



Players of an economy:

- 1) Consumers
- 2) Producers.

when we study individual behaviours of the producers and consumers separately then it is micro-economics.

when we study the behaviours of the producers and consumers as a whole (aggregate) then it is macroeconomics.

Economy consists of :

- 1) Consumer
- 2) Producer
- 3) Government

Demand for consumer goods is called consumption.

Goods are categorised in 2 parts

- 1) Consumer perishables - which can be exhausted fast e.g. food, vegetables, etc.
- 2) Consumer durable - is exhausted in a long time e.g. refrigerator, etc.

Goods can also be categorised as:

- 1) Material goods: visible and tangible, made of some material.
- 2) Non-material goods: Not tangible, services are non-material good. E.g. entertainment, doctor, etc.

Income of an economy comes from both material & non-material goods.

### \* 3 sectors of economy:

- 1) Primary sector: Production of material goods. e.g. agriculture, poultry, etc.
- 2) Secondary sector: Manufacturing industries e.g. steel, ice-cream etc. Production of material goods. Mining, etc.
- 3) Tertiary or service sector: Production of non-material goods. e.g. IT service, teacher, doctor, etc.

Goods can also be categorised on the basis of who is consuming the goods:

- 1) Consumer goods: Demanded by the consumer.
  - 2) Producer goods: Demanded by the producer of & new different products are created from this. e.g. machine, tools, etc. (Man-made goods) or capital goods.
- Consumption:** It is the destruction of utility of the goods.

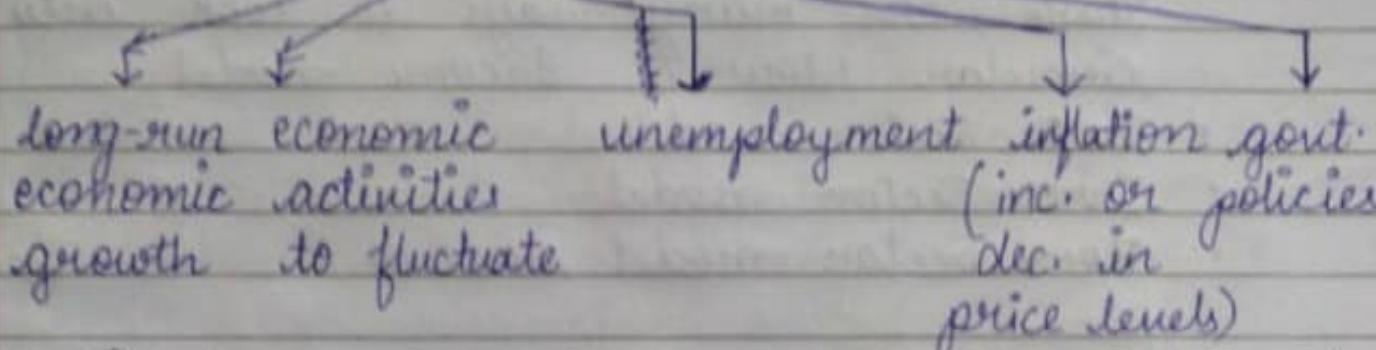
**Utility:**

- \* Circular flow of Income and National Income Accounting

## What is Macroeconomics

The study of the structure and performance of natural economies and of the policies that governments use to try to affect economic performance.

## Main issues



## Basic framework of an economy and Circular flow of Income

- The circular flow of income is illustrated in the circular flow model of an economy which is one of the most significant basic models of economics.
  - This model shows how different economic agents of an economy interact, breaking things down in a highly simplified manner.
  - The circular flow of income demonstrate how economists calculate ~~income~~ nation's Gross Domestic Product (GDP).

GDP is the total monetary or market value of all the finished goods and services produced within a country in a specific time period.

We are talking about the final goods (not intermediate or the process) and it also talks about services.

And the income is also calculated for a particular period of time.

There are many ways to look into the Circular Flow of Income model.

- Two Sector model
- Three Sector model
- Four Sector model and so on.

### Two Sector model

- Firms - The firm sector includes businesses that take on the risk of combining scarce resources to produce goods and services. This sector buys capital goods with investment and pays for the factors of production.  
These are basically the producers & they pay to the household in exchange of factors of production
- Household - The household sector is responsible for consumption expenditure.

## \* Factors of production

- 1) Land
- 2) Labour
- 3) Capital
- 4) ~~Entrepreneurship~~ Entrepreneurship

} Demanded by firms

All 4 factors of production lies inside the household sector and household sectors are expected to hold these factors provide the firms with these factors.

Factors are brought and sold in a market called factor market. The price for the factors is set by the factor market.

When households sell these factors in a particular time period then they earn money ~~for~~ for themselves.

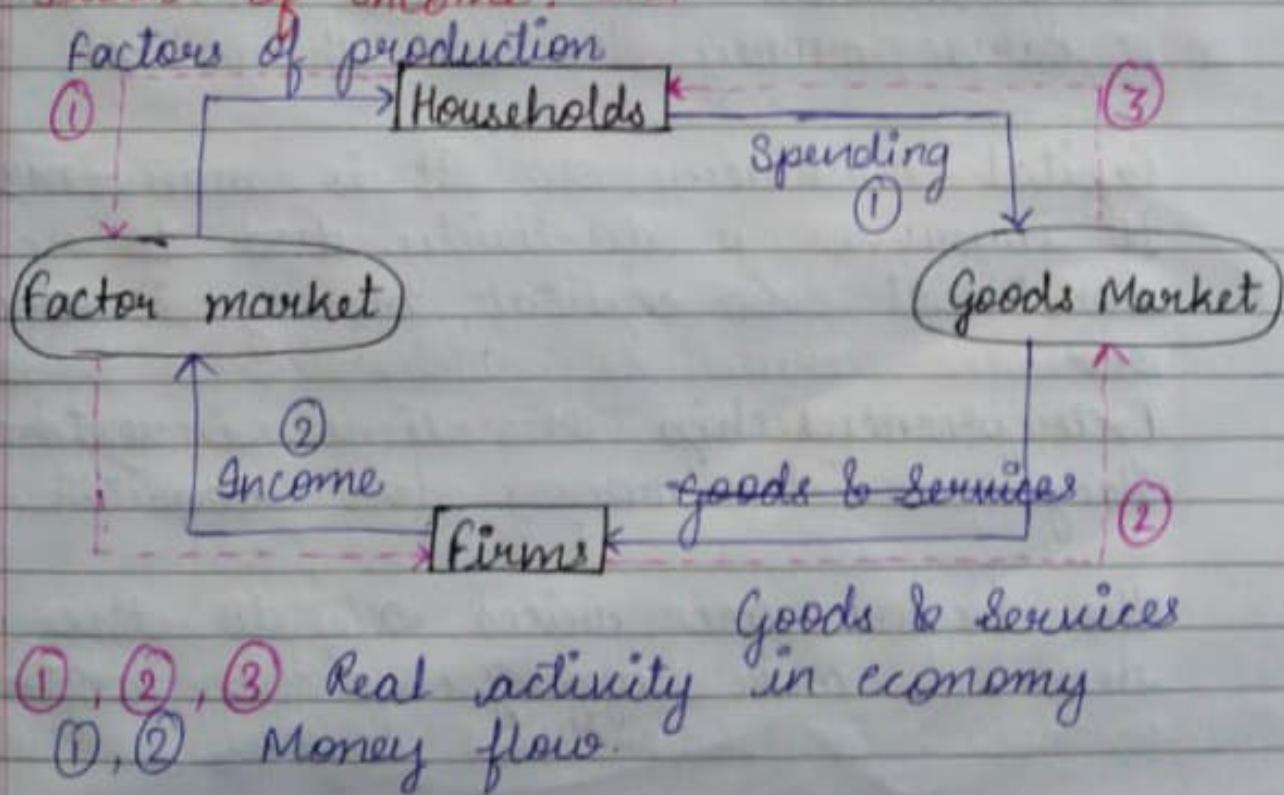
**Capital:** Machinery, etc. It is man-made. It improves productivity. And to construct ~~so~~ capital, money is needed.

**Entrepreneurship:** one-time investment. They provide money for capital.

The factors are priced a/c to the demand and supply of the factors.

- When government is also included then it becomes 3 sector model. Govt can be both producer or consumer. In a country like India govt. can be both producer and consumer while in some countries govt. is only a consumer.
- PSU(s) → Public sector units (Production units of by government).
- If government gets included then it becomes a 3 sector model.
- Every economy is an open economy. and almost all economies are involved in foreign trade. Therefore, including foreign trade, it becomes a 4 sector model.

Basic framework of an economy & Circular Flow of Income. Flow



The factor owners earn incomes in the form of factor income.

Landowner - Rent on the land.

Labour - Wages or the persons who own labours and sell them in the market earn money.

Capital owners - Interest (price of capital)

Entrepreneurship - Profit ~~and~~

\* Income:

In this process, firms are incurred with some cost which they pay to the household sector for factors of production in the form of cost for labour, cost for land, cost for capital.

And this amount which is cost for the firms is the income for the household sector.

