value decreases in real time conditions. As simple examples, it can be seen that what we are able to purchase in ₹ 100/- today, the same commodity cannot be purchased with ₹ 100/- after, say, 2 years. At that time, we have to pay, say, ₹ 120/-. Thus, this means that the value of ₹ 100/- decreased over time.

Similarly, a value of ₹ 100/- stored in a bank account would become say ₹ 115/- after a year. Thus, in a year of time, the value of money decreased!

Hence, if we say $R_1 + R_2 t \dots R_n = C_0$, then we would be overestimating our returns or revenues. Therefore, the need for MEC arises.

MEC & It's significance:

For obvious reasons, profit margin drives business & companies. Thus, any company before making a capital investment, should analyse its profit ambitions. Therefore, companies carry out a study called Investment Project Appraisal before an actual capital investment.

→ Feasibility Study

→ Profitability Study

In the Profitability aspect, MEC is calculated. A company raises or will raise the desired initial amount of capital by floating bonds or stocks, that have a 'rate of interest' which can thus be said to be the 'rate of cost of raising capital'. Then, the Revenues of various periods are estimated keeping in view the [illegible] the MEC is calculated. If

Thus, Keynes exemplified the fact that in practicality, it is e MEC that determines Investment, & not rate of interest none (as stated in Classical Model).

eynesian Investment Function - It's Verisimilitude with Reality

To show that Keynesian Investment function resembles or ntains reality to a greater extent than Classical Investment unction, let us cite an example.

Neglecting the marginal fluctuations otherwise, the rate of terest is more or less same for all commercial banks cross all states of India. Then, each state should be similar n the eyes of Investors & Companies. In other words, the nvestors should be indifferent to investment opportunities various states, in accordance with Classical Theory. But, it observed that while states like Gujarat, Karnataka, Kerala Tamil Nadu form the haven for investment, other states ig behind and are not the choice of investors.

This anomaly, or perplexing paradox is justifiable by the ct that these states are capable of providing a higher MEC the investors. As higher MEC implies profitable returns, these rates become the first targets of investors!

This also explains the verisimilitude of Keynesian Investment unction with reality & reality based situations.

actors that determine MEC:

) Infrastructure
) Governance
iii) Labour Standard
iv) Locational Advantage (Ports, Roads, etc)

Sometimes in exam, a numerical problem might be asked in which the MEC has to be determined. For instance consider this question.

A manufacturing firm is considering an investment proposal. The project has an initial cost of ₹ 1,40,000/- It has a useful life of 4 years. The annual net returns for the project are given below. Estimate the marginal efficiency of capital for the project. If the cost of borrowing the capital is 8%, is the project worth investing?

Year	Net Returns (₹)
1	40,000
2	40,000
3	44,000
4	48,000

From theory & definition, we know that

$$\sum_{t=1}^{n} \frac{R_t}{(1+i)^t} - I_0 = 0$$

Let us apply the same. We get

$$\frac{40,000}{(1+i)} + \frac{40,000}{(1+i)^2} + \frac{44000}{(1+i)^3} + \frac{48,000}{(1+i)^4} - 1,40,000 = 0.$$

Clearly this will result in a 4th degree equation in i. It will become unseemingly complex if we try to solve it mathematically. Thus, only if the number of returns in the question is limited till 3, we will attempt to solve it mathematically, because we will need to just solve a third degree equation, which is easy enough.

→ There is another way of asking a question. There can be cases where the MEC is not asked by the examiner. The cost of raising the capital is given (interest rate) & it is asked if making the investment is feasible.

It should be remembered that MEC is that rate of discount which makes the NPV (Net Present Value) equal to zero. Therefore, in such cases, find out the NPV at the given rate of interest itself. If NPV is positive, it means that MEC has to be higher than interest rate, which implies

Cash Flow	DF@8%	DCF@8%	DF@9%	DCF@9%	DF@8.48%	DCF@8.48%
-1,40,000	1	-1,40,000	1	-1,40,000	1	-1,40,000
40,000	0.9259	37,036	0.9174	36,696	0.9218	36,872
40,000	0.8573	34,292	0.8417	33,668	0.8498	33,992
44,000	0.7938	34,927.20	0.7722	33,976.80	0.7833	34,465.20
48,000	0.7350	35280	0.7084	34,003.20	0.7221	34,660.80
		NPV: 1535.2		NPV: -1656		NPV: -10

PV@ 8% = 1535.20

PV@ 9% = -1656.00

nge in I% = change of 3191.20

start increasing rate from

, we have to increase to

ufy 1535.20 - so, change

uired = $\frac{1535.20}{3191.20} \times 1 = 0.48\%$

8 + 0.48 = (8.48%).

Discounting Factor = $\frac{1}{(1+i)^t}$, where

t = 0 to n

↓

no. of returns.

Discounted Cash Flow

To test our result, again NPV calculated at 8.48% came out to be -10 ~ 0 (almost nullified to zero).

Thus, within acceptable limits of error, it can be said that MEC = 8.48% → MEC > Rate of Interest. Hence investment is feasible.

Had the question not asked us to find MEC, it would have asked to check if investment was feasible. The NPV at given rate of interest (8%) came out to be positive. This meant that whatever the value of MEC be, it will be greater than 8%. Hence investment is feasible.

Had the NPV here at 8% been negative, the investment would not have been feasible.

Shifts in the Aggregate Spending Function and the Multiplier

In the two-sector economy, the aggregate spending function is the sum of the consumption function and the investment function. Mathematically,

$$\text{Aggregate Spending} = \underbrace{C + I}$$

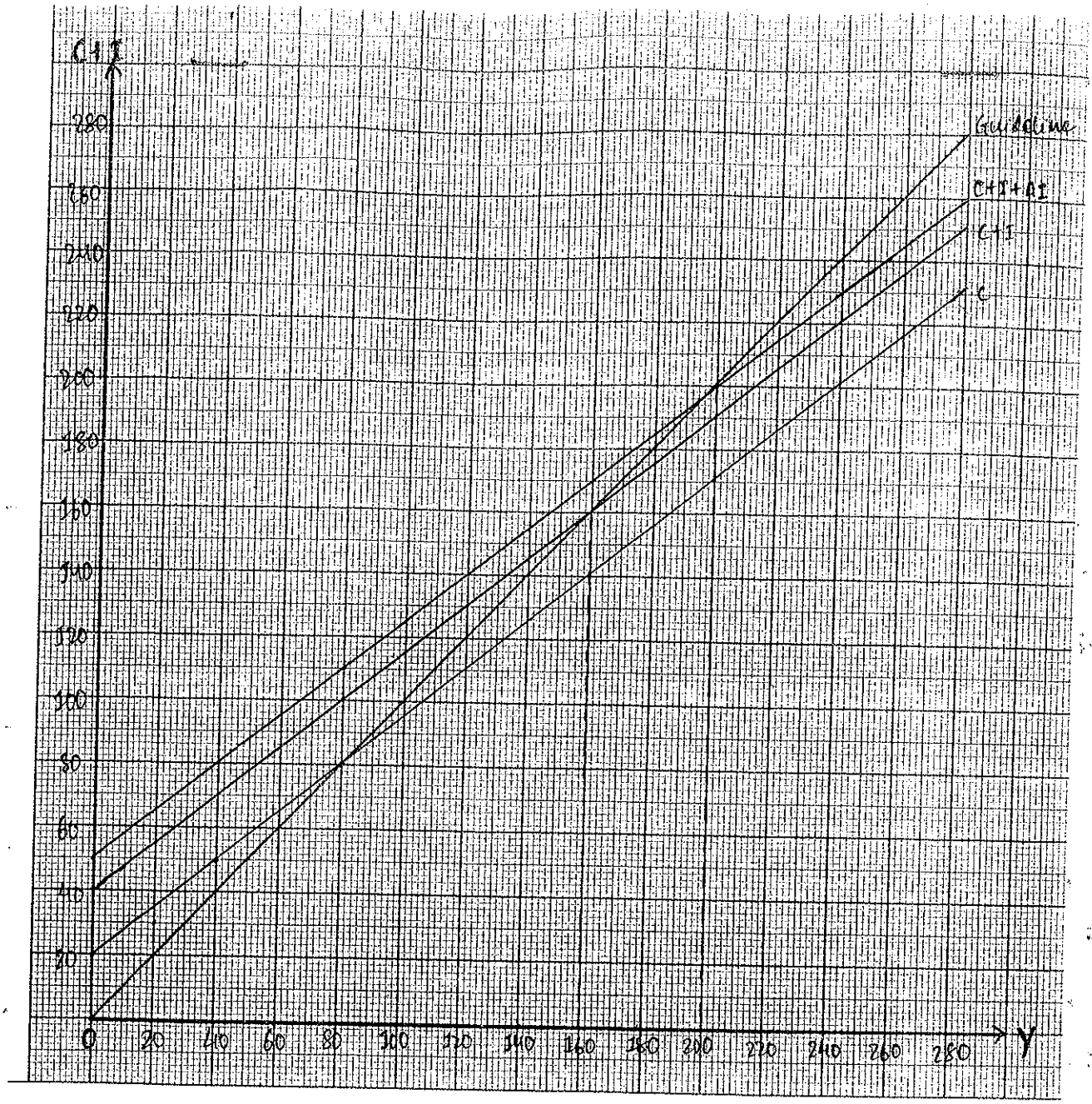
Although either or both of these functions can shift from one time period to the next, most observers agree that consumption function is relatively stable and the investment function is relatively unstable.

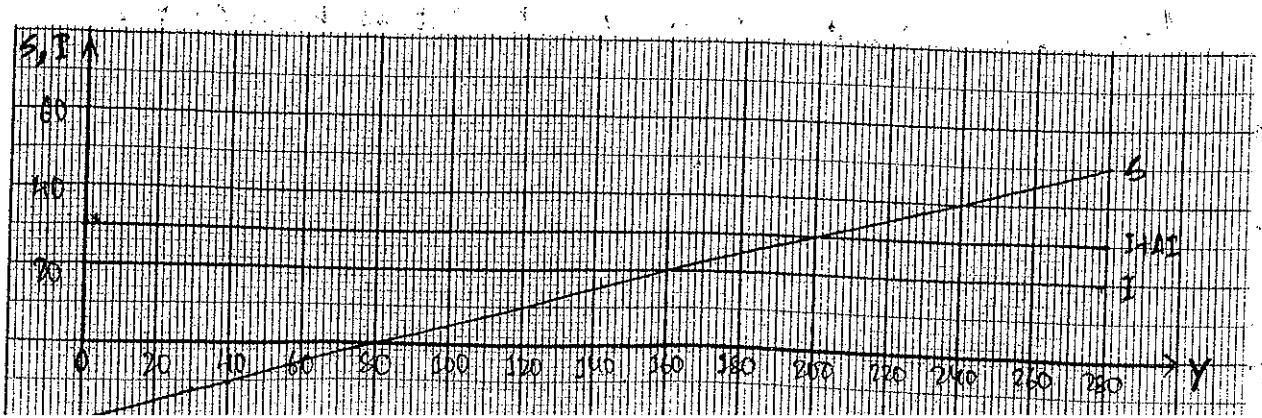
NOTE! → One here should clearly understand, the contextual meaning of the phrase "relatively stable". Consider a case, $C = 20 + \frac{3}{4}Y$. Here, C can only change as a result of change in Y. Thus, consumer expenditures are not stable, but under these circumstances, the consumption function is perfectly stable, i.e., C would not change without a change in Y. The values of the constants 20 or 3/4 do not change, thereby making C a stable function.

IMP! By now, it should be clear, that the entire C curve does not bounce up and down over the short run, & consequently, the S curve also does not bounce up & down over the short run!

* The (C+I) curve does fluctuate over the short run, but this is primarily due to instability of the investment component rather than in the consumption component.

Consider the same example, i.e., $C = 20 + \frac{3}{4}Y$, and $I = 20$ (this was used earlier). Now, suppose, due to an improvement in business expectations, investment expenditures rise permanently from 20 to 30


C, I
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
20 40 60 80 100 120 140 160 180 200 220 240 260 280
Y
Guideline
C+I+AI
C+I
C


S, I
60
40
20
0
20 40 60 80 100 120 140 160 180 200 220 240 260 280
Y
S
I+AI
I

To indicate the increase from 20 to 30 in investment expenditures, we add vertically 10 of additional investment to the curve C+I and thus new aggregate spending function C+I+ΔI.

With the aggregate spending function, C+I, the equilibrium level of output was 160. With the new aggregate spending function 10 higher than the old, a first hand overview might suggest that the new equilibrium level of output to be also 10 higher — an increase from 160 to 170. But 170 is not the new equilibrium level!

As is seen from the graph, at 170, aggregate spending exceeds aggregate output, and investment exceeds savings. The equilibrium level, must hence, be greater than 170.

The graph reveals that, with the higher aggregate spending function, aggregate spending and aggregate output are equal only at an output of 200. This is the effect of the multiplier, i.e., the increase of 10 in investment has raised the equilibrium level of income and output not merely by 10 but by 40!

Temporary Shift in the Aggregate Spending Function:

If the rise in investment is a temporary one, the corresponding rise in income and output will also be temporary. Thus, when investment drops back to its original level, income and output will also eventually drop back to their original level.

To trace the process that rolls into motion, by a temporary increase in investment spending, the time interval required for the system to re-establish equilibrium, is split into a series of shorter, numbered time periods.

C	+	I	+	ΔC	+	ΔI	=	Aggregate spending	≷	Aggregate Output	=	Y	+	ΔY	Realised Investment	Planned Investment
140	+	20	+	0·0	+	0	=	160	=	160	=	160	+	0·0	20·0	20
140	+	20	+	0·0	+	10	=	170	>	160	=	160	+	0·0	20·0	30
140	+	20	+	7·5	+	0	=	167·5	<	170	=	160	+	10·0	22·5	20
140	+	20	+	5·6	+	0	=	165·6	<	167·5	=	160	+	7·5	21·9	20
140	+	20	+	4·2	+	0	=	164·2	<	165·6	=	160	+	5·6	21·4	20
140	+	20	+	3·2	+	0	=	163·2	<	164·2	=	160	+	4·2	21·0	20
140	+	20	+	2·4	+	0	=	162·4	<	163·2	=	160	+	3·2	20·8	20
140	+	20	+	1·8	+	0	=	161·8	<	162·4	=	160	+	2·4	20·6	20
140	+	20	+	1·3	+	0	=	161·3	<	161·8	=	160	+	1·8	20·5	20
⋮		⋮		⋮		⋮		⋮		⋮		⋮		⋮	⋮	⋮
140	+	20	+	0·0	+	0	=	160	=	160	=	160	+	0·0	20·0	20
				30·0		10								40·0		

ange in consumption spending between Period 1 & any following period is shown by ΔC, the change in ent spending between Period 1 and any following period is shown by ΔI. Total consumption spending period is given by C + ΔC, total investment spending by I + ΔI, and aggregate spending by their sum. ates aggregate output in Period 1, ΔY the change in output between Period 1 and any other period, Y + ΔY the aggregate output for any period. The realised investment equals savings, & planned investm ch period is I + ΔI. Realised investments or savings in any period is the difference between that 's output and its consumption, or (Y + ΔY) − (C + ΔC) respectively.

consumption spending of 140 and investment spending of 20, is also 160.

ii) In Period 2, we upset this equilibrium, by introducing an increase in investment spending of £10, or a rise in investment spending from 20 to 30.

iii) It is assumed that businessmen follow a simple rule of thumb of producing in each period, an output equal to their sales in the preceding period.

iv) Therefore, output in Period 2 will be 160. Aggregate spending in Period 2, is however, 170, because in this period we have the increase of 10 in investment spending.

→ Inventories serve as a buffer – the excess of aggregate spending of 10 is absorbed in Period 2 by unplanned decrease of inventories.

v) In period 3, businessmen expand aggregate output to 170 (the figure for total sales in Period 2). Output of 170 generates disposable income of 170 during this period. Given the consumption function, $C = 20 + \frac{3}{4}Y$, consumption spending in period 3 will be 147.5 (7.5 greater than in Period 2).

NOTE Let us assume that investment spending now drops back to its original level of 20 following its temporary rise to 30 in Period 2.

Thus, in period 3, consumption spending of 147.5 & investment spending of 20, add up to aggregate spending of 167.5.

Because output in period 3 is 170, there is now a deficiency of aggregate spending of 2.5, which is reflected in an unplanned increase

vi) In Period 5, there is a further reduction in output and again a deficiency of spending but one smaller than that of period 4.

Thus, in this way, the level of output declines period by period until Period n, assumed to be the last in what is actually an infinite number of periods. In other words, in period n, output is 160, income is correspondingly 160, consumption spending is 140, and investment spending is 20 – or aggregate spending of 160 is equal to aggregate output of 160. The system has returned to the same equilibrium position from which we had started.

The table mentioned before, gives the period-by-period detail of the process just described.

Remarks and Observations:

i) In any time period, aggregate spending may be equal to, greater than or less than aggregate output.

Equivalently, in any time period, planned investment may be equal to, greater than or less than realized investment.

ii) The equilibrium of Period 1 is upset in Period 2, by a rise in planned investment. Equilibrium is not restored until period 'n', because in all intervening periods aggregate spending is either greater or lesser than aggregate output.

Thus, disequilibrium occurs through all these periods, despite the fact that the cause of disequilibrium – the rise in investment spending – is limited to Period 2 alone.

Thus, a 'one period' rise in investment spending, produces the changed level of output in all the ~~latter~~ later periods by initiating

The ΔI of Period 2 initiates a process in which ΔC in each period is $\frac{3}{4}$ (the MPC) of ΔY in that period. Furthermore, given that ΔC is equal to $\frac{3}{4}$ of ΔY of that period and that ΔY of each period is equal to ΔC + ΔI of the preceding period, the fact that the increase in investment (ΔI) is limited to period 2 alone, means that ΔY and ΔC become smaller each period until eventually, in Period n, ΔC becomes zero.

Permanent Shift in the Aggregate Spending Function:

The aggregate spending function shifts upward and remains at the new higher level period after period, and the original equilibrium level of income and output will be replaced by a new, higher equilibrium level.

Just like the earlier case, the table on the next page records the period-by-period detail of the process. The column headings and meanings are the same as before.

A notable point is that ΔI starts at zero in Period 1, becomes 10 in Period 2 and remains 10 in each succeeding period.

As before, ΔY for any period, is the sum of ΔI plus ΔC for the preceding period.

* In comparing the value of ΔY period by period, it is seen that as ΔY becomes larger and larger, the change in ΔY becomes progressively smaller and in Period n, becomes zero.

here, ΔY stabilises at 40, and the sum of Y+ΔY stabilises at 200.

As is already shown in the graph. In period n, aggregate spending equals aggregate output and a new equilibrium is established.

	C	+	I	+	ΔC	+	ΔI	=	Aggregate Spending	> = <	Aggregate Output	=	Y	+	ΔY	Realized Investment	Planned Investment
	140	+	20	+	0·0	+	0	=	160·0	=	160·0	=	160	+	0·0	20·0	20
	140	+	20	+	0·0	+	10	=	170·0	>	160·0	=	160	+	0·0	20·0	30
	140	+	20	+	7·5	+	10	=	177·5	>	170·0	=	170	+	10·0	22·5	30
	140	+	20	+	13·1	+	10	=	183·1	>	177·5	=	160	+	17·5	24·4	30
	140	+	20	+	17·3	+	10	=	187·3	>	183·1	=	160	+	23·1	25·8	30
	140	+	20	+	20·5	+	10	=	190·5	>	187·3	=	160	+	27·3	26·8	30
	140	+	20	+	22·9	+	10	=	192·9	>	190·5	=	160	+	30·5	27·6	30
	140	+	20	+	24·7	+	10	=	194·7	>	192·9	=	160	+	32·9	28·2	30
	140	+	20	+	26·0	+	10	=	196·0	>	194·7	=	160	+	34·7	28·7	30
	⋮		⋮		⋮		⋮		⋮		⋮		⋮		⋮	⋮	⋮
	140	+	20	+	30·0	+	10	=	200·0	=	200·0	=	160	+	40·0	30·0	30

The Multiplier - A Shift in the Aggregate Spending Function

It has already been shown that a permanent shift (upward) in the aggregate spending function results in a movement of income and output to a new equilibrium level, that is higher than the original equilibrium level - by some multiple of the upward shift in the aggregate spending function.