Sum total of the

So, the income obtained from the factor market is the total income of an economy.

\* So, after Goods and services

After obtaining factors of production, firms produce goods and services which are



sold in the goods market.

and after the households get hold of their income, they spend money in buying goods & services from the Goods market. So, the firms gets back the money from the household by selling their goods & services. And this money accounts for the cost spent by the firms on the factors of production and the profit they earned. And so this cycle of income is completed. Everything that is produced has been demanded & equilibrium is established. In this the whole income earned by the household will be spent to create demand (there is no intermediate).

### \* Three Sector Model

assuming that govt. only purchases.

But the govt. will apply taxes on the incomes earned by households & firms. Some part of tax comes from the household and some come from the firm.

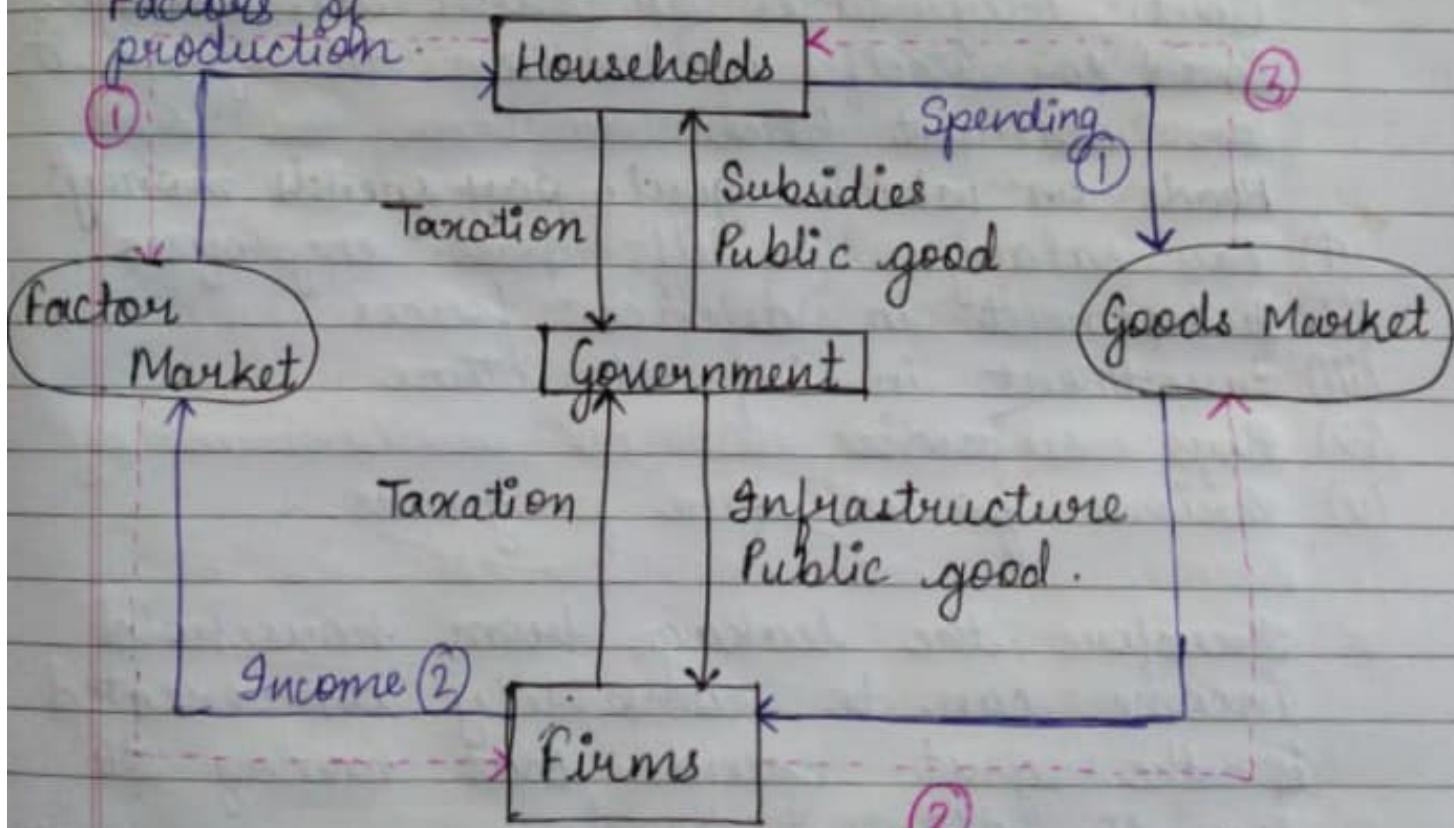
lets consider that the whole income is with the household sector. Then the household sector will pay taxes to the

government. Previously, the whole income earned by the household was spent to buy goods & services. But now the household's income is leaked to the government.

**Leakage:** The income of household is leaked to the govt. by taxation.

As a consequence of this leakage, the disposable income - Income that can be spent by the household decreases, so the demand for goods and services by the household will decrease because their purchasing power has decreased.

Factors of production



① ② ③ Real activity in the ~~the~~ economy

① ② Money flow. (Wage, rent, interest, profit, payment for goods and services).

Household's consumption will dec. by a certain amount & the demand for consumer goods will also decrease by that amount.

But the revenue earned by the govt. is again spent in the form of govt. purchase (consumption).

Therefore, there is an injection in the form of govt. purchase which comes from the tax revenues.

$\therefore$  leakage (Taxation) = Injection (Govt. purchase).

Govt. levy taxes to earn an income, and for itself and then to spend it on different heads.

Heads on which govt. pay spends money:

- (i) Pay salary to diff. govt. employees.
- (ii) Investment in defence forces.
- (iii) Investment in infrastructure.
- (iv) Pays subsidies.
- (v) Various for well-fare programs.

Therefore, the leakage from household income can be completely compensated if the govt. spends that money to pay to different heads.

If govt. purchase = total tax then  
Injection from govt. = leakage from household.



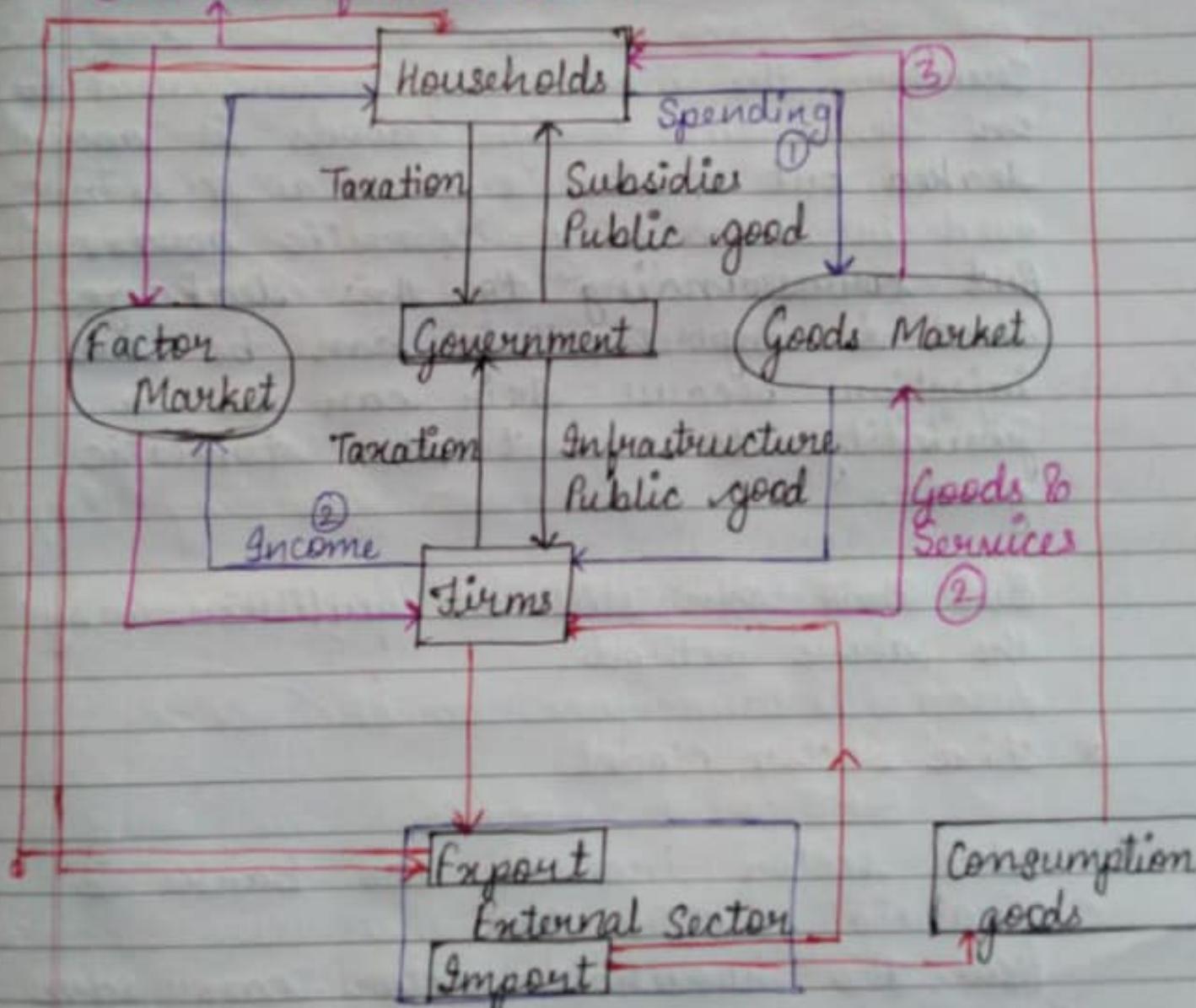
Therefore, the equilibrium is still maintained.

But if  $G$  (Govt purchase)  $\neq T$  (Tax) then there will be some unbalance.

### \* Four sector model.

This will include foreign import and export (trade).

#### ① Factors of Production





Now, in this system, the income which is left with the household after taxation can also be spent in demanding foreign goods leading to import of foreign goods.

The income which was generated by our system will now be also be spent on imported goods as it is an open economy.

Therefore, the amount of income used to demand foreign goods is again leaked out of the system as it is not used in demanding domestic goods.

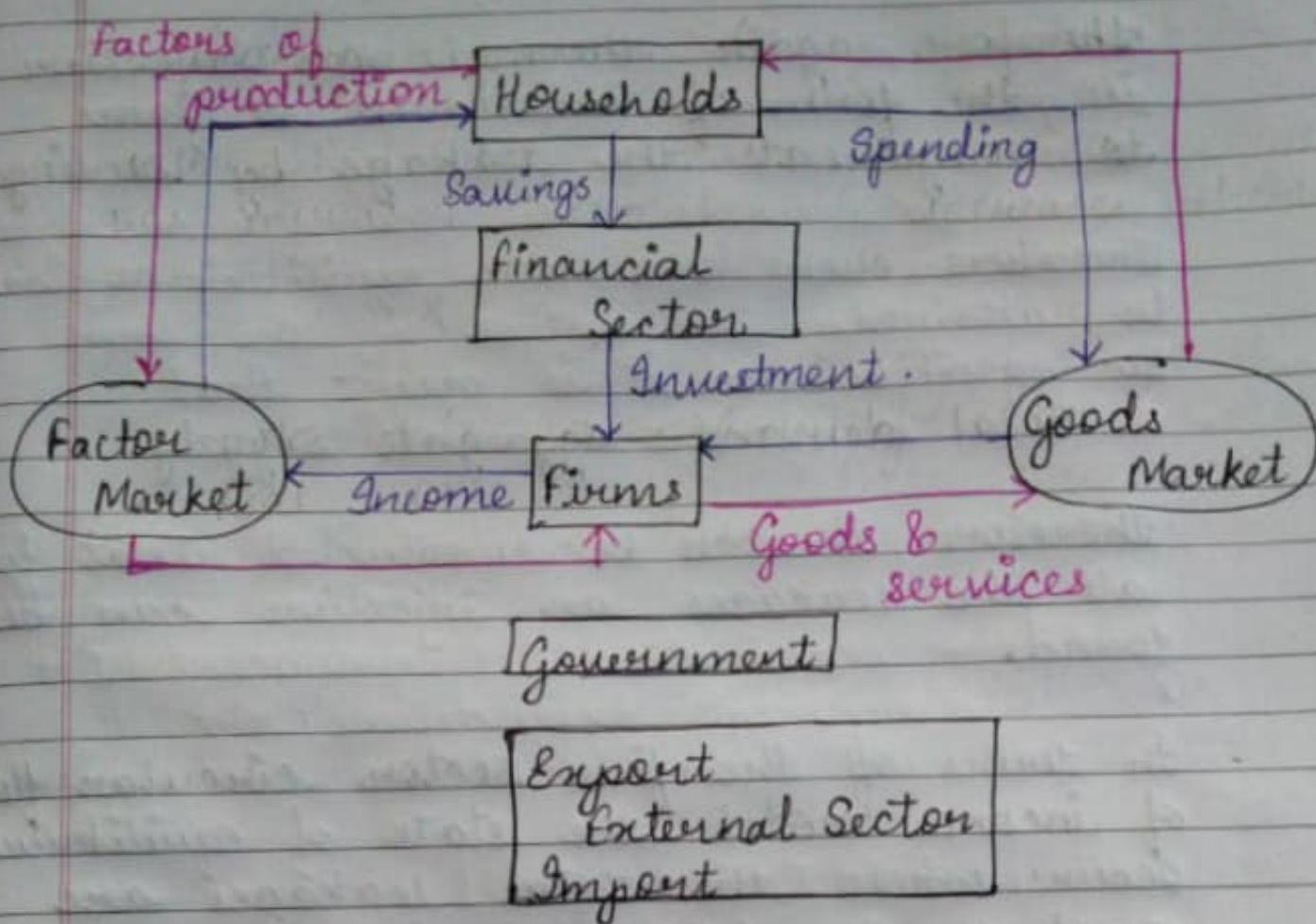
But corresponding to this leakage that is import, there can be an injection because there can be a possibility to export the domestic goods.

But there can still be equilibrium by the above method.

### \* Five Sector Model

This sector includes the banks & financial sector too.

Now, the household sector can save their incomes in the form of deposit



Current saving implies the amount which is saved from the current income. It is the amount not being used to demand goods from ~~the~~ the goods markets. Therefore, the good market will not be able to sell goods of that much amount of income which has been deposited as saving.

Household sector has decided to spend more in future by saving current income. So, the households save money in banks and in turn the bank lends the money to firms for investment purposes.



Therefore, again there is an injection in the form of investment to firms to compensate the leakage by savings.

Therefore, even here an equilibrium can be attained.

- By equilibrium, it is meant that  
Total demand = aggregate supply.

Therefore, it can be concluded that for all the leakages, an injection can be found.

In terms of the five sector circular flow of income model the state of equilibrium occurs when the total leakages are equal to the total injections.

$$\text{Savings} + \text{Taxes} + \text{Imports} = \text{Investment} + G + \text{Government Spending} + \text{Exports}$$

$$S + T + M = I + G + X \quad (\text{Equilibrium})$$

Disequilibrium can be shown as

$$S + T + M \neq I + G + X.$$

- If  $S + T + M > I + G + X$ , the levels of income expenditure and employment will fall causing a recession or contraction in the economic activity.

- If  $S + T + M < I + G + X$  the levels of income, expenditure and employment will rise causing a boom.

## \* NATIONAL INCOME ACCOUNTING

National income accounting provides us with ex-post data about national income.

It is the total income of an economy: Gross Domestic Product (GDP)

The market value of all final goods and services produced within the domestic boundaries of a country in a specified period of time.

## \* Deciphering the Definition

- Market value - Price of the products
- Of all - It is not based on logic but on the practical experience
- E.g. Housewife, volunteers.
- Final - No intermediate goods should be included.
- Goods and services - Includes both goods & services.
- Currently produced - The income should be produced within the specified time period  
The stored money is wealth but it is not income. Income is gained by selling factors or goods or services. Currently produced

income is obtained from the current outputs. Therefore, income is a flow and wealth is a stock.

Within a country - The income should be produced within the boundaries of the country irrespective of the firm or entrepreneur.  
Within a specified period.

### National Income Accounting Identity

$$GDP(Y) = \text{Consumption}(C) + \text{Investment}(I) + \\ \text{Government Expenditure}(G) + \\ \text{Net Export}(X-M)$$

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

When we talk about GDP, we consider the market value of all the goods. All the good and services have different use and value. But to calculate the total value (to aggregate), we must have a standard measure. And therefore, we consider a market value for all the goods and services.

value.

The market ~~price~~ for a good can be referred to as the market ~~value~~ <sup>price</sup> of the good \* the quantity of the good produced.

- And the sum total of the market value of all the goods constitutes the income of the economy.

$$Y = C + I + G_1 + (X - M)$$

- Import has been subtracted from the total income because, the import is already included in Y.

The C is the private consumption by the households, and the households spend on buying both domestic as well as foreign goods which are being imported. So the consumption already includes the import.

$$\begin{aligned} \text{Gov Consumption} &= \text{Domestic consumption} \\ &\quad + \text{Im Foreign goods cons.} \end{aligned}$$

- Also, in the investment, there can be some foreign component. The investors can either use the capital available within the country or they can import capital from abroad. Therefore, an import component is present even with the investment.

- Similarly, government purchase can be both domestic purchase or foreign purchase. Therefore, the import component is already present in C, G<sub>1</sub> & I, therefore, we subtract it from X.