→ The value of this multiple is known as the multiplier & represents the number by which the shift in the aggregate spending function must be multiplied to determine the change in the level of income and output required to establish a new equilibrium.

While drawing the graph for a permanent shift, it was shown that the value of the multiplier was 4.

In the case of the example mentioned, MPC = $\frac{3}{4}$. Thus, income receivers choose to spend 3/4 of any change in income on consumption, or, in other words, they choose to save, or not spend on consumption, 1/4 of any change in income.

With MPS = $\frac{1}{4}$, only when income & output have risen by 40 will income receivers devote an additional 10 of their higher income to saving (which is used for investment!) Only then, $\Delta S = \Delta I = 10$ and a new equilibrium is established.

Thus, because the MPC or the MPS determines the multiplier and because the multiplier determines the size of the increase or decrease in income & output that will follow any given upward or downward shift in the aggregate spending function, the practical importance of the MPC or MPS is great.

INPII

Given the variability of that portion of the aggregate spending function made up of investment spending, the degree of instability of the entire economic system depends to some extent on the values of the MPC and the MPS.

It should be remembered, that whatever the variability of investment spending, a relatively low MPC and a relatively high MPS will tend to produce less instability in the economy than will a relatively high MPC and a relatively low MPS.

The Multiplier - Equations:

Assuming a two-sector economy, we can say $\boxed{Y = C + I}$.

In other words, it can also be said, $\Delta Y = \Delta C + \Delta I$.

We know, from consumption function, $\boxed{C = C_a + cY}$

or $\boxed{\Delta C = c\Delta Y}$ → $\boxed{c = MPC}$

Putting this value of ΔC in our equation, we get-

$$\Delta Y = c\Delta Y + \Delta I$$

or $$\Delta Y(1-c) = \Delta I$$

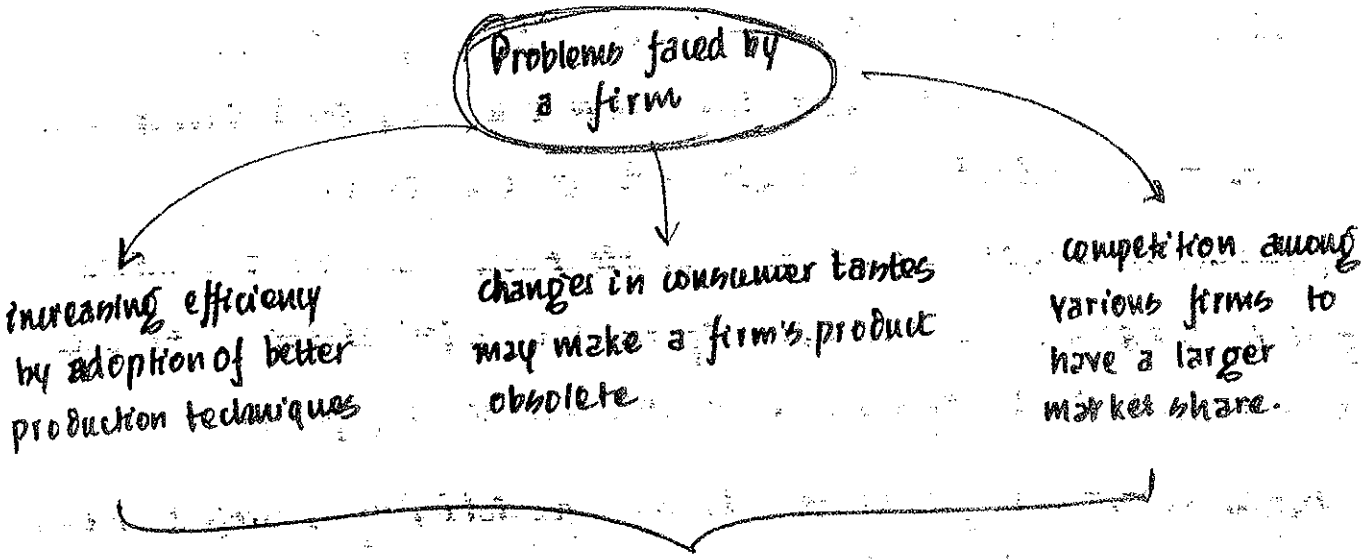
or $$\boxed{\frac{\Delta Y}{\Delta I} = \frac{1}{1-c}}$$ → Multiplier

or $\frac{\Delta Y}{\Delta I} = \left(\frac{1}{1-MPC}\right)$. But we know, $MPS = 1 - MPC$.

Therefore, $\frac{\Delta Y}{\Delta I} = \left(\frac{1}{1-MPC}\right)$. Also, $\frac{\Delta Y}{\Delta I} = \left(\frac{1}{MPS}\right)$

CAPITAL BUDGETING

Capital Budgeting: also known as investment appraisal is the planning process used to determine whether an organisation's long term investments such as new machinery, plants, products and research development projects are worth pursuing.



The firm's management must constantly be on the alert to explore these opportunities & the firm's profitability, growth & very survival on the long run depend on how well management addresses these & similar problems!

↳ somehow, or the other, usage, or to be precise, 'investment of capital' is required to solve those problems.

↳ However, it is also undeniable that major capital investment projects are for the most part irreversible!

- Replacement
- Cost Reduction
- Output expansion of existing products & markets
- Expansion into new products and/or markets
- Government regulation

While the final decision to undertake or not to undertake a major investment project is made by the firm's top management, capital budgeting plays an extremely important role.

The marketing division will need to forecast the demand of the products that the firm plans to sell; the production, engineering, personnel and purchasing divisions must provide feasibility studies and estimates of the cost of the investment project; and the finance department must determine how the required investment funds are to be raised and their cost to the firm.

Therefore, by now, it should be unambiguously clear that capital budgeting integrates the operation of all the major divisions of the firm and that it is of extreme importance to any firm.

Before we proceed further to discuss 'feasibility' of a project, let us pause to understand in detail, a pre-requisite to it — determination or estimation of the net cash flow from a project. As we have commonly heard, 'learning by doing' is the best approach to understand something. So, here is a question, & we prepare the solution, all the while understanding the intricacies.

Tata Steel estimates that a new capital project requires a capital outlay of ₹ 1·50 crores (75 lakh on machinery and 75 lakh on reorganisation of activities). The company can sell 20,000 outputs in the first year at ₹ 700 per unit. The sales are expected to increase by 20% annually over the preceding years' sales in the subsequent years. The project has a life of 5 years. The company has estimated the fixed cost to be 12 lakh annually. The variable cost of the project is 25% of its sales revenues. The company is required to pay a tax of 20% per annum on the profit earned. It applies flat depreciation rate to evaluate the wear & tear changes. The company gets a salvage value

ULARS(J)	YEAR 0	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Units (A)		20,000	24,000	28,800	34,560	41,472
rice (in ₹) (B)		700	700	700	700	700
enue (A X B) = (C)		1,40,00,000	1,68,00,000	2,01,60,000	2,41,92,000	2,90,30,400
t (C x 25%)		35,00,000	42,00,000	50,40,000	60,48,000	72,57,600
		12,00,000	12,00,000	12,00,000	12,00,000	12,00,000
n		13,00,000	13,00,000	13,00,000	13,00,000	13,00,000
t (D+E+F)		60,00,000	67,00,000	75,40,000	85,48,000	97,57,600
(C-G)		80,00,000	1,01,00,000	1,26,20,000	1,56,44,000	1,92,72,800
fit (H x 20%)		16,00,000	20,20,000	25,24,000	31,28,800	38,54,560
er Tax (H-I)		64,00,000	80,80,000	1,00,96,000	1,25,15,200	1,54,18,240
fit (J+F)		77,00,000	93,80,000	1,13,96,000	1,38,15,200	1,67,18,240
apital Investment	-1,50,00,000					
Value Recoverable						10,00,000
FLOW	-1,50,00,000	77,00,000	93,80,000	1,13,96,000	1,38,15,200	1,77,18,240

In the making of the cash flow statement, we came across the term, "depreciation"; it is the diminution in the value of an asset due to normal wear and tear.

* Amount of depreciation is equal to cost of the assets less their salvage value recoverable by selling the asset at the end of the project life.

* In the given case, cost is ₹ 75 lakhs less salvage value of ₹ 10 lakhs = 65 lakhs i.e. depreciation to be provided over the life of the asset.

~~Let us assume that her mind would~~

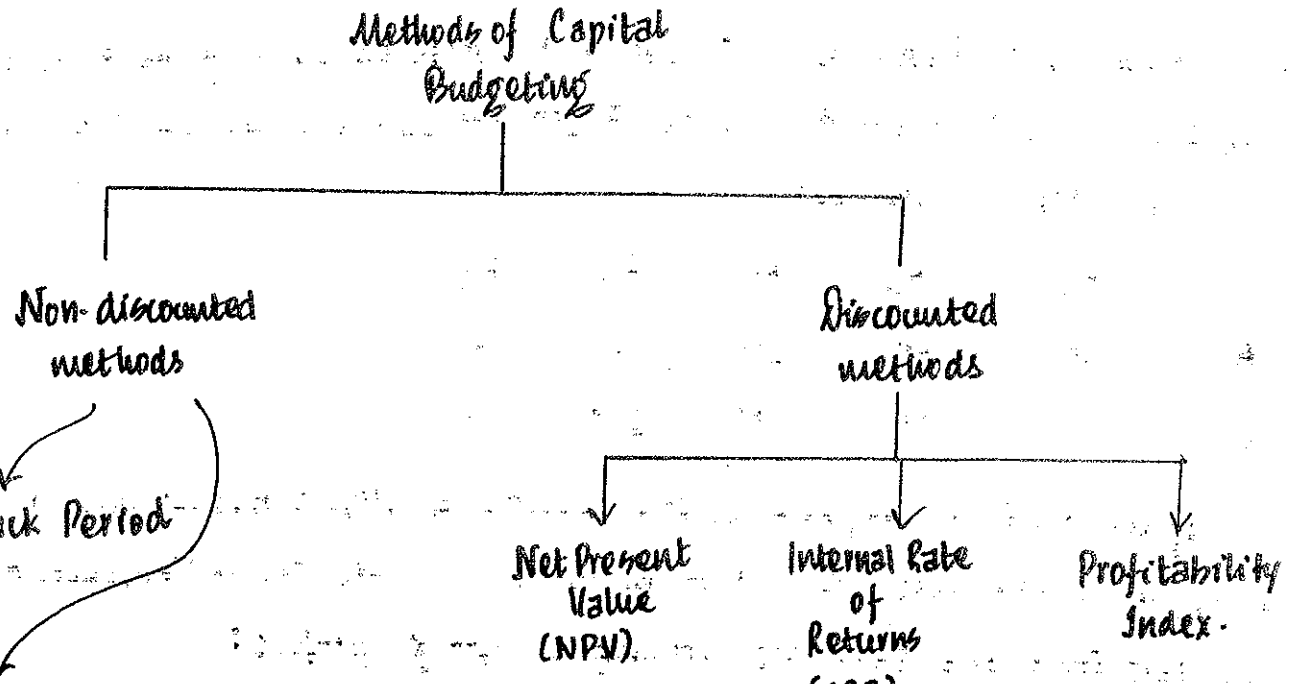
Here the life is estimated at 5 years.

Thus, 65 lakhs divided by 5 years = ₹ 13 lakhs per year.

It is a non-cash expenditure & is considered to arrive at total cost and profit.

To generate cash flow, we have to add depreciation amount in the Profit After Tax.

As mentioned earlier, our objective is to determine whether the firm should or should not undertake the investment. In order to answer this question, one would say that, comparing the net cash flow over the life of the project to the initial cost of the project. This in turn, is done by several methods, some of which are described next.



By now, one should be able to appreciate & understand the fact that ₹1 received in future years is worth less than ₹1 spent today, because the time value of money decreases day by day. Since these 'non-discounted' methods do not involve discounting the future returns, in general, they are considered inferior to the 'discounted methods'.

Payback Period:

- 'Payback period' refers to the period of time required for the return on an investment to 'repay' the sum of the original investment.

For example, a ₹ 1000 investment which returns ₹ 500 per year will have a 2 year payback period.

* Thus, payback period intuitively measures how long something takes to "pay for itself".

* All else being equal, shorter payback periods are preferable to longer payback periods.

↳ This rule, although partially correct, has a serious shortcoming. Consider, for instance, 2 investment projects, each of which, say requires an initial investment of ₹ 100 crores. The annual returns of both the projects are as:

	R_1	R_2	R_3	R_4	R_5
A	40	60	100	-	-
B	25	50	100	150	200

If we consider payback period approach, project A, that has a shorter payback period with respect to B, would be preferred. However, one can definitely say that are choosing a wrong project!

* Hence, it is a method of analysis with serious limitations such as
  - it does not account for the true value of money.
  - it does not take into consideration, opportunity costs.

Net Present Value:

* The Net Present Value (NPV) of a project is equal to the present value of the expected stream of net cash flows from the project, discounted at the firm's cost of capital, minus the initial cost of the project.

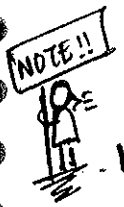
Mathematically:

$$NPV = \sum_{t=1}^{n} \frac{R_t}{(1+r)^t} - C_0$$

R_t refers to the estimated net cash flow from the project in each of the

* NPV is an indicator of how much a value an investment or project adds to the firm.

If...	It means...	Then...
NPV > 0	the investment would add value to the firm.	the project may be accepted.
NPV < 0	the investment would subtract value from the firm.	the project should be rejected.
NPV = 0	the investment would neither gain nor lose value for the firm	we are indifferent in the decision whether to accept or reject the project. The project adds no monetary value & hence decision has to be made on basis of other criteria, e.g. strategic positioning etc.



In the above table, it is extremely important to understand the implications while NPV, if negative, guarantees a project's rejection, a positive NPV, however, just suggests that the project "may be" accepted. One might ask, why?

It is because, NPV at the cost of capital, may not account for opportunity costs, i.e. comparison with other investments. In financial theory, if there is a choice between two mutually exclusive investments, the one yielding higher NPV should be selected.

Internal Rate of Return (IRR)

* The Internal Rate of Return (IRR) of a project is the discount rate that equates the present value of the net cash flow from the project to the initial cost of the project.

Mathematically, it can be obtained by solving the equation:

$$\sum_{t=1}^{n} \frac{R_t}{(1+r)^t} - C_0 = 0$$

solved for 'r'.

* The firm should undertake the project if the IRR on the proje exceeds or is equal to the marginal cost of capital or risk-adjusted discount rate that the firm uses.

* It should not undertake the project if the IRR is smaller than the marginal cost of capital.

Comparison of NPV and IRR:

While evaluating a single or independent project, the NPV and IRR methods will always lead to the same accept-reject decision.

It is because NPV is positive only if the IRR on the project exceeds the marginal cost of capital.

Similarly, NPV is negative only when IRR is smaller than the marginal cost of capital.

But, while considering two different, mutually exclusive projects, the NPV and IRR methods may provide contradictory signals. In other words, a project with higher NPV may have a lower IRR than an alternative project, & vice versa.

	Project A	Project B
Initial Cost	10,00,000	10,00,000
Net Cash Flow (years)		
Year 1	-1,00,000	3,50,000
Year 2	0	3,50,000
Year 3	5,00,000	3,50,000
Year 4	5,00,000	3,50,000
Year 5	14,00,000	3,50,000
NPV at 12% discount rate	13,78,720	12,61,680

A has higher NPV but

The example shown, exhibits the fact that project A has a higher NPV but lower IRR than project B.

The reason for such an ambiguity, is because, under the NPV method the Net Cash Flows generated by the project are implicitly and conservatively assumed to be reinvested at the firm's cost of capital or risk-adjusted discount rate used by the firm.

On the other hand, under the IRR method, the Net Cash Flows are assumed to be reinvested at the same higher IRR returned on the project!

Since there is no certainty that the firm can reinvest the Net Cash Flows generated by a project at the same higher IRR earned on the project, it is generally better to use the NPV method in deciding which of the two mutually exclusive projects to undertake. In other words, it is preferable for the firm to undertake the project with the higher NPV rather than the one with higher IRR, when the two methods provide contradictory signals!

Profitability Index:

We already saw that the NPV method is preferred to determine the feasibility when comparing two mutually exclusive projects (& the NPV, IRR methods provide contradictory signals). That should be the end of the story, right?

However, it should be understood that even the NPV method may lead to difficulties in the case of mutually exclusive investment projects of unequal size.

A smaller project may lead to a lower NPV than an alternative larger project, but the ratio of the present value of net cash flows to the initial cost of the project (i.e. profitability per rupee of

Also, in cases of capital rationing (i.e. when the firm cannot undertake all the projects with positive NPV), the firm should rank projects somehow and choose the projects that are most feasible. Clearly, merely NPV method would not work here.

Therefore, to solve such kind of problems, profitability index comes our rescue.

We know, NPV = PVNCF − C_0

PVNCF → Present Value of Net Cash Flow

C_0 → Initial Cost of project.

Then, mathematically, Profitability Index (PI) is given by

$$PI = \frac{PVNCF}{C_0}$$

* Thus, a firm ranks projects according to their profitability index and then chooses the projects with the highest profitability index rather than those with the highest NPVs.

* By doing so, the firm successfully chooses the projects with the highest relative profitability, or highest profitability per rupee of cost or investment (i.e. those whose PI exceeds 1 by the greatest amount) and by therefore, avoids bias in favour of large projects.

	Project A	Project B	Project C
PVNCF	26,00,000	14,00,000	14,00,000
C_0	20,00,000	10,00,000	10,00,000
NPV = PVNCF − C_0	6,00,000	4,00,000	4,00,000
$PI = \frac{PVNCF}{C_0}$	1.3	1.4	1.4

The table shown above shows that project A has higher NPV than

invest 20.00.000 lakh rupees, project A would be undertaken.

But then, the profitability indexes for projects B and C are greater than for project A, and the firm should undertake both of these projects instead of project A.

What is the need for Capital Rationing?

Capital Rationing may arise for several reasons:

→ undertaking all projects with positive NPV may involve rapid expansion but only a finite strain can be sustained by the managerial, personnel and other resources of the firm.