## \* Real and Nominal GDP

- Nominal GDP applies current prices.
- Real GDP applies constant base-year prices.
- $\text{GDP deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$
- Suppose we have the output data for consecutive years like 2005, 2006, 2007 and so on. So we know the price of the goods in those years.  
Example: Price of petrol in 2005 was not the same as the price of petrol in 2006. So it keeps changing. This price which keeps changing is called the current price.
- So, in most of economies the current price tends to change through years and it increases. So there is an inflation in the current price of goods (e.g. petrol 2005 - ₹ 50, 2006 - ₹ 55, and so on).
- Suppose that in 2005, the price of petrol was ₹ 50 & the quantity produced was 10 litre. So, for 2005 ( $50 \times 10 = ₹ 500$ ) is the value of petrol as output.

and suppose, next year the price of petrol increases to ₹ 55 ~~50~~ and the quantity ~~sold~~<sup>produced</sup> remains same so the value of the output increases to ₹ 550 in year 2006.

So, in this there is no change in the real GDP. Only the nominal GDP has increased. 10 litres of petrol was produced in 2005 and the same quantity ~~is~~ is produced in 2006. But the value of the good has inc. In this case nominal GDP is increasing because we have calculated the income on the basis of the current price. If we want to calculate the change in real GDP, then we should consider 2005 as the base year and ₹ 50 as the base price. So, according to the base price, the value of petrol has not changed in 2006. Therefore, the real GDP has not increased.

Real income = Current quantity of output  
                   \* base price  
 (Corresponds to increase or decrease in real GDP)

Nominal income = Current quantity of output  
                   \* current price  
 (Corresponds to increase or decrease in nominal GDP).

- Therefore, for an economy to grow, real income should rise. Because when real income rises, it implies that the product of the goods has increased (not just their price).
- In the base year, the real and nominal income are the same.
- But in the subsequent years, if the quantity of the product remains same then the real income remains unchanged.
- Let's suppose that in 2006, the quantity of petrol produced increases to 15 litre then the real income will become  $15 \times ₹ 50 = ₹ 750$  & the nominal income will become  $15 \times ₹ 55 = ₹ 825$ . So the rise in nominal income is greater than the rise in real income.
- So, across the globe, real income should be ~~calculated~~ used to compare the GDPs, because it shows the real growth in the economy i.e. the increase in production of goods.

Because nominal income reflects the change in current prices. It does not affect the purchasing power of the population. The purchasing power rema



the same. But when the real income increases then the purchasing power increases.

- If only the nominal income rises, then there is no actual growth of the economy because the purchasing power of those who earn that income remains the same.   
 Because only the general price level has risen. So people cannot purchase more goods by spending more income.

- Therefore, we have GDP deflator.

In 2005 GDP deflator =  $100\%$  (Base)

(Real income = Nominal income)

In 2006 GDP deflator =  $110\%$

∴ There is rise in price level by  $10\%$ . b/w 2005 & 2006.

Therefore, GDP deflator can used to find the inflation rate.

GDP deflator is a way to find the inflation rate w.r.t the base year.

- Base years are changed in regular intervals of times. And a normal year is considered a base year in which there are no natural calamities or pandemics, etc.   
 Therefore, whenever we calculate the real GDP, we take the latest base into consideration.



## National Income: Various Concepts

### \* GDP

The market value of all final goods and services produced within the domestic boundary of a country irrespective of the ownership of the resources.

Example: A software professional's salary at UK is UK's GDP. The profit of the IBM located at Bengaluru is India's GDP.

- So, when the income of the individual persons rise, then they become richer but the quality of life will become better or not, it depends on the real income which ultimately effects the purchasing power of people.

### \* GNP

Income produced by a country's own resources irrespective of the place of production.

$$GDP = GNP - \text{Net factor income earned abroad.}$$

- If some Indian natives work in foreign countries & earn income that it becomes the GNP of the other country. But the profit earned by its entrepreneur is

part of India's GDP.

- Therefore, the Indian natives living and earning money in the foreign countries who send money to their relatives in India, the money they earn becomes a part of GNP of India because that money has been earned by India's resources (natives).
- And similarly the foreigners earning & living in India, their income is considered to be the part of their own country's GNP but it is a part of India's GDP (not GNP).
- We subtract the net factor income earned abroad from GNP to get GDP because we have to consider both the remittances coming & going.

\*  $NNP = GNP - \text{depreciation}$

(Net National Product)

When we calculate national income, we include all capital goods, market goods, services and so on. But capital goods have a tendency to depreciate over time. Therefore, when we consider ~~int'l~~ ~~int'l~~ investment, we should consider net investment rather than gross investment.

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- We should consider net addition to capital stock rather than considering gross addition to capital stock.
  - Investment in the current period is the additional to capital stock.
  - Suppose, in a firm we want to add a new machine but the existing old machine must have depreciated from its new and original state. It would have some wear and tear. Here, the net investment will take into consideration the depreciation in the old machine, so the net investment will be less than the gross investment.
  - Suppose there is an old building which has been highly depreciated and the wear and tear is to an extent that the building can't be used anymore. And now if the investor invests to build a new building then the net investment will be zero even if there is a certain amount of gross investment. Therefore, the net addition to capital stock is zero.

So, GDP & GNP accounts for the new buildings created, new machines added but after taking into account the depreciation it



the already existing buildings & machine, then we can arrive at NNP or NDP or net investment.

### \* NDP = GDP - depreciation (Net Domestic Product)

\* GDP at factor cost: GDP at market price  
- Indirect taxes + Subsidies.

the market price is the price at which the product is actually sold in the market.

factor cost is the cost of producing that output.

Therefore,

$$\text{Factor cost} = \text{market price} - \text{Indirect taxes} \\ + \text{Subsidies}$$

Or

$$\text{Market price} = \text{Factor cost} - \text{Subsidies} + \\ \text{Indirect taxes}$$

The market price of a product is inclusive of the factor cost i.e. cost of labour, capital & so on. So, if the government doesn't give subsidies to the people or to the firms then the market price will be equal to the factor cost.

But when the govt provides the firms with subsidy then the market price will decrease, but there will also be an indirect tax (e.g. sales tax) which the



firm has to pay this indirect tax will increase the market price.

$GNP \text{ at factor cost} = GNP \text{ at market price}$   
 - Indirect taxes + Subsidies

$NDP \text{ at factor cost} = NDP \text{ at market price}$   
 - Indirect taxes + Subsidies

$NNP \text{ at factor cost} = NNP \text{ at market price}$   
 - Indirect taxes + Subsidies  
 (Referred to as true national income)

Market price is sometimes misleading because of the changing income of the population

### \* Household income.

Household income has 3 different variants

(i) Private income

(ii) Personal income

(iii) Personal disposable income.

### 1) Private income

$NNP \text{ at factor cost} + CTG_i + OTA + NDI - IADEP$   
 - IND

$CTG_i$ : Current transfers from the government (direct subsidies, reliefs, social security payments).

$OTA$ : Other net transfers from abroad

NDI: National debt interest on domestic debt

IADEP: Income from the government administrative Deptt from entrepreneurship and property (postal services, Indian Railways, etc.)

IND: Incomes of the government non-dept enterprises (PSUs)

- Private income is the income of the private entities / households.
- But there are many things that are not included in the national income like current transfers by the government.  
Eg. Pension, subsidies, etc. are the current transfers.
- Current transfers are unilateral. They are transferred from the government to the household without getting anything in return from the household.  
E.g. Pensioner gets pension on the basis of the work he/she did i.e. the service contributed by him/her in his youth. But now the person is retired, so he is not doing any work and getting pension without returning anything. As this is unilateral from govt to the person, it is a current transfer.
- Similarly, there are subsidies on LPG which are transfers to the household.



which are eligible for it without getting anything in return.

- Similarly, there are unemployment allowances etc. which is a welfare measure on account of the govt. without to help people ~~and~~ without expecting anything in return is a current transfer.
- So, this becomes a part of the household income but not of the national income because when we talk about national income, it only accounts for the goods and services that ~~can~~<sup>are</sup> be produced in the current period and the people who contribute in producing those goods & services in any way get income. But this not the case with current transfers. So, curv
- So, current transfers are not the part of the national income but it is a part of the private household income.
- Other net transfers from abroad is the money transferred by the people working in abroad to their family members living in India. This transfer is also unilateral and it is not a part of the national income but it is a part of the private household income.

- National debt interest: The interest given by the government on the domestic debt (i.e. money stored by people in bank). It is not a part of the national income but it is a part of the private household income.
- IADEP: It is the income of the govt. departments such as postal services, railways, etc., so this income earned is the income of the govt., it is not the part of private household.
- NDI: It is the income from the non-dept. enterprises like PSUs, NTPC, etc. It is a part of the govt. income not private households.

Govt. has 2 types of incomes:

- (i) Income earned from govt. depts. - The profit earned by these services is a part of the govt. income. e.g. Railway
- (ii) Income from non-dept. enterprises - From organizations like PSUs, NTPC, etc.

So, the income of the govt. has to be subtracted from the national income to arrive at the private household income.

## Personal Income

Personal Income = Private income - Retained earnings - Corporate tax

- In the private income, the income of the corporate sector is also included.
- ~~Corporate income is corporate profit which is included in the national income. But actually the corporate profit belongs to the corporate sector.~~
- So, the person who owns the corporate, who owns the firm, the profit belongs to him, and he belongs to the household so automatically, the profit belongs to the household.
- Corporate tax is the tax paid by the corporate to the govt. from their profit.
- Retained earnings are the profit retained by the corporate firms after paying the tax for further investment or other purposes. It is the part of the profit which is not distributed among the stakeholders. It is the profit retained by the corporate sector.