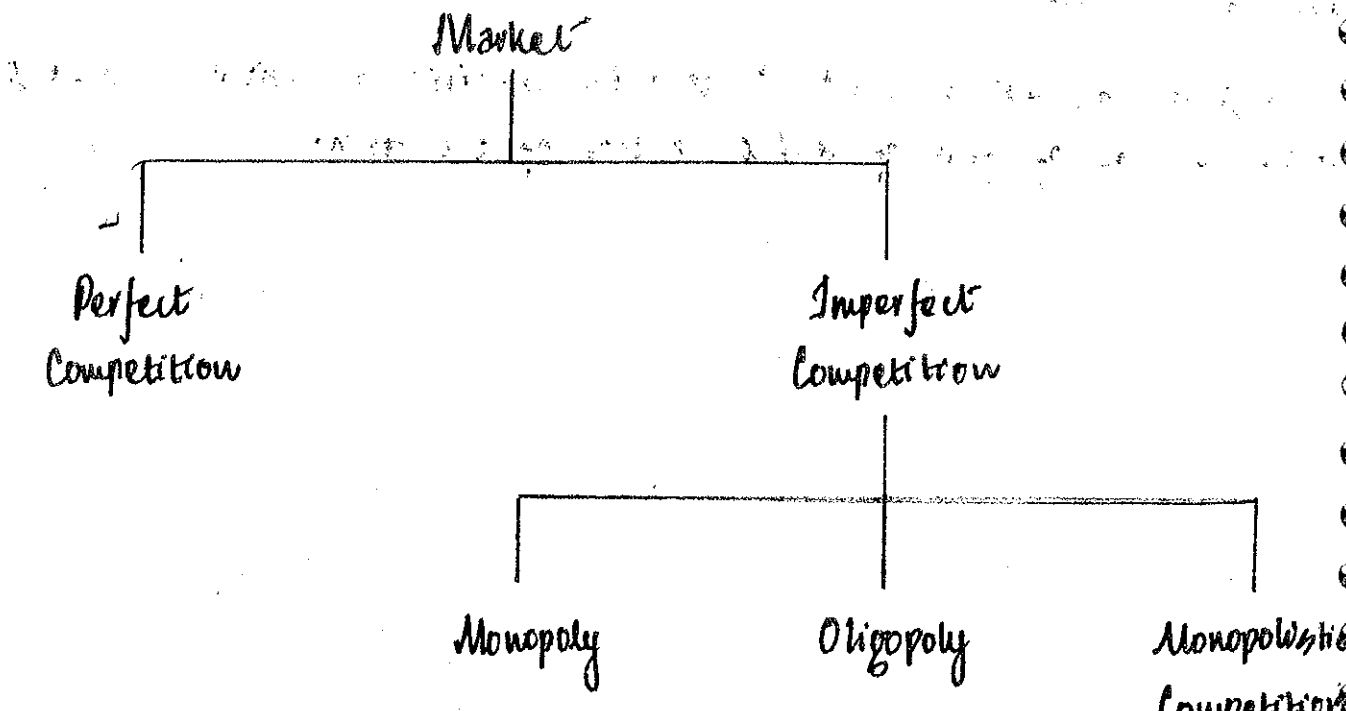
→ a firm may be reluctant to borrow heavily to supplement internal funds, because of the risk to which the firm would be exposed in case of an unexpected economic downturn.

→ a firm may also be reluctant to raise additional capital by selling stocks because of fear of losing control of the firm.

MARKET STRUCTURE

Market: The word itself paints a picture in our mind, because no matter what, everyone of us has been to one such 'market'. However, in terms of economics, a market is an individual institution where the sellers of a particular good or service can meet with the buyers of the certain good, thus creating a potential for a transaction to take place. The buyers must have something to offer in exchange.

In economics, we identify primarily, the following different types of market structure:



Perfect Competition:

The following are the attributes or characteristics of a perfectly competitive market:

i) Large number of buyers and sellers

There are many buyers and sellers of the commodity, each of which is too small in relation to the market to have a perceptible effect on

ii) the commodity is homogeneous.

The commodity is homogeneous, identical or perfectly standardized, so that output of each producer is indistinguishable from the output of others. Thus, buyers are indifferent as to the output of which producer they purchase.

iii) perfect mobility of resources i.e. factors of production.

The resources or inputs are free to move (i.e., they can move at zero cost) among the various industries and locations within the market in response to monetary incentives.

Firms can enter or leave the industry in the long run without much difficulty. There are no artificial barriers (such as patents) or natural barriers (such as huge capital requirements) to entry into or exit from the market.

iv) economic agents have perfect knowledge of market conditions.

Consumers, firms and resource owners have perfect knowledge of all relevant prices and costs in the market. This ensures that the same price prevails in each part of the market for the commodity and for the inputs required in the production of the commodity.

Needless to say, these conditions have seldom existed in any market. Then, one might ask, what is the need to study such a situation? Well, the perfectly competitive model is extremely useful to analyze market situations that approximate perfect competition.

Also, the perfectly competitive model provides the point of reference or standard against which to measure the economic cost or inefficiency of departures from perfect competition. These departures can take the

Monopoly: there is a single seller of a commodity for which there are no good substitutes.

Monopolistic Competition: a competitive market, where there is a large number of firms (sellers), each having a proportion of the market share and slightly differentiated products.

Oligopoly: The market is dominated by a small number of firms, selling either a homogeneous or a differentiated commodity.

An economist's definition of perfect competition is diametrically opposite to the everyday usage of the term.

In economics, the term perfect competition stresses the impersonality of the market. One producer does not care and is not affected by what other producers are doing. The output of all producers is identical, and an individual producer can sell any quantity of the commodity at the given price without any need to advertise.

On the other hand, in everyday usage, the term "competition" stresses the notion of "rivalry" among producers or sellers of the commodity. This is not, however, what an economist means by competition.

Under perfect competition, the firm is a price taker & can sell any quantity of the commodity at the given market price.

If the firm raised its price by the slightest amount, it would lose all of its consumers. On the other hand, there is no reason for the firm to reduce the commodity price since the firm can sell any quantity of the commodity at the given market price.

Thus, the perfectly competitive firm faces a horizontal or infinitely elastic demand curve at the price determined at the intersection of

DEMAND AND SUPPLY ANALYSIS

Utility: When a consumer consumes a particular product of his choice, he gets satisfaction which is called as "Utility" for economics' study and analysis.

Marginal Utility: It is the extra satisfaction or "utility" received by the consumer by consuming one additional unit of the good per unit of time while holding constant the quantity consumed of all other commodities.

Total Utility: The total utility or satisfaction obtained by a consumer from consumption of a particular product. It is the sum of marginal utilities derived by the consumer from consumption of all units he consumed.

UNIT CONSUMED	MU OF EACH UNIT	TU
1st	10	10
2nd	12	22
3rd	8	30

The schedule shown is an example of Mr. X consuming 3 Rasgollas. As shown, his Marginal Utility from consumption of 3 Rasgollas are 10, 12 and 8 units. The Total Utility derived by Mr. X is however, 30 units.

Now, if income, taste, habit of a consumer remains unchanged and he consumes a particular good, the marginal utility derived from each unit consumed will gradually decrease. In the earlier example, Mr. X derived a satisfaction of 10 utils. Suppose he consumes 2nd Rasgolla, the level of satisfaction may also increase, to say, 12 utils. But if he continues consuming more and more, satisfaction derived from each unit consumed will gradually reduce, and after consuming a certain quantum, he may feel reluctant to consume more because he derives negative satisfaction. This concept is called diminishing marginal utility.

Law of Diminishing Marginal Utility:

Definition: As defined by Marshall,

"additional benefit what a man derives from a given increase in the stock also diminishes with every increase in the stock that he already has."

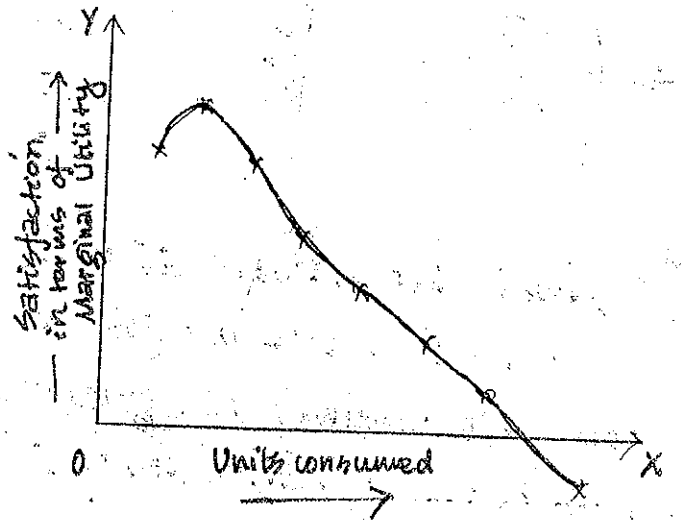
Meaning:

If a particular consumer consumes a particular product successively, marginal utility derived by the consumer from each unit of consumption will diminish.

Example:

A consumer Mr. X has consumed Rasgollas. Satisfaction derived from each unit consumed by way of Marginal Utility is depicted in the table below:

UNIT CONSUMED	MU OF EACH UNIT	TOTAL UTILITY
1st	20	20
2nd	22	42
3rd	18	60
4th	15	75
5th	11	86
6th	8	94
7th	8	102
8th	6	108
9th	2	110
10th	-4	106



The table has been presented graphically in a 2D plane: OX axis represents units consumed and OY axis represents MU derived by the consumer from consumption of Rasgollas. The curve that

result is referred to as Marginal Utility Curve.

Conclusion:

The curve and table veritably show that, if a consumer consumes more and more units of a given commodity, satisfaction derived from such consumption will gradually diminish and it might also be negative after a certain level.

Assumption: The following assumptions have been made:

i) the consumer is a Rational consumer.

ii) Income, taste, habit of the consumer remains unchanged.

iii) resources are limited.

iv) the satisfaction derived by the consumer is measurable absolutely.

Limitations: Some of the limitations of this law are:

i) satisfaction being a subjective feeling, cannot be quantified.

ii) not applicable in case of rare collections, valuables, gold etc. where more a person has, the interest to have more does not diminish.

Cardinal or Ordinal Utility?

Before we proceed any further, we pause to throw light on a certain food for thought. We have already defined "Utility". Here, there exist, two schools of thought!

Ordinalism
people who believe that Utility is a subjective human feeling and cannot be quantified or measured. It, however, can just be compared relatively, in terms

Cardinalism
people who believe that Utility can be very well quantified, either in terms of money or in terms of arbitrary units called UTILS.

Consumer Equilibrium:

The term Equilibrium refers, in a very generalised way, positions of rest. Hence, the term Consumer equilibrium implies that a position when a consumer should stop consuming a particular good. We wont be wrong in saying that consumers are profit maximising entities. Thus, we can say that a consumer would reach equilibrium, when his/her Total Utility is maximum.

Now, the question arises - how to determine the position of rest or consumer equilibrium? The answer to it, is threefold. Firstly, it varies if the consumer pays price, i.e., whether price is payable by consumer or not. Then again, if he pays price, results can be obtained by either using Cardinal Utility or Ordinal Utility approach.

Consumer Equilibrium when Price is not payable by consumer:

If price is not payable for the good consumed, a rational consumer will consume the good till MU is positive. The last unit where MU is positive is the Consumer Equilibrium where TU is maximum.

Consumer Equilibrium when Price is payable by consumer (Cardinal approach of Utility):

The purchasing Power (Money) available with the consumer is limited. The consumer also needs different goods. MU of rupee in terms of other goods is taken as a basis for determining consumer's equilibrium.

As long as MU of rupee spent on the good consumed is greater or equal to MU or worth of rupee in terms of other goods, the consumer will consume the good in question.

Let us take an example. Mr. X has to pay a price of Rs. 2 for each Rasgolla he consumes. MU of rupee in terms of other goods is 4 utils means the consumer will get satisfaction of 4 utils from each rupee he spends for consuming other goods. The table shows MU derived from each Rasgolla consumed under column (2) and MU of rupee spent on each Rasgolla consumed in column (3).

Unit consumed	Marginal Utility of each Unit	MU of each rupee spent on Rasgolla [Column 2/ Price of Rasgolla per unit]
1st	20	10
2nd	22	11
3rd	18	9
4th	15	7.5
5th	11	5.5
6th	8	4
7th	8	4
8th	6	3
9th	2	1
10th	-4	-2

It is seen from the above table that MU of rupee spent on Rasgolla is 4 utils for consuming 6th or 7th Rasgolla. The consumer is indifferent whether he will consume 6 or 7 units. However, beyond 7th unit, it is not advisable to consume, as MU from consumption of Rasgolla is lesser than MU of rupee in terms of other goods. Hence, the 6th or 7th unit is Equilibrium position.

From the above table, we can formulate a mathematical relation that explains consumer's equilibrium.

$$\frac{\text{Marginal Utility from unit consumed}}{\text{Price per unit}} = \text{MU of Rupee in terms of other goods}$$

or

$$\frac{\text{Marginal Utility from unit consumed}}{\text{MU of Rupee in terms of other goods}} = \text{Price per unit}$$

A Two Good Approach

Assumptions:

i) The consumer must be rational.

ii) The income (purchasing power) must be limited.

iii) MU of rupee (MU of money) remains constant.

iv) Utility is additive in nature (TU is sum of MUs)

Mathematical Analogue:

Consider two goods, X and Y. Then,

$$\frac{MU_X}{P_X} = (MU_{money})_X \quad \text{and} \quad \frac{MU_Y}{P_Y} = (MU_{money})_Y$$

But we have already assumed that MU of money is constant. Therefore, equating both for equilibrium condition, we get

$$\boxed{\frac{MU_X}{P_X} = \frac{MU_Y}{P_Y} \quad \text{or} \quad \frac{MU_X}{MU_Y} = \frac{P_X}{P_Y}}$$

NOTE: This expression is not at all different from what we had analytically written earlier. The LHS may be the MU of rupee in terms of good X and the RHS is MU of rupee in terms of good Y.

Example: Given the following marginal utility schedule for good X and good Y for the individual, and given that the price of X and the price of Y are both $1, and that the individual spends all income of $7 on X and Y,

Quantity	1	2	3	4	5	6	7
MU_X	15	11	9	6	4	3	1
MU_Y	12	9	6	5	3	2	1

a) Indicate how much of X and Y the individual should purchase to maximise utility.

b) Determine how much total utility the individual receives when he or she maximises utility?

As we have earlier shown, the consumer equilibrium point is marked by $\frac{MU_x}{MU_y} = \frac{P_x}{P_y}$. The price of both the commodities is $1.50, RHS is 1. Hence, the position of equilibrium will be the position when $MU_x = MU_y$. As per the given schedule, there are 3 cases when this can happen — (3X, 2Y), (4X, 3Y) and (6X, 5Y). In case of (3X, 2Y), we wont derive maximum utility because we just spend $3 out of $7. The case of (6X, 5Y) is eliminated, because we need an amount of $15 to be able to purchase goods, but we have $7 with us.

Therefore, this leaves us with one case only - (4X, 3Y). We spend all our money, $7. The equilibrium condition is also satisfied i.e. $\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$. Hence, the individual should purchase 4 units of X and 3 units of Y to maximise utility.

IMP! It should be noted that the point of consumer equilibrium is identified; however, this does not mean that the consumer will straight away go to, say, a shop and order directly 4 X and 3Y and make the bill payment. The sequence in which he buys, is as follows.

While purchasing the first unit of good, the consumer notices that marginal utility per dollar spent on first unit of good X is greater than marginal utility per dollar spent on ~~second~~ first unit of good Y (15 utils > 12 utils). Hence, the consumer purchases first unit of good X. The consumer's next step is to compare the MU per dollar spent on second unit of good X with MU per dollar spent on first unit of good Y

Now, the consumer has $7 - $2 = $5 remaining with him. With similar arguments, it can be shown that the consumer buys 2nd unit of good X and then is left with $4 (11 utils > 9 utils).

Now, the consumer, on comparing MU per dollar spent on 3rd unit of good X with MU per dollar spent on 2nd unit of good Y, finds both of them to be equal to 9 utils. This makes the consumer indifferent between choosing 3rd unit of good X and 2nd unit of good Y. With the money remaining, he can purchase both, and knows does so! Now, he is left with $2 remaining.

In the next step, he is again indifferent to purchasing or choosing between 4th unit of good X and 3rd unit of good Y because the MU per dollar spent in both cases, is equal to 6 utils. But as he can buy both units, he does so, and exhausts his income, and, as shown, derives maximum utility!

If there exists or presents purchasing power with consumer, even after he attains equilibrium, given a choice, he would make a decision to attain maximum utility. For instance, suppose the above consumer had $8 with him, then after attaining equilibrium at $7, the consumer would compare the MU of dollar spent on 5th unit of good X and 4th unit of good Y, and then would buy the 4th unit of good Y (5 utils > 4 utils).

) The individual would receive 41 utils from consuming 4X (sum of MU_X upto 4X) plus 27 utils from purchasing 3Y (sum of MU_Y upto 3Y) for a total utility of 68 utils. In contrast, if the individual spent all $7 on 7X, he or she would get 49 utils (sum of all MUx), and if we spent all his income for 7Y, he or she would get 38 utils (sum of all MUy).

The condition for consumer equilibrium can be extended to the more realistic case where the consumer must choose how much to consume of many different goods. When there are $N > 2$ goods to choose from, the consumer equilibrium condition is to equate all of the marginal utilities per rupee spent,

$$\frac{MU_{good\ 1}}{Price_{good\ 1}} = \frac{MU_{good\ 2}}{Price_{good\ 2}} = \ldots = \frac{MU_{good\ N}}{Price_{good\ N}}$$

→ Law of Equi-Marginal Utility *

subject to the constraint that the consumer's purchases do not exceed his or her budget.

Now, the question is how to determine consumer equilibrium or utility maximisation if we view utility from Ordinalist point of view. Before we address this question, we will have to see in detail, how Ordinalists view utility and their basis of approaching the problem.

An Ordinal Measure of Utility is based on a few assumptions:

i) The consumer or individual under question is rational.

ii) Utility being a subjective human behaviour, is ordinal in nature and cannot be quantified or measured like a physical quantity.

iii) The tastes of the consumer are transitive; it implies that if good A is preferred to good B, and good B is preferred to good C, then the consumer, given a choice, would prefer good A to good C also.

iv) it is assumed that more of a commodity is preferred to less; i.e., we will assume that the consumer is never satiated with the commodity and the commodity is a "good" rather than a "bad".

* This states that the consumer maximising his total utility will allocate his

Using these assumptions, we can represent an individual's tastes as points on a 2D graph. Each point on the graph represents a certain combination of the goods, say X and Y. Each combination provides the individual, certain level of utility or satisfaction. Then, this kind of becomes obvious, that, there will be several points, or combinations to be precise, that provide the same level of utility. Joining all these points, we get, what is otherwise called the indifference curve, which we can define as "a curve that shows the various combinations of two goods that give the consumer equal utility or satisfaction."

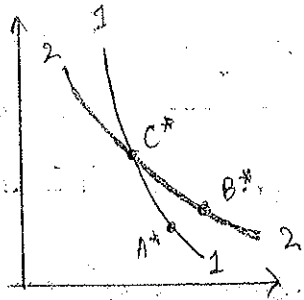
A higher indifference curve refers to a higher level of satisfaction, and a lower indifference curve refers to less satisfaction. However, we have no indication as to how much additional satisfaction or utility a higher indifference curve indicates. Thus, indifferent curves simply provide an ordering or ranking of the individual's preference.

Characteristics of Indifference Curves:

Indifference curves are usually negatively sloped, cannot intersect and are convex to the origin.

because if 1 basket of goods X and Y contains more of X, it WILL HAVE TO CONTAIN LESS OF Y than another basket, in order to give the same level of satisfaction and be on same indifference

because of DECREASING ~~RATE~~ OF MARGINAL SUBSTITUTION



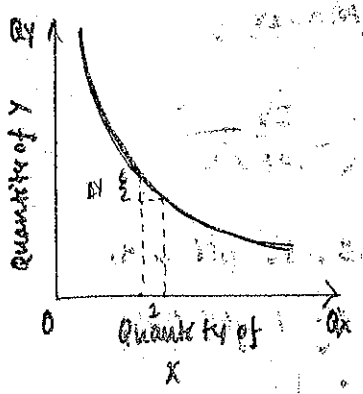
As per diagram, A* is equivalent to C* since both of them on same curve. B* is equivalent to C* since both B* and C* are on curve 2. Then, B* is equal to A* which is NOT POSSIBLE

IMP! Each point in the xy plane refers to a certain possible combination of good X and good Y. Thus, essentially, each point lies on a certain indifference curve. This, in turn, implies that there are infinitely many indifference curves.