- The dividend profit which is distributed among all the stake holders is a part of the personal income but the undistributed profit i.e. retained earnings does not become part of the personal household income.
- The profit earned by the ~~corporate~~ private sector consists of two parts  
Private household  
Private corporate.
- So, the profit earned by the private corporate is a part of the private sector but not a part of the private household.
- So, when we separate the income of private ~~corporate~~ corporate from the private sector, we arrive at the ~~per~~ personal household income.

### Personal Disposable Income

- Personal disposable Income = Personal Income - Household direct tax - Miscellaneous receipts by <sup>to</sup> the government administrative deptt.
- Personal income is the typical household personal income.

- Personal disposable income is the personal income of the household which is disposable i.e. it can be spent.
- Household direct tax is the direct tax paid by the household to the govt. and therefore it can't be spent by the household.
- And the other receipts paid to the govt. (like some fees) also cannot be spent by the household.
- So, the income left after subtracting the above 2 are is the income that can be spent by the household, the way it wants, therefore it is the personal disposable income.

### Measurement of National Income

1. Expenditure approach: GDP at market prices
  2. Income approach: NNP at factor cost  
or National income
  3. Output approach: GDP at factor cost
- \* Output approach or value-added approach  
In this method, national income is measured as a flow of goods and services. We calculate monetary value of all final goods and services produced in an

economy during a year. Final goods here refer to those goods which are directly consumed and not used in further production process.

- In the output approach, we basically calculate the GDP at factor cost
- Sum of the values of the value added from various production centres or the sum of the values of the final goods & services. So, we can calculate the GDP at factor cost using one of these methods. The former is the value added approach & the latter is the output approach.

Output approach:

$$\text{GDP at factor cost} = P_1 Q_1 + P_2 Q_2 + \dots + P_n Q_n$$

$n \rightarrow$  no. of products

$P_i \rightarrow$  price of  $i$ th product

$Q_i \rightarrow$  quantity produced of the  $i$ th product

$P_i Q_i \rightarrow$  value of the  $i$ th product.

- In this method, national income is measured as a flow of goods and services. We calculate monetary value of all final goods and services produced in an economy during a year. Final goods here refer to those goods which are directly consumed and not used in further production process.



- Goods which are further used in production process are called intermediate goods. In the value of final goods, value of intermediate goods is already included therefore we do not count value of intermediate goods in national income otherwise there will be double counting of value of goods.
- To avoid the problem of double-counting we can use the value-addition method in which not the whole value of a commodity but value-addition (i.e. value of final good  $\Rightarrow$  value of intermediate goods) at each stage of production is calculated and these are summed up to arrive at GDP.

### \* Income approach

- Measures NDP at factor cost.
- National Income is measured as a flow of factor income not the flow of outputs which is measured at different prices.
- It is the sum total of the factor incomes that constitutes the total income of an economy.
- Here also we use NDP at factor cost not

the market price because the cost at which factors are bought is available

$$NDP \text{ at factor cost} = W + R + I + P$$

- $W \rightarrow$  Wages (Labour gets wages and salaries)

$R \rightarrow$  Rent (Land gets rent)

$I \rightarrow$  Interest (Capital gets interest)

$P \rightarrow$  Profit (Entrepreneurship gets profit)

- Besides, there are some self-employed persons who employ their own labour and capital such as doctors, advocates, CA etc. Their income is called mixed income.

- There is a huge volume of income that comes from self-employment in a country like India. In this type of employment, the owner himself works, without borrowing capital, land or labour. It is also possible that a part of the labour is employed or a part of the capital is borrowed.

- In the case of mixed income, more than one factor of production comes from the entrepreneur himself, so the income can't be segregated as land, labour, capital or profit. But still it is an income.



- So, the income calculated by the income approach gives us the factor income, no matter whether it is mixed income or segregated wage, rent etc.

### \* Expenditure Method

- Measures GDP at market Prices
- It is based on the market price not on factor cost because it is based on the price at which goods are bought <sup>or sold</sup> in the market.
- $\text{GDP at market Price} = C + G + I + (X - M)$   
It is based on the total expenditure made by different economic agents.
  - Private Consumption Expenditure (C)
  - Government Consumption Expenditure (G)
  - (Government purchase)
  - Gross Investment Expenditure (I)
    - Public investment
    - Private investment
  - Net exports ( $X - M$ )
    - The value of imports is already included in C, I and G.
- In case of investment expenditure, it has 3 components:
- Firms**: plant (in progress)/unused raw

materials.

Firms are the producing units which undertake investment.

They invest on plants or machinery or unused raw material.

- Households:** The total household expenditure has 2 components:

- (i) Consumption expenditure: Major part of the expenditure used for buying goods & services.

- (ii) Investment expenditure: For constructing non-residential building (or buying residential buying)

Household investment expenditure is the private investment demand.

- Inventory investment:** Firms not only invest currently, but they also create inventory for various reasons. i.e. some of the goods produced in a given year may be sold in a later year rather than in the year they were produced or conversely, some of the goods sold in a given year might have been produced in an earlier year. The firms can create inventory for plant or machine, etc.

An inventory is a type of an investment which can be planned or unplanned i.e. that a company decides to have a raw-material inventory or finished goods inventory or un-finished goods inventory. Which means that these things

have not used now, they are stored to be used in the future. This is a planned inventory investment.

But sometimes an inventory is created because the firm was not able to sell the amount it planned to sell. So, an inventory can have 2 kinds of products, first those which are planned to be kept in inventory and secondly those which the firm planned to sell but failed to sell that quantity of product. This is an unplanned inventory investment.

- Government expenditure is used for roads, education, medical & health services, law & order, welfare programs, public works, salary to civil servants, etc.
- More or less the 3 methods gives the same income but there will be some margins because of some data collection issues, etc.

#### \* Items excluded from National Income Accounting

- (i) Second hand goods: The value of good had already been counted once when it was sold fresh, now counting it again & again will lead to multiple

times counting the same product. And also we consider its value in a certain period of time.

(ii) Intermediate goods: Intermediate goods which are not converted to final goods should not be counted in the national income because it will lead to repetition. But if the intermediate good is stored in an inventory than it is considered in the national income.

(iii) Non-marketed goods / services.

This is the matter of convenience. If there is no proper data for good i.e. if a good/service could does not enter the market then it is excluded from the market. E.g. Kitchen garden.

But there can be a farmer which grows a crop and keeps a part of it for personal use and sells the rest of it in the market. But still the whole production is taken into consideration for the national income because the govt. will have the information for the whole production. But in case of kitchen garden, the govt. had no scope of knowing about the production in the kitchen garden so due to convenience reasons, this production can't be included in the



national income.

(iv) Voluntary work / Household work - Housewife  
Parents teaching their children, etc.  
But the maid or a private tutor  
employed by a household will become  
a part of the national income as  
the household is paying for the service

(v) Unreported / Illegal market transactions /  
Black economy

The illegal transfer or money or  
exchange of black money constitutes  
the black economy. Sometimes this is  
also referred to as parallel economy.  
It includes buying or selling of  
banned products, or involve corruption/  
bribe. And these exchange of the  
black money does not occur on the  
surface, so the government has no  
way of knowing that any such  
transactions occurred. And also when  
these transactions on products has  
already been declared as illegal, therefore  
they are not included in the national  
income. And also people are not paying  
any tax or penalty for these illegal  
actions, therefore, the govt doesn't know.  
Unless these people are fined or  
penalized, then the government becomes  
aware of such illegal actions.

- Date \_\_\_\_\_  
Page \_\_\_\_\_
- (vi) Resale of existing houses - It is the value of the house that was already counted at the time when it was sold for the first time, so selling it again will only lead to repetition or recounting because it is just changing hand.
- (vii) Resale of used cars / old houses - This will also tend to repetition or recounting.
- (viii) Equities and bonds except commissions by the intermediaries. These are financial capital only transactions unless the financial capital raised in the stock market is actually utilised to produce goods otherwise they are not considered as a part of the national income. except for the commissions which goes to the intermediaries which because they are actually helping for the transactions to happen i.e. they are providing their service.
- (ix) Public transfers: Unilateral transfers from the govt. to the public.

Therefore, we can conclude that some factors are excluded because of logic or utility or some because of convenience or inconvenience.



## \* Classical theory: Output and Employment.

- When the total leakage becomes equal to the total injection or aggregate demand becomes equal to the total supply, then equilibrium is attained in an economy.
  - Is this equilibrium income automatic?
  - Can an economy attain equilibrium at full employment level always?
  - Full employment equilibrium is just an exception and that underemployment equilibrium is possible as a rule?
- When we say that there is equilibrium at a certain level, then we assume that the output is also in equilibrium and so is employment.
- Income equilibrium corresponds to output equilibrium as well as employment equilibrium.
- By employment, we mean employment of the resources to produce output. i.e. employment of labour. So we check whether the labour is fully employed or not at the point where income reaches equilibrium.