The entire set of indifference curves is called an indifference map and it reflects the entire set of tastes & preferences of the consumer.

Marginal Rate of Substitution:

It refers to the amount of one good that an individual is willing to give up for an additional unit of another good, while maintaining the same level of satisfaction (thus, remaining on the same indifference curve).



The marginal rate of substitution of good X for good Y (MRS_{XY}) refers to the amount of Y that the individual is willing to exchange per unit of X and maintain the same level of satisfaction.

As is shown in the graph, MRS_{XY} measures the downward vertical distance (the amount of Y that the individual is willing to give up) per unit of horizontal distance (i.e. per additional unit of X) to remain on the same indifference curve.

Thus, we can say

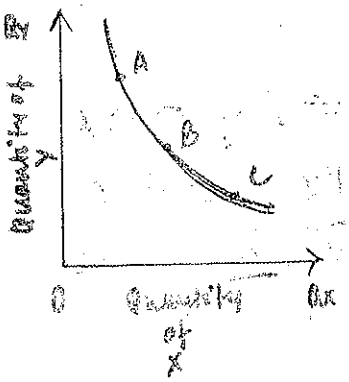
$$MRS_{XY} = -\frac{\Delta Y}{\Delta X}$$

Because of reduction in Y, MRS_{XY} is negative. However, we multiply by -1 and express MRS_{XY} as a positive value.

IMP! This equation also drives home the fact that MRS_{XY} is given by the absolute slope of the tangent to the indifference curve at that point.

NOTE! As an individual moves down an indifference curve, he is left with less and less Y and more and more X. Hence, each remaining unit of Y becomes more valuable to the individual and each additional unit of X becomes less valuable. This would imply an obvious fact, that the individual is willing to give up less and less of Y to obtain each additional unit of X.

Thus, from the previous sentence, and the definition of MRS_{XY}, we can say that as we move down an indifference curve, we see or observe a diminishing marginal rate of substitution. It is this property that imparts the 'convex to the origin' nature to an indifference curve.



Now, we can affirmatively say that,

$$(MRS_{XY})_A > (MRS_{XY})_B > (MRS_{XY})_C$$

or $$\left(-\frac{\Delta Y}{\Delta X}\right)_A > \left(-\frac{\Delta Y}{\Delta X}\right)_B > \left(-\frac{\Delta Y}{\Delta X}\right)_C$$

In other words, we can say that, at point A, the individual is willing to give up more units of Y for one additional unit of X, than that in point B or C.

Co-relation with Cardinal Approach:

All combinations of goods X and Y on a given indifference curve refer to the same level of total utility for the individual. Thus, for a movement down a given indifference curve, the gain in utility ~~that the individual receives from consuming~~ in consuming more of good X must be equal to the loss in utility in consuming less of Y.

Specifically, the increase in consumption of good X (ΔX) times the marginal utility that the individual receives from consuming

each additional unit of X (MU_X) must be equal to the reduction in Y ($-\Delta Y$) times the marginal utility of Y (MU_Y). Hence.

$$(\Delta X)(MU_X) = -(\Delta Y)(MU_Y)$$

or

$$\boxed{\frac{MU_X}{MU_Y} = -\frac{\Delta Y}{\Delta X} = MRS_{XY}}$$

As we move down the indifference curve, we know that we consume more and more X and lesser amount of Y. From, Law of Diminishing Marginal Utility, we know that as we consume more and more, the Marginal Utility derived, is lesser & lesser (& vice-versa!). Thus, as we move down the IC, MU_X decreases & MU_Y increases. This also backs and proves the fact that MRS_{XY} is diminishing in nature!

The Consumer's Income & Constraints:

To understand consumer's equilibrium, we need a fixed parameter. In case of Cardinalist Approach, we had the Marginal Utility of rupee (or any unit of money) spent. But, in Ordinalist view, we do not have such a parameter, & hence, here, we use the consumer's income as the tool.

For easy & better understanding, let us have a two good approach. Let us assume that the entire disposable income available with the individual is spent in buying just two types of goods X and Y. Thus, mathematically,

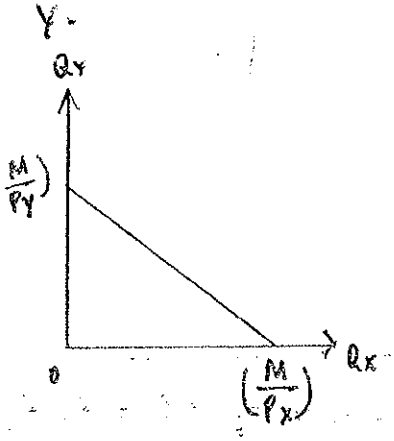
$$M = (P_X)(X) + (P_Y)(Y)$$

X = no. of units of good X purchased

M = net disposable income available with the consumer.

Y = no. of units of good Y purchased.

The limiting cases can be found, i.e. conditions in which the individual spends entire income in buying only X or only Y.



We have, $M = P_X(X) + P_Y(Y)$.

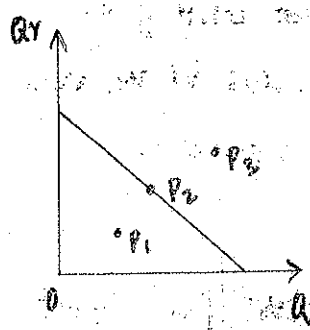
Putting $X=0$, we get $Y = \left(\frac{M}{P_Y}\right)$.

Putting $Y=0$, we get $X = \left(\frac{M}{P_X}\right)$.

We plot these two points as intercepts and join them with a straight line. This line is called the budget line. It can be defined as the "graphical depiction of the various combinations of two selected products that a consumer can afford at specified prices for the products given his/her particular income level".

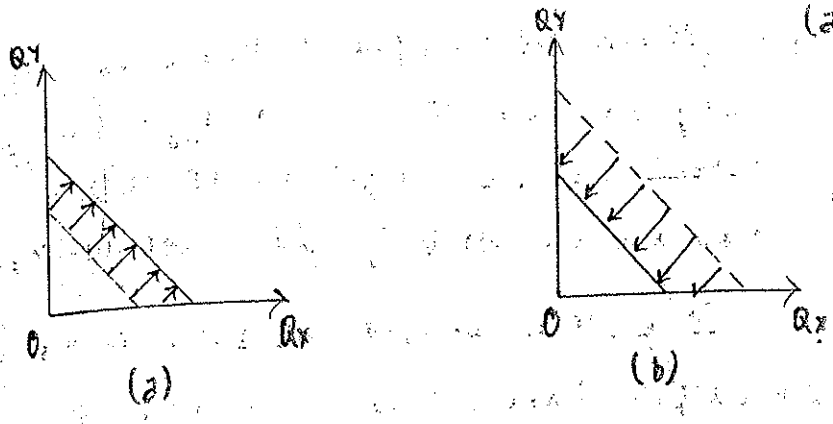
Characteristics:

i) any point on the budget line represents entire consumption of disposable income, i.e. savings are nullified.



Point P_2 is on the budget line, and represents the condition stated above. Point P_3 is an impossible case, because the total expenditure exceeds the budget or money available. Point P_1 is a situation where the consumer does not spend the entire amount of income, and instead has some savings. Thus, an individual can operate either on the budget line, or at any point in the area enclosed by the budget line and co-ordinate axes.

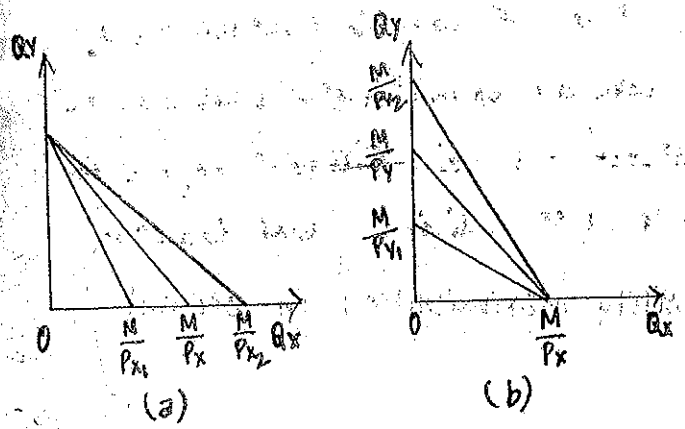
ii) If the prices of the commodities remain constant and the budget allocation, i.e. disposable income changes, then the budget line shifts parallel to the old one, rightwards in case of increasing [illegible] with it leftwards.



(a) shows the budget line shifting rightwards, when M increases.

(b) shows the budget line shifting leftwards, when M decreases.

iii) If only the price of good X changes, the vertical or Y-intercept remains unchanged and the budget line rotates upward, or counterclockwise if P_X falls and downward or clockwise if P_X rises. Similarly, the case can be understood when price of good Y changes and P_X remains constant.



In (a), $P_{X_1} > P_X > P_{X_2}$.

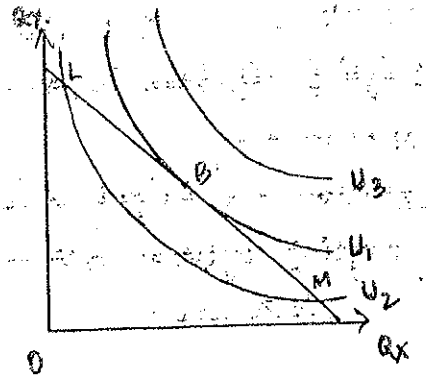
In (b), $P_{Y_1} > P_Y > P_{Y_2}$.

Red line = initial budget line

Black & Blue are two possible cases.

Utility Maximisation in Ordinal Approach:

Given the tastes of the consumer (reflected in his or her indifference map), a rational consumer seeks to maximise the utility or satisfaction received in spending his or her income. Since each IC on the indifference map represents a certain level of utility, it is obvious that the consumer would like to operate on the highest IC possible. But as we know, there can be infinitely many ICs. The constraint here is therefore, the amount of disposable income. Therefore, it can be said, that, as a utility maximisation entity, the consumer would operate on the highest indifference curve attainable with his or her



This figure brings together on the same set of axes the consumer indifference curves and the budget line (in red), to determine the point of utility maximisation.

Since points L, B, M, all three lie on the budget line, the consumer can operate in any of them: but it should be noted that L and M lie on IC curve U_2 while B lies on IC curve U_1. Since U_1 is higher than U_2, obviously, the consumer would have a higher utility at B than at L or M.

Any point on U_3 would have a higher utility than U_1, but it should be seen that the consumer cannot operate on U_3 because, any point on it would have an expenditure that cannot be afforded with the budget allocated. Thus, needless to say, B is the point of consumer equilibrium or utility maximisation. Therefore, it can be said that utility maximisation in ordinal approach is achieved when,

"an indifference curve is tangent to the budget line, and the slope of the indifference curve is equal to the slope of the budget line."

Thus, the condition for constrained utility maximisation, consumer optimization or consumer equilibrium occurs when the consumer spends all disposable income, and

$$MRS_{XY} = \frac{P_X}{P_Y}$$

Demand: In economics, it is an economic principle that describes a consumer's desire and willingness to pay price for a specific good or service. It refers to how much (quantity) of a product or service is desired by the buyers. It is essential to note that the term demand signifies the ability & willingness to buy a particular commodity at a given point of time.

Demand Schedule: A table showing the quantity of a commodity that the consumer demands, at each price of the commodity, while holding constant all other relevant economic variables on which demand depends (the "ceteris paribus"* assumption).

* Ceteris paribus is a Latin phrase, which translated means "with other things the same".

NOTE: In the above excerpt, the two terms have been defined for individual consumers or households. If we sum up all the individuals demands of various consumers, we will get the market demand & market demand schedule respectively.

Law of Demand:

Definition:

Assuming a ceteris paribus state for various 'other' determinants of demand, the 'demand' and 'price' of a commodity consumed, is are inversely related.

Meaning:

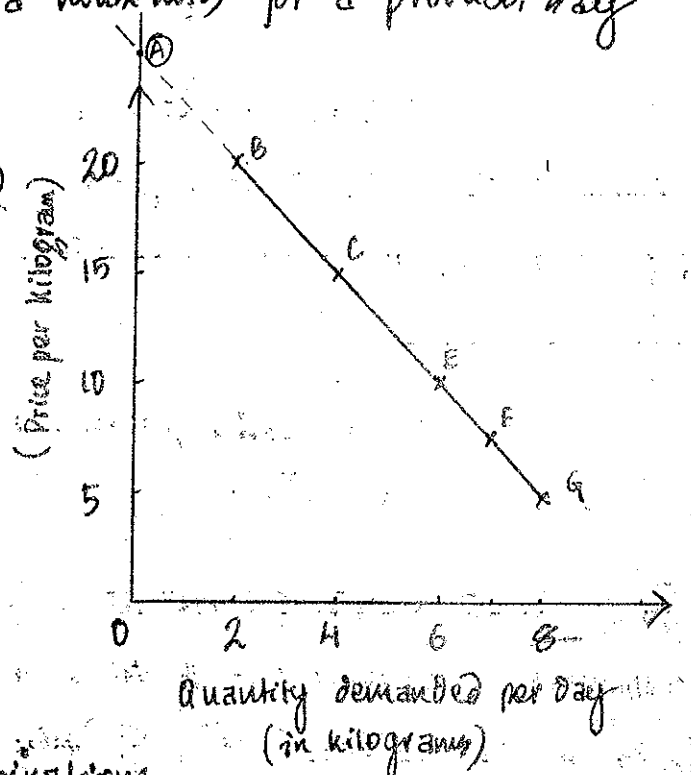
When the variables - income, tastes & habits of consumers, prices of related goods (substitutes & complementary) are held

implies that a greater quantity of the commodity is demanded at lower prices and a smaller quantity at higher prices.

Example & Description:

The following table shows the price & corresponding quantity demanded by a consumer (or a household) for a product, say potatoes.

Price per kilogram	Quantity demanded per day (in kilograms)
₹ 20	2
₹ 15	4
₹ 10	6
₹ 7·50	7
₹ 5	8

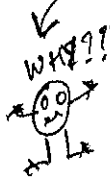


By plotting on a graph the various price-quantity combinations given by the demand schedule, we obtain the demand curve for the commodity. The price per unit of the commodity is measured along the vertical axis, while the quantity demanded per unit of time, is measured along the horizontal axis. Any point on the demand curve reflects the price & corresponding quantity demanded at such price level. The curve is reminiscent of the fact that as the price increases, the demand decreases & vice versa.

Here, the demand curve is shown to be a straight line. i.e., demand could be expressed as a linear function of price

of commodity. $D_x = f(P_x) = (a - bP_x)$ (say).

But, it is not necessary to be a linear function. Hence, it should be remembered that the demand curve may also be a curve (an exponential curve), but irrespective of the nature or shape of curve, one thing will remain unchanged, i.e., demand curve has a "negative" slope; it always slopes downward to the right.



When price of a commodity increases, MU of rupee spent on the commodity reduces, so the consumer equilibrium is shifted & he consumes less. Similarly, when price of a commodity reduces, MU of rupee spent on the commodity increases, & hence the consumer is willing to consume more & more, (as long as MU of rupee spent on commodity equates with MU of rupee in terms of other goods). Thus, it can be said that the demand curve & diminishing part of MU curve bear a striking verisimilitude with each other. The MU curve slopes downwards towards the right (as a consequence of Law of Diminishing Marginal Utility) and this also explains the nature of demand curve.

It is an obvious fact that demand can never be negative. But, it can be zero. The point A shows the situation, when demand is ~~maximum~~ zero. Another plausible situation is, when price reduces to zero (commodity becomes 'free') the demand is maximum!

Assumptions: The following assumptions are made:

(a) Ceteris paribus for other 'determinants of demand' such as

b) consumer is a rational consumer.

c) it is assumed that the consumer has not reached a level of saturation with the good, i.e. given an opportunity, the consumer would tend to consume more.

Limitations: There can be situations where the Law of Demand does not hold good. These are explained below:

i) Giffen Good:

Though most economists disagree on the existence of such goods in the market, it should be discussed in this context. A Giffen Good describes an inferior good that as the price increases, demand for that good increases. The nature of such a good is that it is mainly consumed by poor households & that its expenditure forms a major share of the disposable income. Consider, for instance, a household of a daily unskilled labour. Suppose, his monthly allocation for food (budget) is ₹ 210/-

15 kg of rice @ ₹ 10/kg	=	₹ 150/-
3 kg of vegetables @ ₹ 20/kg	=	₹ 60/-
		₹ 210/-

Now, suppose the price of rice increases to say, ₹ 13/kg. The household cannot decrease its demand from 15 kg because that is their bare minimum to live. Hence, it would respond by cutting demand of luxury good (in this case, vegetables), and instead ~~bought~~ buy rice. They may also buy a little more rice in anticipation of further rise of price of rice.

15 kg of rice @ ₹ 13/kg = ₹ 195/-

0.75 kg of vegetables @ ₹ 20/kg = ₹ 15/-

₹ 210/-

Therefore, in a sense, rice here, is a Giffen good.

As another example, during the Irish Potato Famine of the 19th century, potatoes were considered a Giffen good. Potatoes were the largest staple in the Irish diet, so as the price rose it had a large impact on income. People responded by cutting out on luxury goods such as meat & vegetables, & instead bought more potatoes. Therefore, as the price of potatoes rose, so did the demand!

FACT! These goods are referred to as Giffen goods, in honour of the nineteenth century British economist, Robert Giffen, who supposedly first discovered it.

ii.) Commodities which are used as status symbols:

Some expensive commodities like vintage cars, paintings etc are used as status symbols to display one's wealth. The more expensive these commodities become, the higher their value as a status symbol and hence, the greater the demand for them (among the rich and elite, of course!) The amount demanded increases with increase in price. These are also called Veblen Goods.

iii.) Expectation of a 'further' increase in price:

If a household expects the price of a commodity to increase it may start purchasing a greater amount of the commodity even at the presently increased price. Similarly, if the household

By now, it should be an obvious fact that we will be studying demand fluctuations. There are of two types:

Change in Quantity Demanded refers to movement along a given demand curve as a result of change in commodity price. All other determinants of demand remain constant. The demand curve is also fixed.

Change in Demand the shifting of the demand curve! It is caused by change in the economic variables that were held constant while drawing a demand curve.

Therefore, the factors or driving forces responsible for a change in demand, are referred to as determinants of demand. They are:

i) change in consumer incomes.
ii) change in tastes, habits of consumers.
iii) change in prices of related goods.

} all of which were assumed to be constant under ceteris paribus assumption while drawing a demand curve.

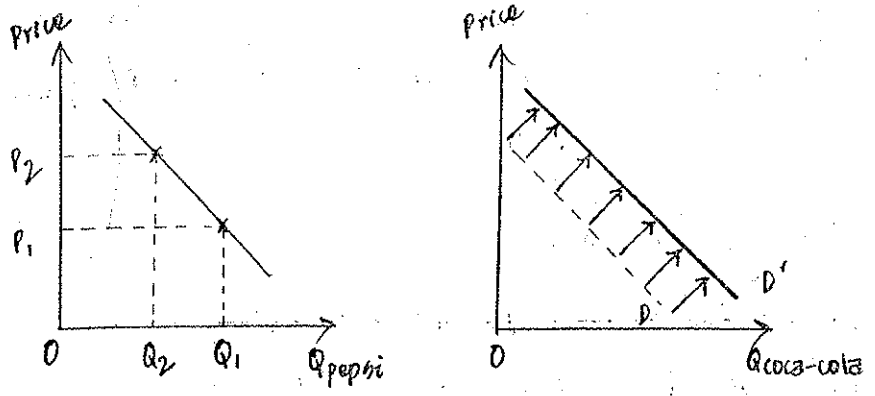
Let us understand each factor in further detail:

Change in Prices of Related Goods:

Two types → Complementary ~~Related~~ Goods
Two types → Substitute Goods

Substitute Good: Two goods are said to be substitutes of each other, if an increase in the price of one of them leads to increase in demand of the other.

For an instance, let us assume that consumer is not brand-loyal and that his urge is to satisfy himself with a softdrink. Initially, he consumes Pepsi, whose price per unit is say, Q_1 (as shown).



Now, if the price per unit of Pepsi rises from P_1 to P_2. This would cause the consumer to consume less Pepsi, thus indicating the quantity demanded from Q_1 to Q_2. At the same time, the consumer, to satisfy his thirst, would resort to drinking Coca-cola. Hence, for the substitute good Coca-cola, there is a change in demand and its demand curve shifts out for all price levels, from D to D', leading to more of this substitute good consumed.

Therefore, if goods A and B are substitutes, an increase in the price of A will result in a leftward movement along the demand curve of A and cause the demand curve for B to shift out. A decrease in the price of A will result in a rightward movement along the demand curve of A and cause the demand curve for B to shift in.

Complementary Good: If goods A and B are complements, an increase in the price of A will result in a leftward movement along the demand curve of A and cause the demand curve for B to shift in; less of each good is demanded. A decrease in price of A will result in a rightward movement along the demand curve of A and cause the demand curve of B to shift outward; more of each good is demanded.

Consider the example of tea and sugar. If we make an assumption

increase in the price of tea would lead to decrease in its consumption, and consequently demand of sugar will fall. Hence, sugar is complementary good of tea.

Change in Tastes Habits of Consumers:

Suppose, a consumer is impressed by an advertisement in TV, in which his/her favourite actor drinks Coca-cola, and as a result, his/her liking for Coca-cola increases. This would shift his/her demand curve to the right. This is an example of a "favourable" change. An "unfavourable" change in taste will imply the opposite.

Therefore, we can say, "a favourable (unfavourable) change in tastes shifts the demand curve to the right (left)".

One maybe of the opinion that consumers make buying decisions solely based on price & their own personal preference. However, it is not so. The Bandwagon effect & Snob Effect elucidate the same.

Band-wagon effect: It is a general rule in behavioural science, that conduct or beliefs spread among people, like trends, with "the probability of any individual adopting it, increasing with the proportion who have already done so." Thus, as more & more people come to believe in something, others also "hop on the bandwagon".

In microeconomics, it describes interactions of demand & preference. It arises when people's preference for a commodity increases as the number of people buying it increases. The fashion industry & electronics market show this effect visibly.

Snob effect: It refers to the situation where the demand for a certain good for individuals of a higher income level is inversely related to the demand for the good by individuals of a lower income level. Thus is the behavioural effect that arises from the ego of the "rich" to being "rich" & "having a class". For instance, the rich would go to a designer wear shop and buy an exorbitantly priced dress, just because of the fact that the people with lesser income would not be able to buy it (irrespective of the object's value or usefulness), and would use it to flaunt their "richness".

Change in Consumer Income: It depends on the nature of the good- whether it is a normal good or an inferior good. Normal Goods are those, for which demand increases as income increases. Inferior Goods, on the other hand are those, for which demand falls as income rises.

Example 1: Suppose that you only buy peanuts & ice cream from your pocket money. Ice cream is your favourite but it is costly. You like peanuts much less, but they are cheap. Suppose that your pocket money increases. Obviously, you would buy more ice cream, & very likely, you will buy less of peanuts, not because your taste changes but because you can afford more ice cream, which is your favourite. Thus, for you, peanut is an inferior good whereas ice cream is a normal good.

Example 2: Cheaper cars are an example of inferior goods. Consumers will generally prefer cheaper cars when their income is restricted. As a consumer's income increases the demand of cheap cars will decrease. So cheap cars are inferior goods.

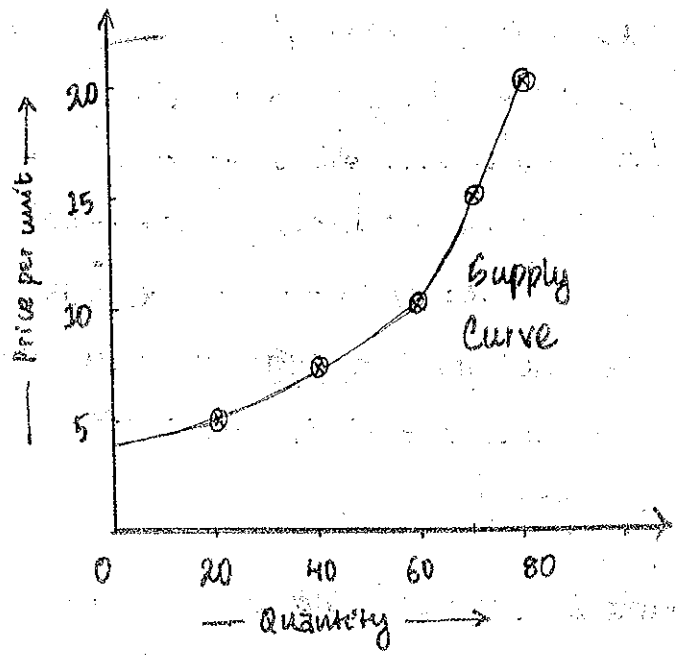
Law of Supply:

Definition: With all other determinants of supply ceteris paribus, an increase in price of a product leads to increase in quantity supplied of it & vice versa.

Meaning: With other factors like production methodology, input & costs etc remaining constant, a producer or supplier would prefer to supply more & more as price of a commodity increases, to reap incremental profit and on the contrary, would supply less, when the price falls.

Example: A producer is producing & selling a product, say processed food packets. The quantity the producer would like to supply at different prices is depicted below in the supply schedule given below:

Price in Rs/ Unit	Quantity supplied in numbers per day
₹ 5	20
₹ 7.50	40
₹ 10	60
₹ 15	70
₹ 20	80



The above depiction shows that the producer will not supply any processed food packets when at a certain price (Rs 3.50, say). As the price increases, the supplied quantity increases

Conclusion: A producer facing demand would like to supply more & more in the market as price increases & vice-versa, i.e., shrink the supply when price decreases.

Assumptions:

i.) Production technology, scale of operation remain unchanged.

ii) Costs of inputs remain same.

iii) imposition of Govt. Regulations such as tax rates, etc remain unchanged.

v.) Effect of non-economic factors such as hazards, natural disasters, strikes etc is nullified.

Limitations: The determinants of supply, factors that were mentioned in Assumptions section do not remain under ceteris paribus condition practically. Hence, their effects do creep in while determining supply.

NOTE! While justifying Demand concepts, the difference between 'change in demand' & 'change in quantity demanded' was explained. Similarly, the difference between 'change in supply & change in quantity supplied' can be explained, & think, is self-explanatory.

Determinants of Supply:

Change in Input Prices: When the prices of inputs of production increase, it becomes less attractive to produce, & the quantity that firms are willing to supply ~~increases~~ decreases. In contrast, firms are willing to supply more output when the prices of the inputs to production decrease. Thus, in general, an 'increase (decrease) in an input price shifts the supply curve to the left (right)'.

Technological Changes:

Technology, in an economic sense, refers to the processes by which inputs are turned into outputs. Technology is said to increase when firms can produce more output than they could before from the same amount of input (alternatively, getting the same amount of output as before from fewer inputs). On the other hand, technology is said to decrease when firms produce less output than they did before with the same amount of input.

Increase in technology makes it more attractive to produce, because the Marginal Cost of Production or per unit production cost decreases. Hence, technological increase shifts the supply curve leftwards & technological decreases shifts it rightwards.

Imposition of Govt. Regulations:

Taxes are levied on the total production cost of a firm. Thus, a change in tax rates has a cumulative effect on production costs. Therefore, an increase (decrease) in tax rates shifts the supply curve to the left (right).

Changes in the Prices of Related Products:

Producers, with their given amount of resources, manufacture more than one item. Consider a farmer who has a given amount of land, which he uses to produce wheat or corn (or both). If the market price of wheat increases, he will grow less corn even when the price of corn, the technology of producing corn & input prices remain the same. It is because, growing corn is less profitable now, compared to growing wheat.

Thus, an increase (a decrease) in the price of a substitute good in production shifts the supply curve of a good to the left (right).

Non-economic factors:

There are several chance factors like weather changes, health of workers, strikes etc which can shift or change marginal cost of production. The supply curve is also influenced by price speculations. In times of natural disasters, war, prices of essential goods typically rise. Some producers try to take advantage by 'hoarding'; i.e. withholding their supply to the market, expecting to sell later at further exorbitant prices.

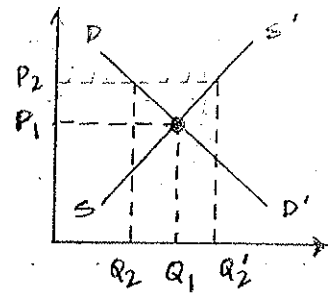
Market Equilibrium:

Now that we have understood the notions of supply and demand, let us take a step further and realise the intricacies of their interaction and inter-relations with reference to the market. Market Equilibrium refers to a condition where a market price is established through competition such that the amount of goods or services sought by buyers is equal to the amount of goods or services supplied by sellers. This 'price' does not tend to change unless demand or supply changes.

Quite a mouthful, right? Interestingly though, the point of market equilibrium is defined by the point of intersection of the demand and supply curves. Now that's pretty neat and simple!

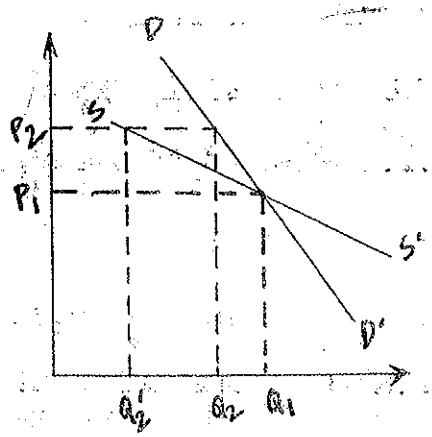
There are two approaches - considering the economy to be a static one or as a dynamic one with ever changing economic variables. Further, the equilibrium can be stable, unstable or even neutral. The equilibria under static economy can be explained with the help of price mechanism and the Cobweb model approach would be adopted for explaining the equilibria in dynamic economy.

Stable Equilibrium: (Static)



The hypothetical market demand & market supply curves are shown by DD' & SS'. Their point of intersection marks equilibrium. Thus, P_1 is the market equilibrium price. Let us assume the price of the good increases to, say P_2. As a consequence, the demand drops to Q_2. At the same time, as $P_2 > P_1$, to earn extra profit, the suppliers supply a greater quantity of goods Q_2'. Thus, there is an extra supply in the market [demand < supply]. Because of the accumulation of unsold stock, the producers would decrease the price. Correspondingly, the demand would then increase and thus, the equilibrium is re-attained. Therefore, this is deemed as stable equilibrium.

Unstable Equilibrium: (Static)

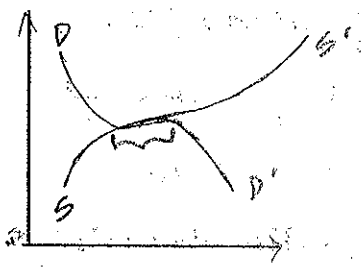


On a firsthand overview, one may conclude that the supply curve is 'weird' & does not fulfil 'Law of Supply'. Consider the example of war. At wartime, prices of services goes up; but the value of services reduces. For instance, suppose wages increase, but the labourers now give less manhours.

Consider another example. Say I am a farmer, desperately looking for ₹ 10,000/- for some emergency need. I have plenty of rice in my godown. One of my options maybe to sell a portion of rice in the market (say 1 tonne) @ ₹ 10/kg = ₹ 10,000/-. If the price of rice increases to ₹ 20/kg, then I would sell only 500 kg! So, this shows a case when price increases & supply reduces!

In such a situation, suppose the equilibrium price is P_1. If the price increases to P_2, the quantity demanded becomes Q_2 & the supply becomes Q_2'. As is shown, $Q_2' < Q_2$, i.e., their is a shortage of goods, because demand > supply. This leads to further escalation of price & further 'dis-equilibrium'. The system no way restores its equilibrium. Therefore, it is deemed as unstable equilibrium.

Neutral Equilibrium: (Static)



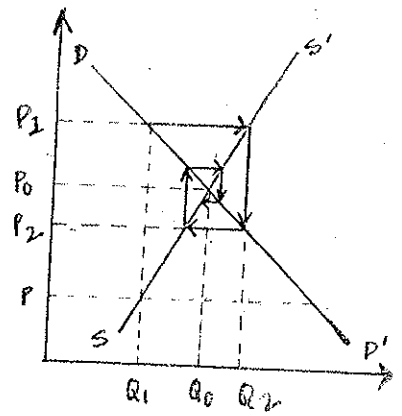
occurs when the demand & supply curves coincide over a considerable range of either price or quantity. Once disturbed, the nature of equilibrium is not maintained or determinable.

~~Stable Equilibrium: (Dynamic)~~

Dynamic Equilibrium:

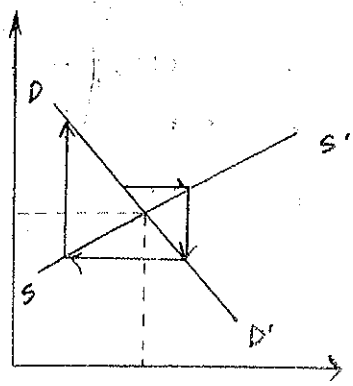
Whereas in a static equilibrium all quantities have unchanging values, in a dynamic equilibrium, various economic parameters may all be growing at the same rate, leaving their ratios unchanging. Thus, we can say that the parameter of 'time' gets added to the picture. To analyse the 3 cases of dynamic equilibrium, we take help of the Cobweb Theorem. The most important assumption in this case, is that supply is a lagged function of price. In other words, there is a time lag between supply and demand decisions. A best example to drive home this fact is that of agricultural markets, where there is a time lag between planting and harvesting. Speaking of industries, it should be understood that each commodity has a processing or production time. Hence, instantaneous change in supply is not possible.

Stable Equilibrium: (Dynamic)



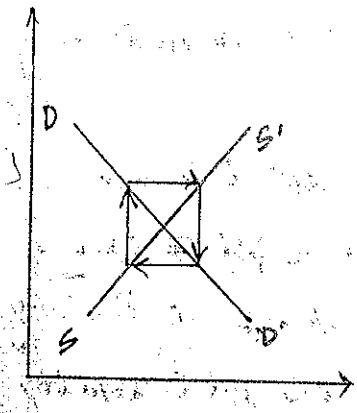
The curve in red is the demand curve & the one in blue is the supply curve. The equilibrium price is at the intersection of these 2 curves. Another thing should be noted that supply curve is steeper than the demand curve, i.e., absolute slope of demand curve is more than that of supply curve. At time $t = 0$, say the equilibrium price of strawberries is P_0 (as shown). Suppose at period $t = 1$, as a result of unexpected bad weather, the crop becomes unusually small and hence supply falls to Q_1. But at Q_1 demand, the price rises to P_1. How does this happen, one might ask. The fact is, when quantity supplied is Q_1, the farmers charge a price of say P (from supply curve). But at this price P, the quantity demanded becomes exorbitantly high than supply. As demand is greater than supply, the price increases, and by the end of period 1, prices are at a high of P_1. Now, to earn extra profit, under the expectation that the high price will continue, the farmers cannot increase the supply instantaneously. So, the farmers aim at having a higher supply Q_2, at period $t = 2$. But as the demand was Q_1, there is an excess of supply, which plummets the price to a lower P_2 (with an aim to sell their stock). As this process repeats itself, oscillating between periods of low supply & high prices & then high supply with low prices, the price & quantity trace out a spiral. As is the case above, if supply curve is steeper than the demand curve, then the fluctuations decrease in magnitude with every cycle, so the plot of prices & quantities over time looks like an inward spiral or cobweb.

Unstable Equilibrium: (Dynamic)



If the slope of the supply curve is less than the absolute value of slope of demand curve, then the fluctuations increase in magnitude with each cycle, so that prices and quantities spiral outwards. This is called unstable or divergent case.

Oscillating Equilibrium: (Dynamic)



If the slope of supply curve equals the absolute value of slope of demand curve, then the fluctuations remain of constant magnitude, & so the plot would be a square or rectangle. This is the case of an oscillating equilibrium.

We have been dealing with changes in demand, changes in supply. But what we have been doing is qualitative treatment. For quantitative analysis, we turn to elasticity, the concept of which captures the magnitude of change or the degree of responsiveness. Thus, now, we will view 3 things:

- Price elasticity of demand → quantifies the effect of change in own price on the quantity demanded.
- Income elasticity of demand → quantifies the effect of change in ~~price~~ income on the quantity demanded.
- Cross elasticity of demand → quantifies the effect of change in prices of related goods on the quantity demanded.

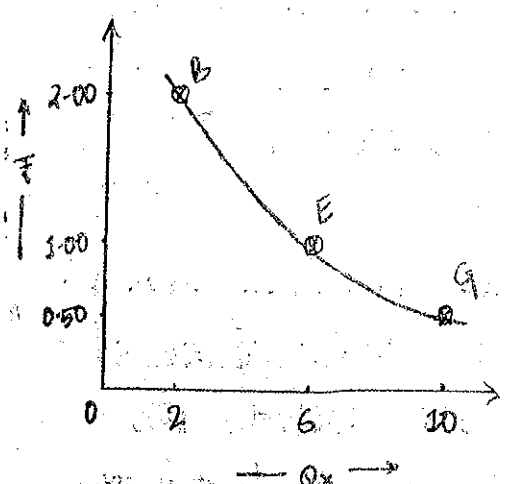
Price Elasticity of Demand:

A measure to show the responsiveness, or elasticity of the quantity demanded of a good or service to a change in its price. It is given by the %age change in quantity demanded of a commodity divided by the %age change in its price, ceteris paribus.

By definition, $PED = \frac{(\Delta Q/Q) \times 100\%}{(\Delta P/P) \times 100\%} = \left(\frac{\Delta Q}{\Delta P}\right)\left(\frac{P}{Q}\right)$

inverse of slope of Demand Curve is a component of PED.

This formula measures point elasticity of demand or elasticity at a particular point on the Demand Curve.



However, if we want to determine the price elasticity between 2 points on the demand curve, we need the arc elasticity of demand. If we use the point elasticity formula, we would get different results depending on whether the price rises or falls. Hence, we use the average of the 2 prices & the 2 quantities in the calculations.

$$PED = \frac{\Delta Q}{\Delta P} \cdot \frac{(P_1+P_2)/2}{(Q_1+Q_2)/2} = \frac{\Delta Q}{\Delta P} \cdot \frac{(P_1+P_2)}{(Q_1+Q_2)}$$ ← arc elasticity of demand.