## \* Classical Economics

- This theory was proposed before Keynes came into picture.
- Keynes came to picture in 1930s when there was great depression (started in 1929 & ended in 1939).
  - There was a state of disturbance in the economy wrt income.
  - There was a state of business cycle which put almost all the big capital economies into trouble.
  - There was a slowing down of economy, income was falling, employment was falling and there was deep recession.
- At this time, Keynes came up with a new model of macroeconomics refuting the classical economics.
- So Keynes Classical Economics refers to the traditional principles of Economics which have been handed down since the time of David Ricardo.
- There was a classical era prior to Keynes which was more or less pioneered by the father of economics Adam Smith, in which the classical theory of

economics by was given.

- Adam Smith's 1776 release of the ~~width~~ Wealth of Nations highlights some of the most prominent developments in Classical Economics.
- Theories explaining values, prices, supply, demand and distribution were in focus.
- After the release of Wealth of Nations, many economists came into picture & their ideas converged more or less and they gave a classical theory. These economists are often referred as classical economists.
- The basic proposition of classical econ economics is:
  - (i) There is full employment of labour and other resources.
  - (ii) There is existence of stable equilibrium at the full employment level.

## Classical theory: The Basic Proposition

- There is full employment of labour and other resources.
  - They believed that the normal situation of an economy is ~~full emp~~ the existence of full employment and stable equilibrium.
- equilibrium: Aggregate demand = aggregate supply
- Income  $Y = C + I + G$  (in a closed economy) with only 3 players producers, consumers and the government and they make expenditure and demand various goods where we consider government is only a consumer not producer)
  - In classical economy, it is believed that the income is generated by the consumers, producers and the government in a closed economy in a particular time period.
  - SE in other sense, all that is earned is spent No general overproduction, anything which is supplied is demanded.  
$$Y = C + G + I \text{ or}$$
$$\text{Injections} - \text{Leakages}$$



and in case of closed economy

$T = S$

$G = I$

$T \leftrightarrow G, S \leftrightarrow I$

$T \leftrightarrow G$

$S \leftrightarrow I$

$$G + T = I + S$$

- So, they believed that this is a natural phenomena in an economy. All the workers seeking job are employed (full employment of labour), full employment of factors of production.

- A/c to classical economists, there will be full employment equilibrium, there will not be under-employment eq. i.e. all labour, land, capital will be fully employed.

There will be

- The normal situation of an economy is the existence of stable equilibrium at the full employment level.
- A/c to the theory the full employment or stable equilibrium can be achieved in the long run. It's a long-run theory, it can't be achieved in a short-run.

- The disturbances in the short-run could be corrected in the long-run. There won't be any disturbances in the long-run, there can be some temporary disturbances in the long run.
- Short but ultimately full employment will be achieved at the point of equilibrium of income in the long-run.
- Disturbances can be attributed to government intervention or private monopoly in the free play of market forces.
- As per the theory, govt. intervention should not be there in the market free play of market forces, there should be private enterprises to operate. The prices of the goods and services should be decided by the private enterprises without any govt. intervention.  
(No govt. intervention in the free play of market forces).
- There should not be private monopoly. The market in which goods and services are bought & sold should be perfectly competitive. There should not be a single seller of a product, there should be multiple sellers of a product.



Private monopoly brings imperfection/unbalance in the market.

- Income is spent automatically at the rate which keeps all the resources fully employed. According to this, the whole income should be spent. Saving is another way of spending money. And if there is saving then there will be investment & investment is spending money on producer's goods.

There are 2 types of goods:

- Consumer goods
- Producer goods

If a part of the household income is not used to demand consumer goods, then it has been saved and according to classical theory, the savings are automatically channeled toward productive investment. Thus, saving is another way of spending money on producer goods.

So, here leakage automatically becomes equal to injection.

- If there is saving, it involves spending on producer's goods (investment). Hence, a part of the income is spent on consumer goods, the other part is spent on investment goods.

## \* Meaning of Full Employment and Unemployment

- When we talk about unemployment in economy, it is mostly unemployment of labour.
- A/c to classical economists, full employment implies absence of involuntary unemployment.
- There can be voluntary, frictional and structural unemployment.
- A/c to the theory whoever is seeking a job will be employed then there is no involuntary unemployment.
- But if anybody volunteers ~~will~~ not to work (i.e. unwillingly) then it is voluntary unemployment.
- Voluntary unemployment may arise when workers are unwilling to accept the going wage.
- A/c to classical economics, wages are assumed to be flexible. They are the prices of labour. Whenever there is unemployment, the wage rate will go down and unemployment occurs when

the supply of labour is greater than the demand for labour.

Amount of labours seeking job >

Amount of jobs available  
Then, there will be involuntary unemployment.

- Involuntary unemployment can be cured by reducing the wage rate, so that the poor unemployed can be employed.
- A/c to the classical theory, wages are flexible, they can go up or down. So, depending upon the requirement i.e. If demand for labour > supply for labour then wage will go up and vice-versa.
- Flexible wage is the mechanism in the labour market through which the labour market can clear itself.
- But some people who have voluntarily accepted not to work with the low wage rate will remain unemployed. This type of unemployment occurs ~~when people~~ because of people's attitude ~~towards~~ of voluntarily not working at the current wage rate. They will remain voluntarily unemployed.

- Some people may remain idle because they prefer leisure to labour. They don't like to work:
  - (i) Idle rich: They have enough wealth already available with them maybe from their past activities or from their forefathers. They prefer not to work, not to seek jobs, they will remain unemployed.
  - (ii) Idle poor: They are poor but still they prefer leisure to labour and therefore they are voluntarily unemployed
- A/c to classical economists voluntary unemployment may coexist with full employment. Because the people who don't want to work either because they are not satisfied with the current wage rate or they prefer leisure to labour can't be possibly be provided with jobs. So, this type of unemployment can't be called unemployment.
- Fictional unemployment may arise due to imperfections in the labour market attributable factors: Labour immobility, seasonal seasonality in work, shortage of materials, breakdown in machinery, ignorance of job opportunities.

- There can also be structural unemployment which occurs due to some new change in the structure of the economy. People may temporarily lose or loose jobs.
- Even if there is ~~a~~ fiction some ignorance of job opportunity or seasonal unemployment, then also the person can get a job later. And if there is some structural unemployment, then ~~it~~ once after the economy settles down again, people may get back their jobs.
- As per the classical economists, even if people lose jobs due to some frictional or structural unemployment in the short run, they can be employed again later in the long run i.e. frictional & structural unemployment is temporary.
- So, the temporary unemployments can be overcome in the long-run & full employment can be achieved at the point of stable equilibrium in coexistence of voluntary unemployment.

## \* Basic assumptions

### • Laissez-faire set up

There is minimal intervention of the govt. in the free play of market forces. There will be govt. but its role will be like police, to prevent ~~internal disturbances~~ protect the people from internal disturbances and to external aggression. Market should be given a free hand to ~~not~~ operate against any govt. intervention.

- When we talk about market of a good, we actually talk about the demand and supply of that particular good. It is not necessarily a place.
- So, s/c to the classical theory, both goods & factor market should be given right to ~~not~~ operate freely without govt. intervention i.e. the price of the goods will be determined by the demand and supply of the good. Government can't decide the price.
- The goods will be produced by private enterprises and the price will also be decided by them according to the relative strength of demand & supply without any govt. intervention.



If the market is given a free right

- If the private enterprises are given free rights to run the market, then the few firms have a tendency to monopolize. This will bring imperfection in the market.
- Market can be divided into 2 categories:
  - (i) Perfect competition
  - (ii) Imperfect competition
- A/c to classical economics, both product and factor should be perfectly competitive. This is a kind of very ideal market which have certain attributes unique and it is different from the imperfect competition where the different levels of imperfection market players may bring in, the imperfect market will vary.
- There can be different forms of imperfect market like monopoly (single seller of a particular product or factor) i.e. if product X is monopolized then there is only one firm producing & selling the product, no other firm can enter into competition with that firm.
- There can be other forms of imperfection also. There can be alleged monopoly also where there are few firms or few sellers of a particular good.



- There can be monopolistic competition as well where there would be large number of firms where they would not produce identical products. They produce differentiated products which are close substitute to one another.
- There can be monopoly in the labour market as well where there is one labour union which is the source of labour, which supplies labour to the labour market.
- If there is some imperfection in market then it will lead to unemployment.
- Wages and prices are flexible.  
They believed that the wages for the firms paid to the labour owner are flexible. They can increase or decrease depending upon the relative strength of demand and supply of labour.  
If the supply of labour increases <sup>exceeds</sup>, given the given demand of labour, then the wages decrease & vice-versa.
- Wages are even allowed to decrease in the time of unemployment, therefore, according to classical economists, as long as we allow wages to be flexible downward, then no one will remain unemployed.



there

- But if there is wage rigidity, that is they are only flexible to rise, so then the firms cannot create employment because they are for everybody because they cannot create employment & pay higher wages. They can only create employment at lower wage acceptable to lower the labour owners. And as long as wages are flexible, this is possible.
- Not only labour, but each factor has a price. Capital owners are paid interest. Interest rate should be flexible. Price of all factors should be flexible.
- In classical economics, interest is determined by saving and investment
- They believed that interest is a flexible mechanism and when there is any discrepancy b/w saving & investment, then it can be automatically corrected by interest rate.
- The intersection b/w saving & investment determines the rate of interest.
- Classical economists believed that both saving & investment is a function of rate of interest.