To make us realise the importance of arc elasticity & shortcomings while using point elasticity, let us look at the graph above.

For a decline in price from B to G,

PED using point elasticity $= \frac{8}{(-1.50)} \times \frac{2}{(2)} = -\frac{16}{3} = -5.33$

On the other hand, for a price increase from point G to B, on the same demand curve.

$$\text{PED using point elasticity} = -\frac{8}{(1.50)} \cdot \frac{(0.50)}{(10)} = -\frac{4}{15} = -0.27$$

Thus, for the same two points, we get different results (values of PED) depending whether the price rises or falls.

But, using arc elasticity from B to G or G to B, we get

$$\text{PED} = -\frac{8}{(1.50)} \cdot \frac{2.50}{(12)} = -\frac{20}{18} = -1.11$$

IMP! When demand curve is not a straight line, we have to draw a tangential line at the point where we want to find elasticity of demand. This tangential line will give us the requisite slope & price & quantity component.

IMP! The absolute value of PED can range from zero to infinity. In general, PED can also be negative. The various cases are presented below:

i) $|PED| > 1$: $PED = \frac{\Delta Q/Q}{\Delta P/P} > 1$ implies that numerator is greater than denominator. In other words, %age of change in demand is greater than %age of change in price. Here, the demand is said to be elastic and examples of such goods are luxury items like jewelry, expensive vehicles etc.

ii) $|PED| < 1$: Here, the %age of change in demand is lesser than %age of change in price. The demand is thus said to be inelastic and examples of such goods like rice, clothes & basic necessities.

iii) $|PED| = 1$: Here, the %age of change in demand equals %age of

iv.) $|PED| = 0$: Here, the %age of change in demand is Zero, irrespective of %age of change in price. Here, the demand is therefore, perfectly inelastic. One of the best example includes basic medicines for common ailments.

v.) $|PED| \to \infty$: Here, the denominator or %age of change in price is zero. Thus, the demand changes but price doesn't. The demand is said to be perfectly elastic.

Properties of PED:

i) PED is just a ratio of %ages. & thus, is independent of choice of unit.

ii) Of two parallel demand curves (linear or non-linear), the one further to the right has a smaller PED at each price.

iii) When 2 demand curves intersect, the flatter of the two is more price elastic at the point of intersection.

Factors affecting the magnitude of PED:

i) Availability of close substitute:

PED for a commodity is larger the closer & the greater are the number of available substitutes.

For instance PED for coffee is more elastic than the demand for salt because coffee has more substitutes (cocoa, tea, health drink) than salt. Thus, it can be said that if a commodity has perfect substitutes, its PED would be infinite.

ii) Proportionate of Total Expenditure:

In a very generalised way, the larger (smaller) the fraction of income spent on the product, the greater (lesser) is its PED.

For instance, people spend a little amount of income on salt. Thus, a change in price of salt would have insignificant or no impact on its demand. On the contrary, if it is a car, or say, something expensive that eats off considerable portion of income, it would have a high PED.

iii) Time Period:

PED is larger, longer is the time period allowed for consumers to adjust to a change in price of the good.

For instance, consumers may not be able to reduce much of the quantity demanded of electricity soon after learning of an increase in the price of electricity. However, over a period of several years, households can change or upgrade into energy efficient appliances and so on.

PED's effect on Total Expenditures:

Just a bit of logical analysis would explain the following results:

Price Change	Elasticity	Total Expenditure
↑	$\|PED\| > 1$	↓
↓	$\|PED\| > 1$	↑
↑	$\|PED\| < 1$	↑
↓	$\|PED\| < 1$	↓
↑↓	$\|PED\| = 1$	No change

Income Elasticity of Demand:

A measure to show the responsiveness or elasticity of the quantity demanded of a good or service to a change in consumer income. It is given by the %age change in quantity demanded of a commodity divided by the %age change in consumer income, ceteris paribus.

By definition, $IED = \frac{(\Delta Q/Q) \times 100\%}{(\Delta I/I) \times 100\%} = \left(\frac{\Delta Q}{\Delta I}\right) \cdot \left(\frac{I}{Q}\right)$

↙ inverse of slope of Engel curve, the curve that shows the amount of a commodity that a consumer would purchase per unit of time at various income levels, ceteris paribus.

We already know the definitions of a normal good & an inferior good. So, now we can say that if IED is positive, it is a normal good and if IED is negative, it is an inferior good.

Now, a normal good can be further classified as a necessity if IED is less than 1 and as a luxury if IED is greater than 1.

In reference to Engel Curve:

i) if the tangent to Engel Curve is positively sloped & crosses the income axis, IED exceeds 1 and the good is a luxury at that income level.

ii) if the tangent to Engel Curve is positively sloped & crosses the origin, IED equals 1.

iii) if the tangent is positively sloped & crosses the horizontal axis, IED is less than 1 and the good is a necessity at that income level.

iv) if tangent to Engel Curve is negatively sloped, the commodity is an inferior good.

Cross Elasticity of Demand:

We have already seen the effect of fluctuation of a good's price in the ~~price~~ demand of substitute and related goods. Thus, we can measure the responsiveness or sensitivity in the quantity purchased of commodity X as a result of a change in the price of a commodity Y by the cross elasticity of demand (CED). This is given by:

$$\text{By definition, } CED = \frac{(\Delta Q_x / Q_x)}{(\Delta P_y / P_y)} = \left(\frac{\Delta Q_x}{\Delta P_y}\right) \cdot \left(\frac{P_y}{Q_x}\right)$$

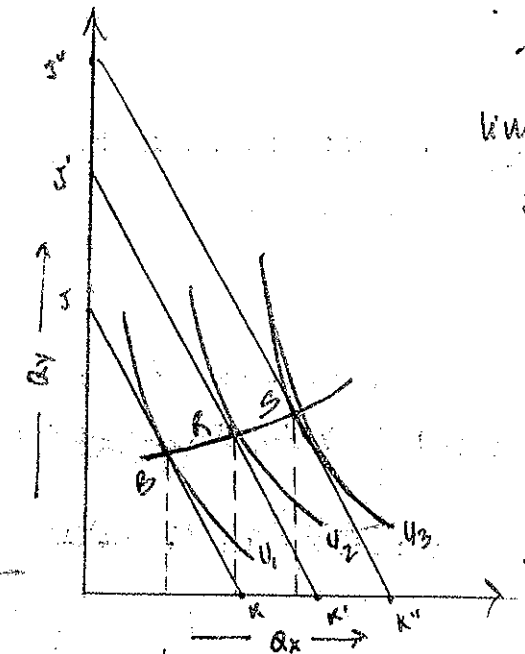
It should be noted that while measuring CED_{xy}, we hold constant P_x, consumers' incomes, their tastes & the number of consumers in the market.

* If $CED_{xy} > 0$, X and Y are substitutes because an increase in P_y leads to an increase in Q_x as X is substituted for Y in consumption.
* If $CED_{xy} < 0$, X and Y are complements because an increase in P_y leads to a reduction in Q_x.
* The absolute value, i.e. $|CED|$ measures the degree of substitution or complementarity. For instance, if $|CED|$ between coffee & tea ~~are better substitutes than coffee~~ larger than $|CED|$ between coffee & hot chocolate, this means that coffee & tea are better substitutes than coffee & hot chocolate.
* If CED_{xy} is close to zero, it means that X & Y are independent commodities.
* It should also be understood that the value of CED_{xy} need not be equal to the value of CED_{yx}, because the responsiveness of Q_x to a change in P_y need not equal the responsiveness of Q_y to a change in P_x.

CONSUMER BEHAVIOR

Changes in Income:

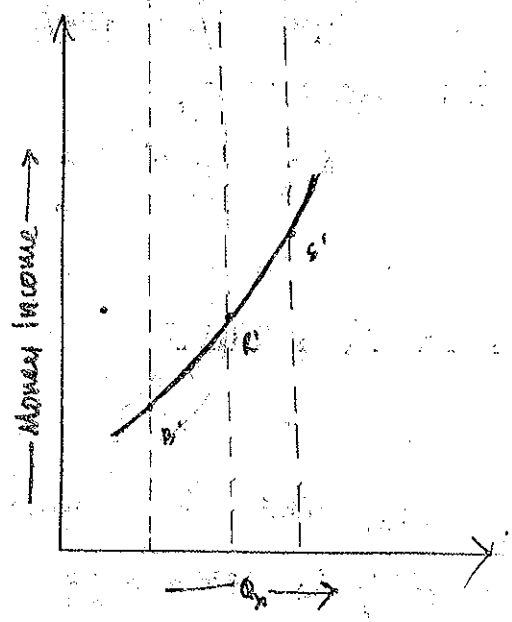
We study the consumer behaviour changes with change in income, while holding prices & tastes constant. We derive the income-consumption curve, which is the locus of consumer optimum points resulting ~~only~~ when only the consumer's income varies.



The top curve shows that with budget line JK the consumer maximises utility or is at an optimum at point B, where indifference curve U_1 is tangent to budget line JK.

When the income increases, as P_x & P_y remain the same, the budget line shifts parallel to JK and becomes J'K'. The consumer maximises his utility at point R. Similarly, when the income increases further, the consumer equilibrium shifts to S.

By joining the points B, R & S, we get the Income Consumption Curve of the consumer. From this curve, we can derive the Engel Curve, which shows the amount of a good that the consumer would purchase per unit of time at various income levels.



NOTE 1)

i) Price Engel Curve & ICC are derived from points of consumer utility maximisation, $MRS_{xy} = P_x/P_y$ at every point on the curve.

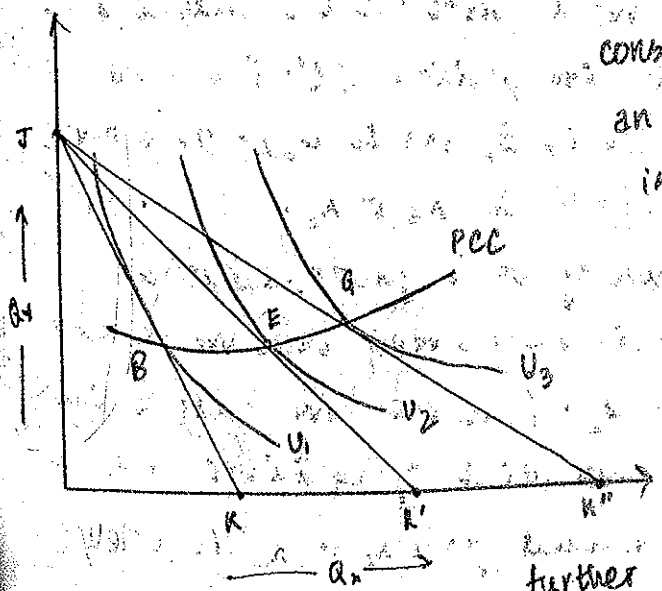
ii) if the Engel curve rises gently, it indicates that a given increase in income leads to a proportionately larger increase in the quantity purchased of the good.

iii) if the Engel curve rises rapidly, it indicates that a given increase in income leads to a proportionately smaller increase in quantity purchased of these goods.

Changes in Price:

A change in commodity prices changes the consumer budget line, and thus affects consumer purchases. By changing the price of good X while holding constant the price of good Y, income & tastes, we can derive the consumer's price consumption curve for good X.

Thus, the price-consumption curve, for good X is the locus of consumer optimum points resulting when only the price of good X varies.



As is shown with budget line JK, the consumer maximises utility or is at an optimum at point B, where U_1 is tangent to budget line.

Suppose the price of X decreases. All other things remaining same, the new budget line is JK', & the new point of maximum utility is E. Similarly, if the price of X further decreases, we get the point G.

Joining B, E & G, we get the price-consumption curve.

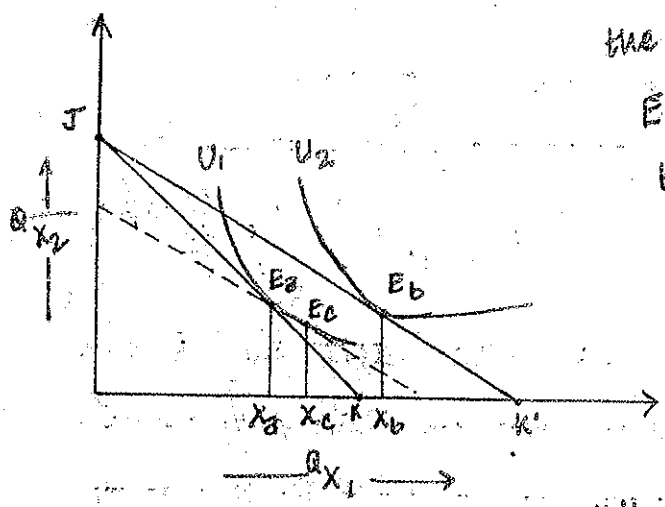
Economists often separate the impact of a price change into two components:

i) the substitution effect → involves the substitution of good X_1 for good X_2 or vice-versa, a result of change in prices.

ii) the income effect → results from an increase or decrease in the consumer's purchasing power.

The decomposition of the Price Effect into income & substitution effect can be done in several ways. Two of the important approaches are: Hicksian method & Slutsky method.

Hicksian Approach:

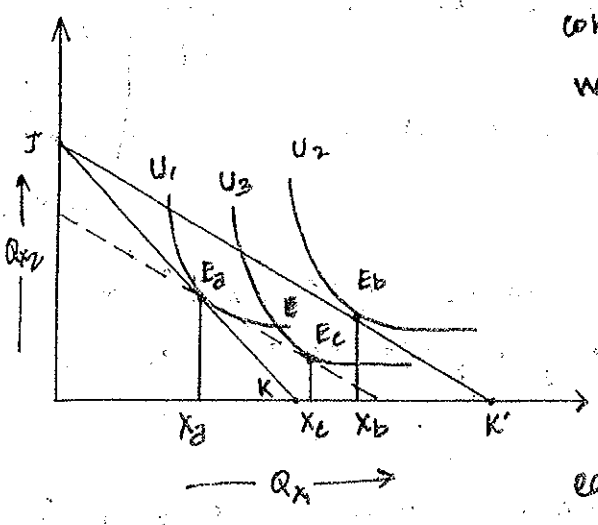


Initially, the budget line was JK and the consumer's equilibrium point was E_a, where budget line was tangent to indifference curve U_1.

All other things remaining constant, a fall in price of good X_1 would pivot out the budget line to new position JK'. The new equilibrium is E_b (on IC U_2). As shown on horizontal axis, the total Price Effect is X_a to X_b.

Now, Hicks assumed that, because of some factor, suppose the income decreases, ceteris paribus, in such a way that we came back to our initial indifference curve U_1. Thus, the new budget line is shown in red-dashed line. The new point of equilibrium is E_c. The decrease in quantity demanded from X_b to X_c is solely in response to a change in income of the consumer. This is the Income Effect. On a similar note, therefore, X_aX_c is called the Substitution Effect.

Slutsky Approach:



Price Effect is X_a to X_b.

Initially, the budget line was JK and the consumer's equilibrium point was E_a, where budget line was tangential to indifference curve U_1.

All other things remaining the same, a fall in the price of good X_1 would result the budget line to pivot out to JK'. The new equilibrium is E_b (on IC U_2). The total

To isolate the substitution effect, Slutsky assumed the consumer's money income to that ~~the~~ he/she would just be able to afford the original consumption (E_a). Thus, the new budget line (marked in red-dashed line) ~~shows the~~ passes through point E_a.

For this budget line, there would be a certain indifference curve say U_3, that would be tangential to it. Here, E_c marks the equilibrium point.

The movement from E_a to E_c is the substitution effect, & the remainder of the Price effect is called the Income effect.

Analysis of Substitution & Income Effects:

i) In the real world, the substitution effect is likely to be much larger than the income effect.

The reason is that most goods have suitable substitutes, & when the price of a good falls, the quantity purchased is likely to increase very much as consumers substitute the now-cheaper goods for others.

ii) If a consumer purchases several goods & hence spends only a small fraction of his or her income on any one good, the income effect of a

iii) although the substitution effect of a price reduction is always positive (always leads to an increase in the quantity demanded of a good),

the income effect can be positive if good is normal or negative if good is inferior.

iv) Because the substitution effect is usually larger than the income effect, the quantity demanded of inferior good increases when its price falls.

v) if substitution effect is smaller than the negative income effect, this becomes a Giffen Good.

Demand - a view from the producers' perspective:

Upto now, we examined demand only from the consumers' side. But it is not hard to ascertain that consumers' expenditures on a commodity are the receipts or total revenues of the sellers of the commodity. So here, let us extrapolate & analyse the sellers' side of the market.

Total Revenue: The total receipts of a seller, from the sale of a certain good in question. It is equal to the price per unit times of the commodity times the quantity of the commodity sold.

Marginal Revenue: The additional revenue that will be generated by increasing product sales by 1 unit.

In other words, it is the change in total revenue per unit change in the quantity sold.

It should be understood that the sum of the marginal revenues on all units of the commodity sold equals total revenue.

Relation between Marginal Revenue & Price Elasticity:

Let P be the per unit price of a certain commodity and Q be the total quantity of goods demanded (hence sold). Then,

Total Revenue, $TR = (P \times Q)$.

Differentiating both sides with respect to Q, we get

$$\frac{d(TR)}{dQ} = P + Q\frac{dP}{dQ}$$

From definition, $\frac{d(TR)}{dQ}$ = change in total revenue per unit change in quantity sold = Marginal Revenue (MR).

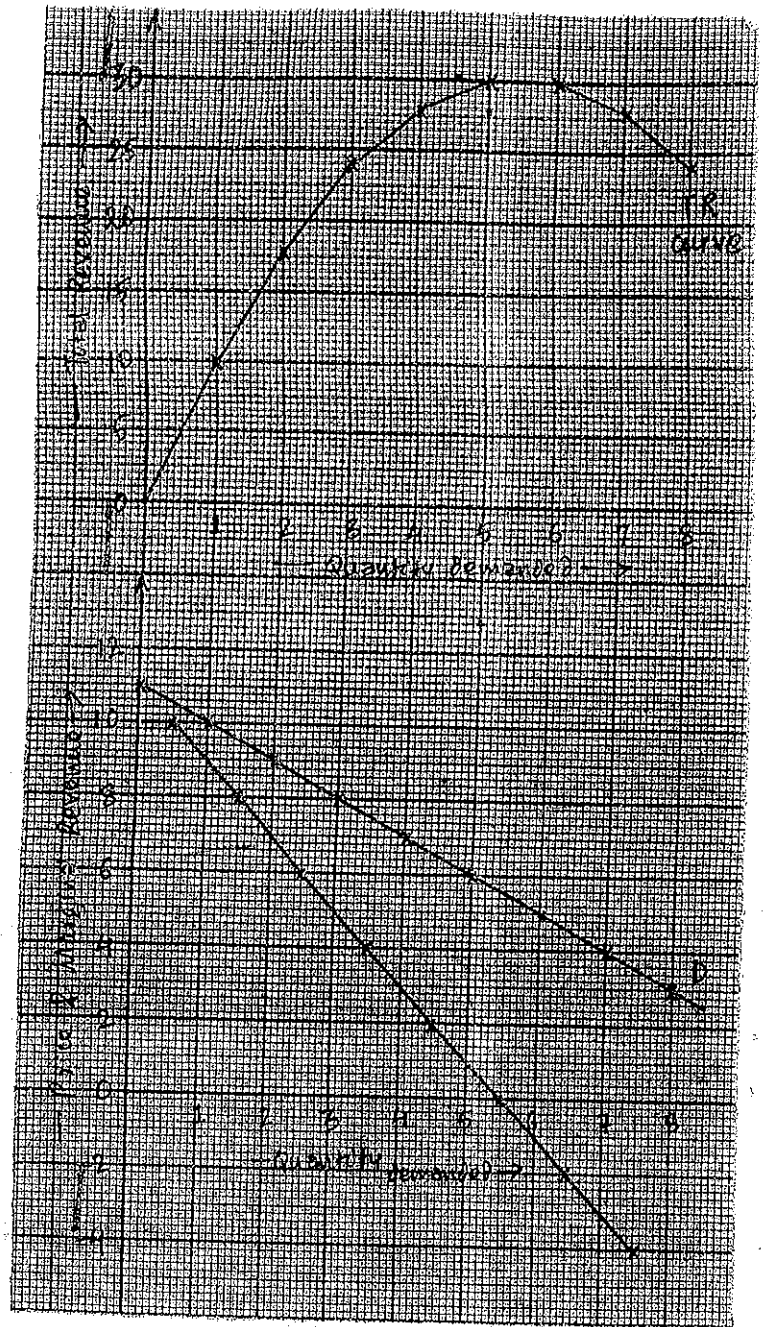
Hence, $MR = P + Q\frac{dP}{dQ} = P\left(1 + \frac{Q}{P}\frac{dP}{dQ}\right) = P\left(1 + \left(\frac{dP/P}{dQ/Q}\right)\right)$

or, $\boxed{MR = P\left(1 + \frac{1}{PED}\right)}$, where PED = price elasticity of demand.

The following table is such that, price (column 1) and quantity (column 2) give the demand schedule of the commodity. Price times quantity gives total revenue (column 3). The change in total revenue resulting from each additional unit of the commodity sold gives the marginal revenue (column 4).

Price	Quantity	Total Revenue	Marginal Revenue
11	0	0	-
10	1	10	10
9	2	18	8
8	3	24	6
7	4	28	4
6	5	30	2
5	6	30	0
4	7	28	-2

As a check on the calculations, we see that the sum of the marginal revenues equals total revenues. Now, let us plot all the information on a graph.



The top panel gives the total revenue curve. The bottom panel gives the corresponding demand (D) and marginal revenue curves (MR).

Since MR is defined as the change in TR per unit change in Q, the MR values are plotted at the midpoint of each quantity interval in the bottom panel.

i) The MR curve starts at the same point on the vertical axis as the D curve and is everywhere else below the D curve. This is because, to sell one more unit, price must be lowered for the additional unit.

ii) When D is elastic ($|PED| > 1$), MR is positive and an increase in Q increases TR.

iii) When D is unitarily elastic ($|PED| = 1$), MR is zero because increase in Q leaves TR unchanged (TR is maximum at that instant).

iv) When D is inelastic ($|PED| < 1$), MR is negative because an increase in Q decreases TR.

PRODUCTION & COST

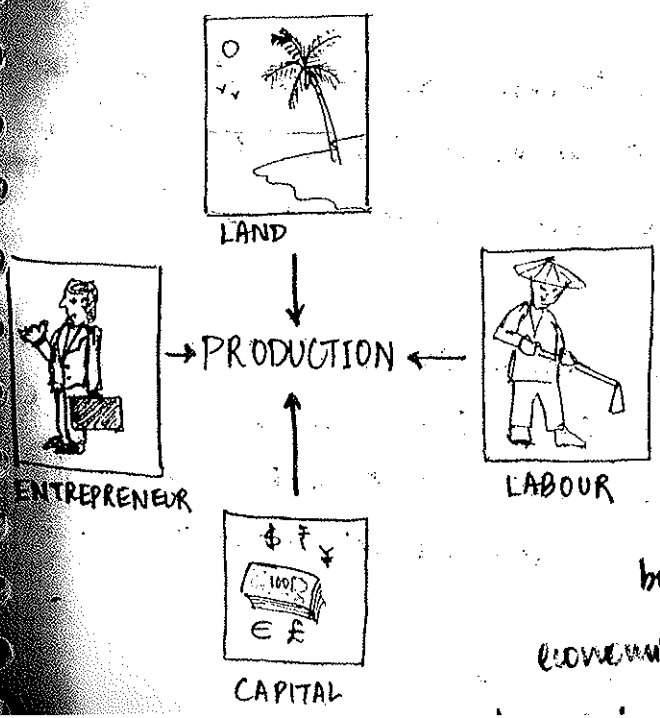
Production: The process of transformation of inputs into outputs in the form of goods and services (with some value addition). The output can be intermediate or final in nature.

Firm: A firm is an organisation that combines and organizes resources (inputs) for the purpose of producing goods and services for sale at a profit.

In general, a firm can be
- proprietorship (owned by an individual)
- partnership (owned by two or more individuals)
- corporation (owned by stockholders)

Just as consumers seek to maximise utility or satisfaction, firms generally seek to maximise profits.

Now, there are enormous number of goods in the market and hence, innumerous number of inputs that go into production functions to produce outputs. For economics' study & analysis, however, inputs, resources or otherwise referred to as factors of production can be broadly classified into four broad categories:



A firm has to pay cost for each of the factors of production. Price payable for each factor is different. Putting more factors into the production process is likely to increase output but it is also associated with extra cost. As long as inputs generate more revenue than costs, there will be addition to profit. Hence, proper economic analysis is necessary to enable firms

Inputs can also be classified as

↓ Fixed Inputs

the inputs that cannot be varied or can be varied only with excessive cost during the time period under consideration.

For instance, the scale of production of an automobile plant, number of robotic arms installed in the assembly line.

↓ Variable Inputs

the inputs that can be varied easily and on short notice during the time period under consideration.

For instance, raw materials (you pay more, get more), unskilled manual labour, amount of electricity an industry requires etc.

Whether an input is fixed or variable, depends on the time horizon being considered.

The time period during which at least one input is fixed is called the short run, and the time period during which all inputs are variable is called the long run.

Again, it should be understood that the length of time it takes to vary all inputs (i.e. to be in the long run) varies for firms in different industries.

To determine the optimal use of inputs, we have to examine & study each input independently, keeping all other inputs constant at a given level. But before we proceed further, we need to understand some terms.

Production Function: Just like an equation relates independent and dependant variables, the production function is defined as "the technological relationship that relates the maximum output that can be produced per unit period of time with various combinations of inputs."

Marginal Physical Product: The output derived from each input put into production process by a producer.

For instance, suppose a farmer cultivates paddy using his land. He increases more & more area under paddy cultivation say 1 to 2 to 3 to 4 acres & so on. Paddy produced from each acre of land under cultivation is the MPP from each acre.

Total Physical Product: It is the sum of output generated from all units of inputs.

For example, the farmer cultivated 4 acres. MPP from four acres are as follows:

i) 1st acre - 20 quintals (MPP of 1st unit)

ii) 2nd acre - 21 quintals (MPP of 2nd unit of input)

iii) 3rd acre - 18 quintals (MPP of 3rd unit of input)

iv) 4th acre - 15 quintals (MPP of 4th unit of input)

Here TPP of all the 4 acres is sum of MPP of each acre under paddy cultivation. Hence, TPP here is 74 quintals.

The concept of Total Utility is similar to the concept of Total Physical Product.

Average Physical Product: At any level it is the TPP divided by the total units of inputs used for production process. APP will vary each unit of input we put in production process. ~~Example~~

Units of input utilized in the production processes	MPP from each unit of input in quintals	MPP from each unit of input in quintals	TPP in quintals	APP quintal
1st unit (1 acre of land)		20	20	20.00
2nd unit (2 acre of land)		21	41	20.50
3rd unit (3 acre of land)		18	59	19.67
4th unit (4 acre of land)		15	74	18.50
5th unit (5 acre of land)		15	89	17.80
6th unit (6 acre of land)		12	101	16.83
7th unit (7 acre of land)		11	112	16.00
8th unit (8 acre of land)		-8	104	13.00

Observations:

i) When MPP reduces, TPP increase at diminishing rate. When MPP is negative, TPP reduces. Due to increase in TPP at diminishing rate, APP shows a gradual declining trend.

ii) Given any one either APP, MPP or TPP we can find the others.

iii) The concept of APP, TPP and MPP is applicable for all inputs but one input at a time.

LAW OF VARIABLE PROPORTION OR LAW OF DIMINISHING RETURNS

Definition: (Samuelson's definition)

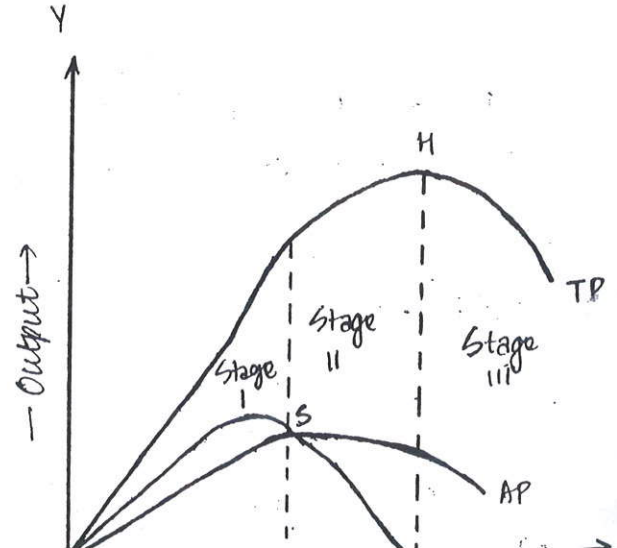
"An increase in some inputs relative to other fixed inputs will in a given state of technology cause output to increase, but after a point the extra output resulting from the same addition of extra input

same, as more of a particular input is used in production, after a certain level, its marginal physical product decreases with further employment of it."

Example: Suppose a farmer is having 10 acres of land, one tractor & agricultural appliances. Let us assume that agricultural soundness, technological prowess, etc remain the same & the farmer gradually increases labour deployment from 1 person to 9 persons. TPP, MPP derived from each labour deployed is shown:

Labour	MPP (quintals)	TPP (quintals)	APP (quintals)	
1	10	10	10.00	Increasing Marginal Returns (MPP)
2	15	25	12.50	
3	12	37	12.33	Diminishing Marginal Returns (MPP)
4	10	47	11.75	
5	8	55	11.00	
6	5	60	10.00	
7	3	63	09.00	
8	0	63	07.88	Negative Marginal Returns (MPP)
9	-1	62	06.89	

The above data, when presented graphically, in 2 dimensions, would appear like



OX axis represents labour deployed and OY axis represents output. Curve TP represents TPP, Curve AP represents APP and Curve MP represents MPP.

Description: The table & the graph show three stages indicating increase in Marginal Returns, diminishing marginal returns & negative marginal returns, due to successive labour deployment from 1 unit to 9 units.

It shows that land, agricultural appliances & other Variable, fixed factors remaining constant (ceteris paribus), as we go on increasing one of the variable factor such as labour, the MPP per labour deployed increases at a faster rate upto certain point, then it increases at a diminishing rate upto a certain point & thereafter, MPP from each unit of labour deployed becomes negative.

Thus, the TPP increases at a faster rate & then at a diminishing rate & reduces when MPP of labour deployed is negative. TPP is HIGHEST WHEN MPP is ZERO!

Causes of Increasing/Diminishing & Negative Returns:

(a) Increasing Returns:

The fixed factor is initially under-utilised and as we go on increasing variable factors, it is intensively utilised which results in a better output at increasing rate, upto a certain stage, till the fixed factor is optimally utilised.

b) Diminishing Returns:

Beyond a certain stage, application of more & more variable factors causes the fixed factor to work harder, proportion of fixed factor for each unit of variable factor reduces, & as a result, the efficiency reduces & MPP reduces, but remains positive.

:) Negative Returns:

When number of variable factors become too excessive relative to fixed factors, the combination fails to produce, & hence MPP becomes

Assumptions:

i) applicable only in short run situation.

ii) state of technology, scale of operation remain unchanged.

iii) only one of the factors is variable, all others in a state of ceteris paribus.

iv) each factored unit is assumed to be identical & homogeneous.

Limitations:

i) always not possible that each factored unit be homogeneous & identical.

ii) long run implications not clear.

Some Important Observations:

i) MP curve reaches its maximum point before the AP curve.

ii) As long as AP_L curve is rising, the MP curve is above it.

iii) When AP curve is falling, the MP curve is below it.

iv) When AP curve is highest, MP curve intersects AP curve.

The reason for these is that, for the AP to rise, the MP must be greater than the average, to pull the average up. For the AP to fall, MP must be lower than the average to pull the average down. For the AP to be at a maximum (neither rising nor falling), MP must be equal to AP.

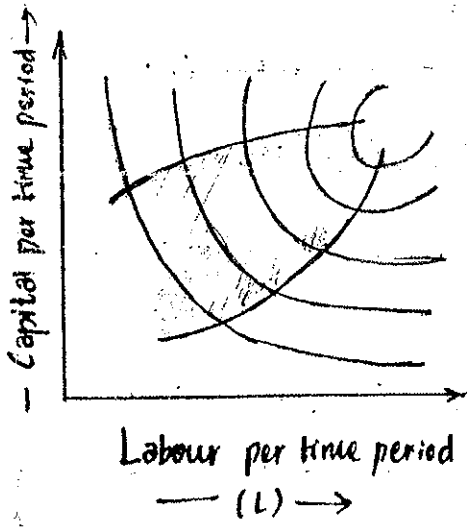
A direct, real-life example that would elucidate this concept is that of a student. To increase his or her cumulative average test score, he or she must receive a grade on the next test that exceeds his or her average. With a lower grade, the student's average would fall & if the grade equals the previous average, the cumulative average will remain

NOTE 1

While studying Law of Variable Proportions, we came across three stages of production : Stage I, Stage II & Stage III. A rational producer will never operate in stage III (negative returns) as he sustains losses. It is advisable to operate in stage II. But then again, one might ask, why not stage I? A detailed study of the concept of costs would provide the answer.

Production With Two Variable Inputs:

Earlier, we had seen production function with only one variable factor. Now, let us understand the case of production with two variable inputs. Before we proceed, it should be understood that this concept bears a striking resemblance to the concept of 'indifference curves'.



An isoquant shows the various combinations of two inputs (say, labour & capital) that can be used to produce a specific level of output.

Just like a higher indifference curve indicates a greater level of satisfaction or utility, similarly, a higher isoquant refers to a larger output, & a lower isoquant to a smaller output.

Characteristics of Isoquants:

We have already driven home the fact that isoquants are similar to indifference curves. However, whereas an indifference curve shows the various combinations of two commodities that provide the consumer equal satisfaction (measured ordinally), an isoquant shows the various combinations of two inputs that give the same level of output (measured

cardinally, or in actual number of units of the commodity).

i) they are negatively sloped in the economically relevant range
ii) they are convex to the origin.
iii) no two isoquants intersect each other.

The absolute value of the slope of the isoquant is called the Marginal Rate of Technical Substitution (MRTS). This is analogous to the marginal rate of substitution of one good for another in consumption.

For a downward movement along an isoquant, $MRTS_{LK}$ (MRTS for of labour for capital) is given by

$$(MRTS)_{LK} = -\left(\frac{\Delta K}{\Delta L}\right)$$

→ It measures the amount of capital that the firm can give up by using one additional unit of labour & still remain on the isoquant.

All points on an isoquant refer to the same level of output. Thus, for a movement down an isoquant, the gain in output from using more labour must be equal to the loss in output from using less capital.

Thus, the increase in the quantity of labour used (ΔL) times the marginal product of labour (MP_L) must equal the reduction in the amount of capital (ΔK) times the marginal product of capital (MP_K), to remain on the same isoquant. Thus,

$$(\Delta L) \times (MP_L) = -(\Delta K) \times (MP)_K$$

or $$-\left(\frac{\Delta K}{\Delta L}\right) = \left(\frac{MP_L}{MP_K}\right).$$

Hence, $$MRTS_{LK} = \frac{MP_L}{MP_K}$$

Earlier, we encountered a term, "economically relevant range".

The parts of all isoquants, where they bear a negative slope can be enclosed by two ridge lines, (as shown in the isoquant map, in the form of black lines). This region, enclosed by the two ridge lines, represents the economic region of production, where the MP_L & MP_K are both positive, but declining.

Producers would never want to operate outside this region, & hence, in general, when isoquants are drawn, only their negatively sloped portions are shown.

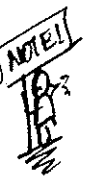
Whatever we had seen till now was the short-run situation. In the long-run case, however, all the factors become variable in nature and hence, the Law of Variable Proportions no longer holds good. Therefore, here, what can be done, is that all the inputs are changed in the same proportion and the nature of returns is commented upon. This is called the Law of Returns to Scale.

By changing all the inputs or factors in the same proportion, the production is classified as:

Increasing Returns to Scale: refers to the case where output changes by a larger proportion than inputs. For instance, if the farmer as we discussed earlier while learning Law of Variable Proportions, increases his land, agricultural appliances as well as labour, say by 20%, his production could increase to, say, 28%, i.e., more than 20%.

Constant Returns to Scale: refers to the case where output changes by the same proportion as inputs. In other words, if the inputs are increased by 10%, output also rises by 10%.

Decreasing Returns to scale: refers to the situation where output changes by a smaller proportion than inputs. Thus, increasing all inputs by 10% increases output by less than 10%.



There is no negative Returns to scale like negative returns, as we see in the Law of Variable Proportions.

Constant, increasing and decreasing returns to scale can be shown by the spacing of the isoquants. A constant spacing denotes constant returns to scale, whereas an increasing (decreasing) spacing as we proceed to the higher isoquants denote a ~~increasing~~ decreasing (~~decreasing~~ increasing) returns to scale.

Real life situations for all the 3 cases:

Constant Returns to scale: It somehow makes sense in a first hand overview itself. We would expect two similar workers using identical machines to produce twice as much output as one worker using one machine.

Similarly, the output of two identical plants employing an equal number of workers of equal skill would be twice the output of a single plant. This kind of seems obvious; nevertheless, increasing and decreasing returns are also possible.

Increasing Returns to scale: It arises, because, as the scale of operation increases, a greater division of labour and specialisation can take place, more specialised and productive machinery can be used.

With a large scale of operation, assembly lines can be installed, each worker can be assigned to perform a specific task. The result is higher productivity and increasing returns to scale.

increasing returns.

For example, using a conveyor belt to unload a small truck may not be justified, but it greatly increases efficiency in unloading a whole train or ship. Also, doubling the diameter of a pipeline more than doubles the flow and so on.

Decreasing Returns to Scale: arise primarily because, as the scale of operation increases, it becomes even more difficult to manage the firm effectively and coordinate the various operations & divisions of the firm.

The channels of communication become more complex, and the number of meetings, paper work and telephone bills increase more than proportionately to the increase in the scale of operation. All this makes it increasingly difficult to ensure that the managers' directives are properly carried out. Thus, efficiency decreases because of what is otherwise known as managerial diseconomics.

The Cobb-Douglas Production Function:

It is the simplest and most widely used production function in empiral work today. The formula is given by

$$Q = AL^{\alpha}K^{\beta}$$

where, Q = output in physical units

L = quantity of labour, K = quantity of capital

A, α & β are positive parameters estimated in each case from the data.

The parameter A refers to technology. The more advanced the technology, the greater the value of A.

The parameter α refers to the percentage increase in Q [illegible]

L, while holding K constant. Thus, α is the output elasticity of labour.

* For instance, if $\alpha = 0.7$, it implies that a 1% increase in the quantity of labour used (while holding constant the quantity of capital), leads to a 0.7% increase in output.

* The parameter β refers to the percentage increase in Q, for a 1% increase in K, while holding L constant. Thus, β is the output elasticity of capital.