- Saving is an increasing function of rate of interest & investment is a decreasing function of rate of interest.  
So, when the other factors remain same, when the interest rate increases, saving increases ~~not~~ & vice-versa, and similarly when interest rate increases, investment decreases & vice-versa.
- Therefore, the saving curve is positively sloped & the investment curve is negatively sloped w.r.t to interest rate & the intersection b/w the 2 will determine the equilibrium b/w saving & investment.
- So, all that is saved will be invested as long as the interest rate is flexible.
- Similar to wages, which will clear the labour market, interest rate will clear the capital market.
- Prices are also assumed to be flexible. Prices are fixed by the market forces, which are perfectly competitive. Prices of all goods are not rigid. They are again flexible that is decided by the perfectly competitive market ~~on~~ on the basis of market demand and market supply of the product.



- So, when the wages, interest rate & prices of goods are flexible then there will be full employment at the point of stable equilibrium of the economy.
- One of the primary focus of Classical Economics is aggregate supply.
- They introduced aggregate demand only to fulfill find out the eq. price to prevail in the economy.
- Supply creates its own demand. So in this case there is no general overproduction, there can be no general unemployment as long as the labours get wages according to their own physical productivity.

Based on the premise : The Say's law of Markets (Supply creates its own Demand)

- 1) Every producer who brings the goods to the market does so only to exchange them for other goods.
- 2) There is no general over-production.
- 3) There cannot be general unemployment as long as workers receive wages according to their physical productivity.



## Perfect Competition in Product Market: Basic characteristics

- When we say that a market is perfectly competitive, then there is complete absence of rivalry among the players (or sellers in particular).
- There is complete absence of "competition" (rivalry) in the true sense of the term. This is possible because of certain special characteristics of the market:
  - Large number of buyers and sellers. A particular can be produced and sold by a large number of firms.  
e.g. Same crop is grown and sold by lakhs of farmers, or hundreds of firms producing automobiles. "Large" is context dependent.
  - Sellers, companies, firms, producers all are the same. Consumers and buyers are the same.
  - No seller is a big entity, each individual seller is a very insignificant entity in the market in terms of the volume of production.

How much a seller sells in the market at a particular time given the demand of the product at that time. Therefore, the share of an individual seller is very insignificant, in such large no



- And as an individual seller is an insignificant entity, therefore it cannot fix/influence the price of a particular product in the market.
- And similarly as there are a large number of buyers, an individual buyer cannot influence the price of a particular good in the market.
- E.g. if the market fixes the price of a good as ₹ 10 but a seller does not want to sell his product at ₹ 10 & the market doesn't want to change the price, so the seller withdraws from the market. But his withdrawal from the market doesn't influence the total supply in the market as he was a very insignificant part of the market.
- The supply curve is the sum total of the supplies made by all the sellers at different prices. So, when a one seller doesn't want to sell his product at the existing price then also it will not influence the total supply. There will not be any visible change in the volume of supply, the change will be very small. So, in turn an individual seller <sup>or buyer</sup> cannot influence the price of a particular good.

- No individual buyer/seller can influence the price of goods in the market because he is an insignificant entity.
- Product homogeneity  
Product All the firms producing a particular product produce identical products. So, the consumers fail to distinguish between products produced by 2 different firms.  
and as the buyers cannot distinguish between the products, they cannot expect prices to be different. Therefore, the price will remain same as long as the product is identical.

- Free entry and exit  
any new firm can enter & any existing firm can leave.

Example: There are thousands of firms doing a particular business at a particular time and they are making some profit i.e. the total revenue they earn is greater than the total cost spent on capital. So when they are making some positive or super-normal profit, then some new firm will be attracted to this industry. & Industry is the sum total of firms. So, in this type of market, any new firm wishing to join can enter the market.

- Sometimes, there are some companies which have a patent right on a particular product for a particular period of time. In that period of time no other company can produce that particular good. But in case of perfectly competitive market, there are no patent rights on any product, so any firm willing to join the market is allowed to enter.
- And also any firm willing to leave (due to incurring losses) then it can leave.
- Free entry and exit is possible only in the long-run.
- Perfect mobility of factors and products Factors like labour are perfectly mobile (they can freely move from one place to another), there is no artificial restriction imposed on the mobility of factors.
  - Eg if there is surplus of labour in one place & depreciation of labour in the other then the labours are free to move from the place of surplus to depreciation. As a result, the price of labour will become uniform eventually. But if there is immobility of labour, then there will be disturbance in the market because the price of

labours will be non-uniform at different places.

- As long as we allow, the factors to be ~~mobile~~ perfectly mobile, the prices of the factors will become uniform across different places.
- If we allow product to be perfectly mobile b/w places where there is surplus & deficiency of that product, then there will be a uniform price of the product across the regions.  
according to
- Depending upon the climatic changes, availability of labours and other factors of production, we choose a particular region for the production of a particular product.
- But if products are immobile, then at places where it is deficient its price will be high and the place where it is in surplus, the price will be low. This will lead to non-uniform prices across regions which will lead to imperfection in market as it will be difficult to keep a fixed price for a product.



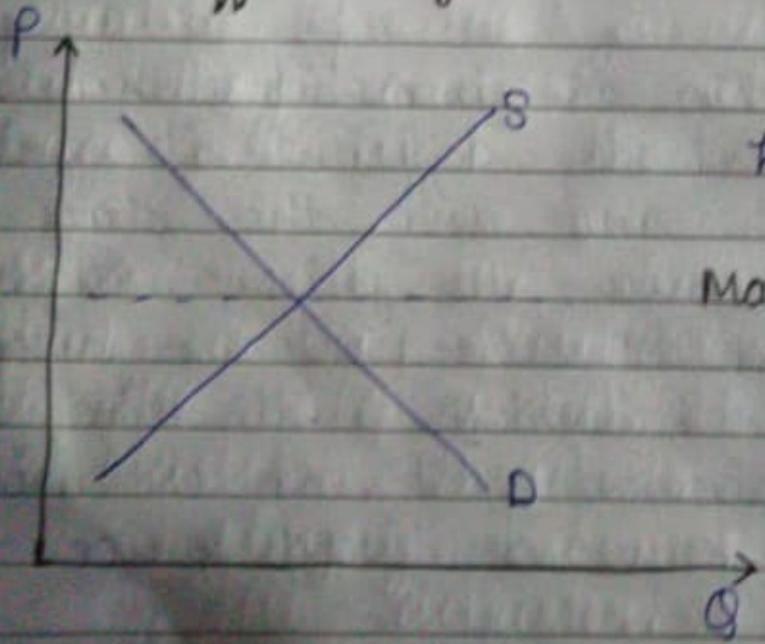
Perfect knowledge about the market.

In this market, there is no information asymmetry. Information is perfectly shared among all players of the market. Information about products, price, etc. is perfectly shared among all players.

In this form of market, the firms are only price takers, they have no authority in deciding the price.

The price of the product is decided on the basis of market supply & market demand. (or industry demand & industry supply).

Market demand = Sum total of individual demands for the particular product at different prices.



Demand curve  
has negative slope.

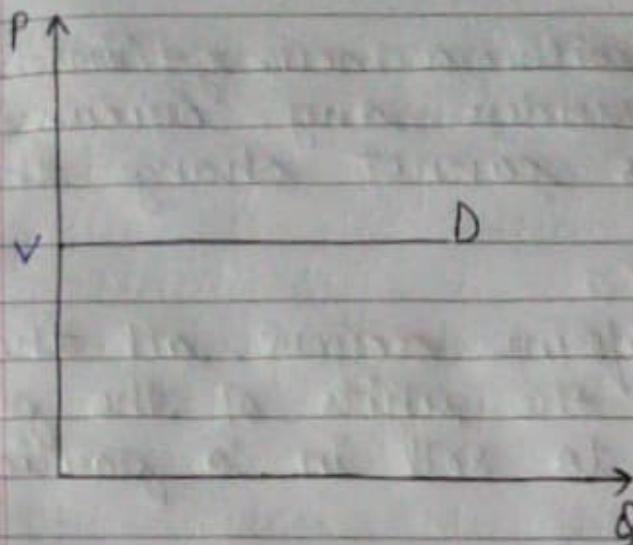
Market.

Law of demand: When other things remain constant, when the price of the product

increases then the quantity demanded decreases and vice-versa.