For instance, if $\beta = 0.3$, it means that a 1% increase in K, while holding L constant, leads to a 0.3% increase in Q.

In the above example, $\alpha + \beta = 0.7 + 0.3 = 1$. Thus, we have constant returns to scale, i.e., a 1% increase in both L and K leads to a 1% increase in Q. Another name for constant returns to scale is homogeneous of degree 1. Thus, we can say,

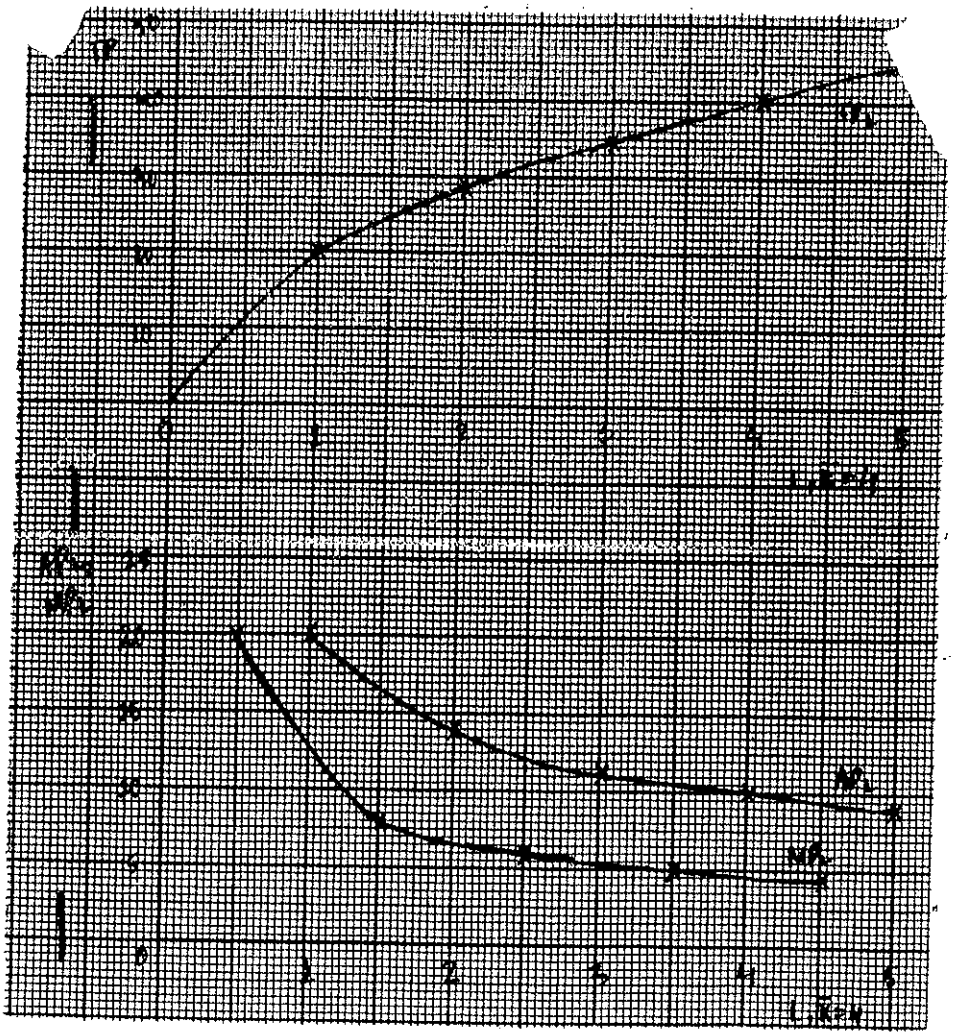
- $\alpha + \beta = 1$ ⇒ with an increase of L and K by 1%, Q increases by a total of 1%, hence constant returns to scale.
- $\alpha + \beta > 1$ ⇒ a 1% increase in L and K leads to a greater than 1% increase in Q., hence increasing returns to scale..
- $\alpha + \beta < 1$ ⇒ an increase in L and K by 1% leads to an increase in Q of less than 1%, hence decreasing returns to scale.

Consider an example. Suppose $A = 10$, $\alpha = \beta = 1/2$, and $\bar{K} = 4$ and is held constant (so that we are dealing with the short run). Thus, we have

$$Q = 10L^{1/2}4^{1/2} = 10\sqrt{4}\sqrt{L}$$

By then substituting alternative quantities of L used in production into the above equation, we derive the total product (TP) schedule, and from it, the average product of labour (AP_L) & marginal product of labour (MP_L)

L	TP	AP_L	MP_L
0	0	-	-
1	20.00	20.00	20.00
2	28.28	14.14	8.28
3	34.64	11.55	6.36
4	40.00	10.00	5.36
5	44.72	8.94	4.72



Plotting the TP_L, AP_L & MP_L, we see that the Cobb-Douglas production function exhibits diminishing AP_L & MP_L from the very start or with the first unit of L used, and that MP_L never becomes negative.

* The AP_L and MP_L are functions of or depend only on the K/L ratio.

* That is, they remain the same regardless of how much L and K are used in production as long as the K/L ratio remains the same.

However, in the long run situation, both L and K are variable. Thus,

$$Q = 10L^{1/2}K^{1/2} = 10\sqrt{L}\sqrt{K} = 10\sqrt{LK}$$

Also since $\alpha + \beta = 0.5 + 0.5 = 1.0$ in this case, we have constant returns to

Scale.

* We can also determine isoquants for a certain Cobb-Douglas production function. For example, the isoquant for Q = 50 can be defined by substituting 50 for Q in the equation.

By then substituting various quantities of labour into the resulting equation, we get the corresponding quantities of capital required to produce 50Q.

$$50 = 10\sqrt{LK}$$

$$\text{or} \quad 5 = \sqrt{LK}$$

$$\text{or} \quad 25 = LK \Rightarrow \boxed{\frac{25}{L} = K}$$

Thus, if L = 10, K = 2·5; if L = 5, K = 5; if L = 2·5, K = 10 and so on. Other isoquants can be derived in a similar fashion.

Empirical Estimation of Parameter Values:

One method of estimating the parameter values (A, α, β) is to apply statistical analyses to time series data on the inputs used & outputs produced. For instance, the analyst may collect data on the number of automobiles produced by an automaker in each year from 1997 to 2007 and on the quantity of labour and capital used in each year to produce the automobiles. The data is transformed into natural logarithms and regression is carried out. The form of the Cobb-Douglas function is then

$$\boxed{\ln Q = \ln A + \alpha \ln L + \beta \ln K}$$

Thus, we obtain an estimate of the value of ln A, α and β.

Another approach is by regression analysis using cross-section data. Here,

produced. The only difference is that, instead of collecting data for one firm over many years, we now collect data for a given year for many firms in the same industry.

As in the previous case, data is transformed into natural logarithmic form for further regression to be carried out.

Limitations:

i) We have to assume that the best production techniques are used by all firms at all times. However, due to lack of information or erroneous decisions, this may not be the case.

ii) difficulty in the measurement of capital input because machinery and equipment are of different types, ages and efficiencies.

Costs Of Production

From the firm's production function, that shows the input combinations that the firm can use to produce various levels of output, and the price of inputs, we can derive the firm's cost functions.

these functions show the minimum costs that the firm would incur in producing various levels of output.

→ We assume that the firm is too small to affect the prices of the inputs it uses. Thus, the prices of inputs remain constant regardless of the quantity demanded by the firm.

Explicit Costs: the actual out-of-pocket expenditures of the firm to purchase or hire the inputs it requires in production.

→ These include the wages to hire labour, interest on borrowed capital, rent on land and buildings, expenditures on raw and semi-finished materials

Implicit Costs: refer to the value of the inputs owned and used by the firm in its own production processes.

→ The value of these owned inputs must be estimated from what these inputs could earn in their best alternative use.

→ include the maximum wages that the entrepreneur could earn in working for someone else in a similar capacity.

→ also include the highest return that the firm could obtain from investing its capital elsewhere and renting out its land and other inputs to others.

→ in a loose sense, it is the summation of the various opportunity costs

Opportunity Cost:

The opportunity cost to a firm in using any input is what that input could earn in its next alternative use (outside the firm).

→ True & applicable for inputs purchased or hired by the firm as well as for inputs owned & used by the firm in its own production process.

Consider, suppose a firm has to pay wages of ₹ 2,00,000 per year to one of its employees if that is the amount the worker would earn in his or her best alternative occupation in another firm. If this firm would pay less, the worker would simply seek employment in the other firm.

→ Thus, for a firm to retain any input for its own use, it must include an a cost the opportunity cost that the input could earn in its best alternative use or employment.

Private Cost: refers to the opportunity costs incurred by individuals and firms in the process of producing goods and services.

Social Cost: refer to the costs incurred by the society as a whole.

Social costs are higher than private costs, when firms are able to escape some of the economic costs of production. For instance, a firm dumping untreated waste into a river imposes a cost on the society (in the form of cleaning costs & so on) that is not reflected in the costs of the firm.

Private costs can be made equal to social costs by public regulation requiring the firm to install antipollution equipment and treatment facilities.

Costs in the Short Run:

As seen in production theory, in the short-run case, some inputs are fixed and some are variable; this leads to fixed and variable costs.

Total Fixed Costs: the summation of total cost obligations of the firm per time period for all the fixed inputs.

→ include payments for renting the plant and equipment, or equivalent depreciation if they are owned by the firm, insurance payments, property taxes, salaries of personnel on contract basis etc.

Total Variable Costs (TVC): the summation of total cost obligations of the firm per time period for all the variable inputs.

→ include payments for raw materials, fuels, most types of labour, excise duties etc.

Total Costs (TC): By definition, $\boxed{TC = TFC + TVC}$

Consider a hypothetical TFC, TVC and TC schedule.

Quantity of Output	Total Fixed Costs	Total Variable Costs	Total Costs
0	30	0	30
1	30	20	50
2	30	30	60
3	30	45	75
4	30	80	110
5	30	145	175

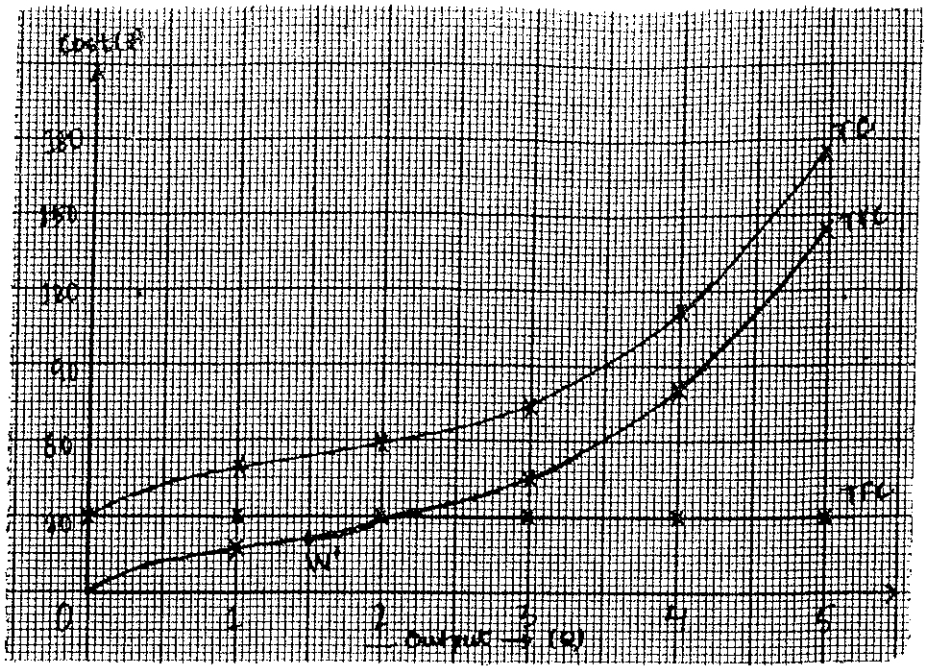
The data has been plotted in the next page.

From the table, we see that TFC are ₹30 regardless of the level of output.

This is reflected in the horizontal TFC curve at the level of ₹30.

TVC are zero when output is zero and rise as output rises.

IMP!!! The shape of the TVC curve follows directly from the Law of Diminishing



little of the variable input with the fixed inputs that the law of diminishing returns is not yet operating. As a result, the TVC curve faces downward or rises at a decreasing rate.

Past point W', the law of diminishing returns operates and the TVC curve faces upward, rising at an increasing rate.

Also, since TC = TFC + TVC, the TC curve has the same shape as the TVC curve but is $ 30 (the TFC) above it at each output level!

From total costs, we can derive per-unit costs. These are of even greater importance in the short-run analysis of the firm.

Average fixed cost (AFC): equals total fixed costs divided by output.

Average Variable Cost (AVC): equals total variable costs divided by output.

Average Total Cost (ATC): equals total costs divided by output.

Just as TC = TVC + TFC. similarly. $\boxed{ATC = AFC + AVC}$

Marginal Cost (MC): equals change in TC or in TVC per unit change in output.

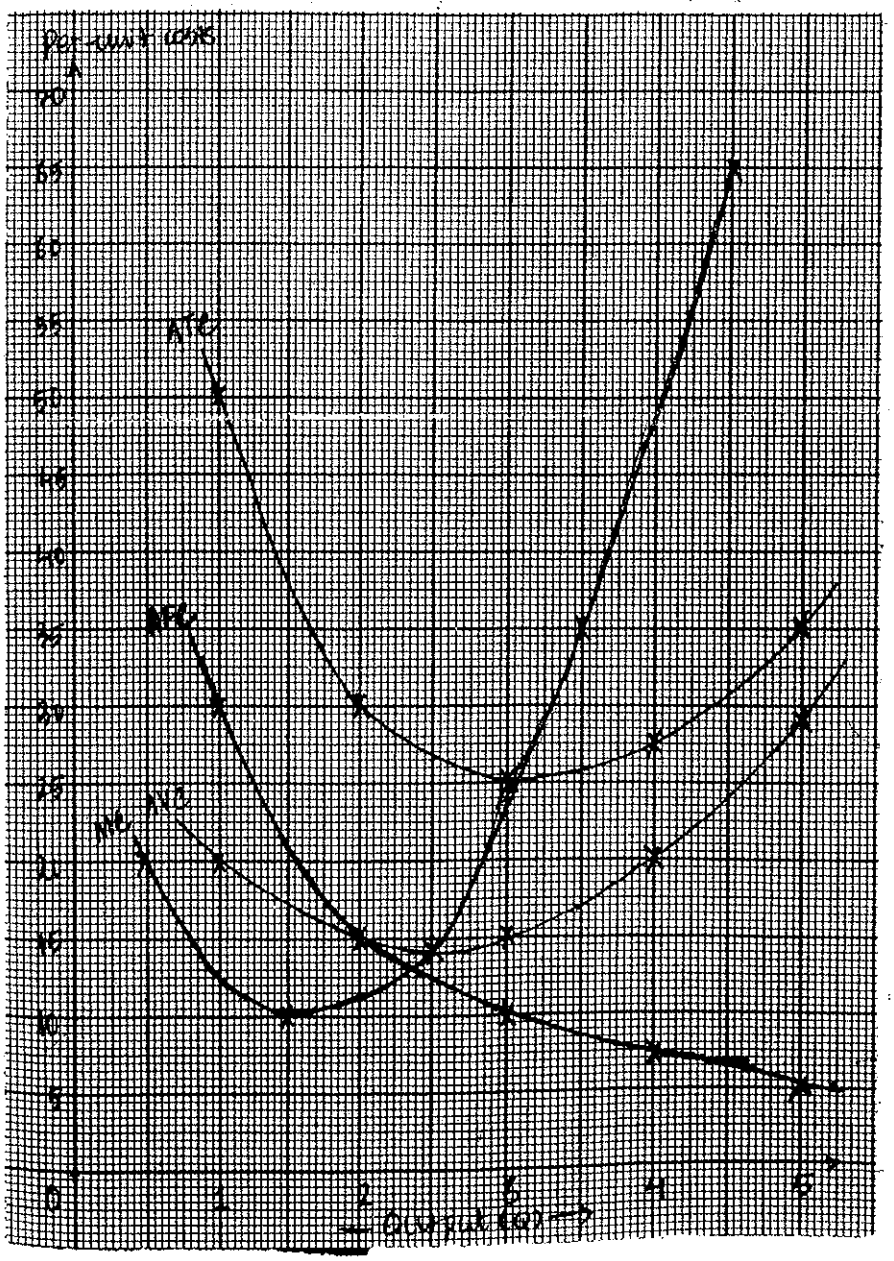
MC does not depend on TFC. We know, TC = TFC + TVC.

$$\Rightarrow \frac{d(TC)}{dQ} = \frac{d(TFC)}{dQ} + \frac{d(TVC)}{dQ}. \quad \text{But } \frac{d(TFC)}{dQ} = 0, \text{ because TFC = Constant}$$

Hence, MC is change in TC or corresponding change in TVC.

Quantity of output	TFC	TVC	TC	AFC	AVC	ATC	MC
1	30	20	50	30	20	50	20
2	30	30	60	15	15	30	10
3	30	45	75	10	15	25	15
4	30	80	110	7.50	20	27.50	35
5	30	145	175	6	29	35	65

The per-unit cost schedules given in the table are plotted in the graph. Note that MC is plotted between the various levels of output.



* the AFC curve falls continuously, while the AVC, ATC and MC curves first fall and then rise (i.e. they are U-shaped)

* Since the vertical distance between the ATC and AVC curve equals AFC, a separate AFC curve is superfluous and can be omitted from the figure.

Why is the AVC curve U-shaped ?

With labour as the only variable input in the short run, TVC for any output level (Q) equals the given wage rate ($\bar{w}$) times the quantity of labour used. Then,

$$AVC = \frac{TVC}{Q} = \frac{\bar{w}L}{Q} = \frac{\bar{w}}{(Q/L)} = \frac{\bar{w}}{AP_L} = \bar{w}\left(\frac{1}{AP_L}\right)$$

With $\bar{w}$ constant and from our knowledge that the average physical product of labour (AP_L) usually rises first, reaches a maximum, & then falls (result of the Law of Variable Proportions), it follows that the AVC curve first falls, reaches a minimum & then rises.

IMP!

Thus, the AVC curve is the monetized mirror image or reciprocal of the AP_L curve.

→ Since the AVC curve is U-shaped, the ATC curve is also U-shaped.

→ The ATC curve continues to fall even after the AVC curve continues to rise, because, for a while, the decline in AFC exceeds the rise in AV

Why is the MC curve U-shaped ?

We have

$$MC = \frac{\Delta TVC}{\Delta Q} = \frac{\Delta(\bar{w}L)}{\Delta Q} = \frac{\bar{w}(\Delta L)}{\Delta Q} = \frac{\bar{w}}{\Delta Q/\Delta L} = \frac{\bar{w}}{MP_L} = \bar{w}\left(\frac{1}{MP_L}\right)$$

Since the marginal product of labour (MP_L) first rises, reaches a maximum, and then falls, it follows that the MC curve first falls, reaches a minimum, and then rises. Thus, the rising portion of the MC curve reflects the operation of the law of diminishing returns.

It should be realised that the MC curve reaches its minimum point at a smaller level of output than the AVC and ATC curves, and it intersects from below the AVC and the ATC curves at their lowest points.

The reason is that for average costs to fall, the marginal costs must be lower than them and conversely, to pull up the average costs, the marginal costs should be higher than them. Also, for the average costs to neither fall nor rise (i.e. to be at their lowest point), the marginal cost must be equal to them.