- When the individual demand curve is negatively sloped, then the market demand curve is also negatively sloped as the market demand is the sum total of the individual demands. It is the horizontal summation of individual demands curves.
- And the market demand is the same as the ~~industry~~ demand. It is the sum total of the demand made for a particular product by all the buyers.
- Similarly market supply is the same as the industry supply
- The supply curve is positively sloped which is based upon the law of supply other factors remain same, when price of the product increases, more quantity is offered for sale and vice-versa.  
The supply curve for an individual firm is positively sloped and so is the supply curve for the market because market ~~sup~~ supply is the same as sum ~~of~~ total of individual supplies curves.

- The intersection of the market supply & market demand curve gives the eq. price of the product.
- According to classical economists, the price of a good is determined by the industry which is the sum total of firms by all the buyers and sellers together on the basis of the intersection of the industry demand and industry supply. In a perfectly competitive market.
- The equilibrium price (at the point of intersection) is applicable for every buyer & firm, no firm can change influence the price.
- Each individual firm can decide the quantity of the product to be sold but they cannot determine the price. Price per unit the output remains same as a result, the demand curve for a firm is a straight ~~line~~ line parallel to the  $x$  (Q asked). It is infinitely elastic. Therefore, the individual firm simply becomes the ~~price~~-take or output adjuster. It <sup>has</sup> no authority in fixing the price of a product.



1. The price of a product is constant for a firm.

Firm is a profit maximizer. A firm produces output to maximize profit. It can maximize profit, not by changing the price because the price is not under its control, it is decided by the industry (on the basis of market demand and market supply).

Price is not fixed always, it can change but it is changed only by the industry. Suppose for some reason the industry demand curve shifts towards right or left given the supply curve, its price will change.

Once the price is changed by the industry, the new price becomes applicable for the individual firms. The vertical intercept for the demand curve, V will change but still the demand curve will remain a straight line parallel



the  $\alpha$  ( $P$ -axis) with a new  $y$ -intercept, which implies under any circumstance individual firms cannot change the price.

The price is uniform across all the ~~form~~ firms across all the units of the product the firm likes to sell in a particular time period.

Average revenue = Total Revenue / Total quantity of the output the firm sells = Revenue per unit output

Average revenue is same as price, which is the revenue per unit of output.

If a firm sells 10 units of output at ₹10/unit, then the total revenue is (₹10 × 10 = 100), average.

$$\begin{aligned} \text{Average revenue} &= ₹100 / \text{quantity of output sold} \\ &= ₹100 / 10 = ₹10 \text{ units} \\ &= \text{price} \end{aligned}$$

Average revenue will remain same as long as price remains unchanged.

Marginal revenue = Slope of the Total revenue

$$\text{Total revenue} = P * Q \quad P \rightarrow \text{Price} \quad Q \rightarrow \text{Quantity}$$

$$\text{Marginal revenue} = \frac{d(TR)}{dQ} = \frac{\partial TR}{\partial Q}$$

= Change in total revenue resulting from 1 unit change in the output

If a firm sold 10 units,  $TR = ₹ 100$

If the firm sold 11 units,  $TR = ₹ 110$

Revenue earned from the change in the units (1 unit) = ₹ 10.

$$\text{Marginal revenue} = \text{Total revenue (n units)} - \text{Total revenue (n-1 units)}$$

Marginal revenue refers to the last unit on the slope of the Total revenue.

When price remains unchanged from the industry then

For a firm  $AR = MR = \text{Price}$ .

### Equilibrium Conditions

Given the above attributes, the eq. condition is the profit maximizing condition

$$\Pi = R - C$$

### First order necessary condition

$$\frac{d\Pi}{dQ} = \frac{dR}{dQ} - \frac{dC}{dQ} = 0 \quad MR = MC$$

Second order sufficient condition requires that  $MC$  must be rising at equilibrium

$$\frac{d^2\pi}{dq^2} < 0$$

Slope of  $MC >$  Slope of  $MR$ .

- ~~If~~ The single point goal of a firm is to maximize profit.
- Total revenue = ~~Average~~ average revenue  $\times Q$   
= Price  $\times$  Quantity
- Profit = Total revenue - Total cost

$$\pi(\text{Profit}) = R - C$$

- $R \rightarrow$  Revenue function (~~Demand function~~  
derived from the demand function)  
 $R = P \times Q$  (Horizontal straight line  
↓ for an individual firm)  
constant
- Total cost ( $C$ ) is derived from the production function
- ~~For~~ In order to maximize the profit, the firm can predict the quantity of the good to be sold from the profit func?
- Equilibrium for an individual firm is reached when profit becomes maximum.



- For profit to be maximized, its first order derivative wrt  $Q$  should zero.

$$\frac{d\pi}{dQ} = \frac{dR}{dQ} - \frac{dC}{dQ} = 0$$

$\frac{dR}{dQ}$  → slope of the revenue function.

$\frac{dC}{dQ}$  → Slope of the cost function

- Slope of the revenue function is the marginal revenue & similarly slope of the cost function is the marginal cost.

$$MR = MC$$

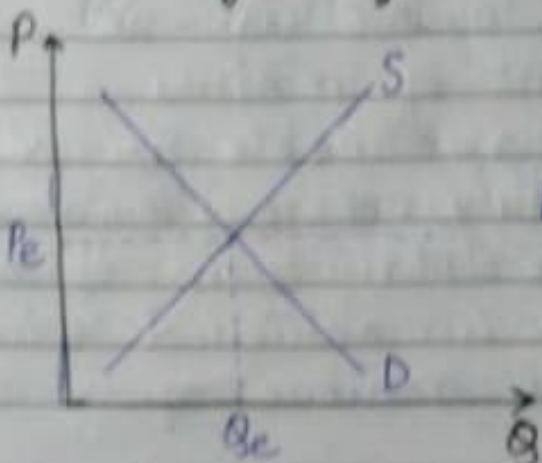
Marginal revenue = Marginal cost.

- But first order derivative = 0 can also mean minimization of profit for maximization. second order derivative ~~should~~ should become negative

$$d^2\pi/dQ^2 < 0$$

At the point  $MR = MC$

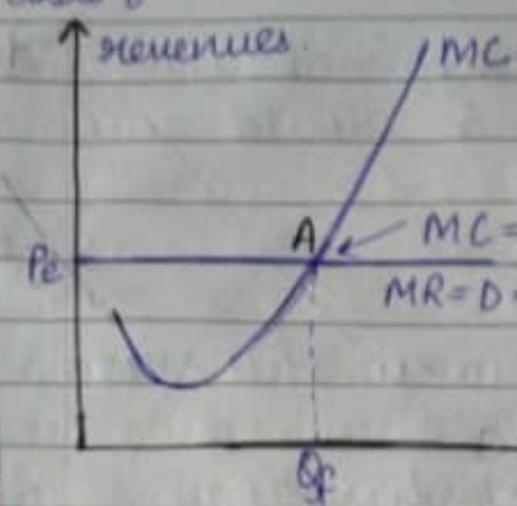
slope of  $MC >$  slope of  $MR$ .



Perfectly competitive industry



Costs &amp;

Perfectly competitive  
firm

- Marginal cost is decreasing in the beg. when there is an increase in output then it is increasing.
- ∵ Initially there is increasing return (decreasing cost) & then ~~there~~ when there is diminishing return then there is increasing cost.
- ∵ The marginal cost curve can cut the marginal revenue curve at 2 points A & B at which  $MR = MC$ .  
But ~~at~~ only at point A, profit is maximum because slope of  $MC >$  slope of  $MR$ .  
But at the ~~other~~ point indeed  $MR = MC$  but slope of  $MC$  is -ve  $\therefore$  slope of  $MR$   $\therefore$  it is point of minima.  
This condition is applicable for a particular firm selling a particular product but industry is the total sum of all the firms : industry eq. is achieved when all the individual firms achieve eq.

the this classical theory of economics apply more to agriculture than to the other industries.

#### \* Summary:

As per classical economist, the normal situation of an economy is the existence of full equilibrium income i.e.

$$\text{Aggregate demand} = \text{Aggregate supply}$$

$$\text{Injection} = \text{leakage}$$

The eq. income is attained at full employment of resources in particular, labour (as labour is fully employed). Labour wage is flexible then all those seeking jobs will be employed but there can be voluntary (structural or frictional) unemployment in the short run. But in the long run, there cannot be involuntary unemployment.

The whole theory is based on the sales law of market i.e. Supply creates its own demand and it is also based on certain assumptions :- there is perfect competition in labour & factor market, there is flexibility of interests and wages, etc.

#### \* The Classical Output and Employment

- Some terms are used interchangeably: output, income, employment.  
when there is eq. output then there is eq. income & employment as well



The level of output is solely determined

- (i) by aggregate supply curve of output
- (ii) Aggregate demand for output is introduced only to determine the price level.

Classical theory is based on supply but to determine the eq. price, demand curve is also necessary.

Derivation of Aggregate Supply curve of output involves:

- (i) Production function from which demand curve for labour is derived
- (ii) Supply curve of labour.

### \* The supply curve of Output: Firm

- The supply curves that we derive here are all short run curves.
- In short run, the state of technology ~~se~~ remains constant and the only way to change the amount of output production is by changing the amount of labour a firm employs.
- In the long-run, the technology and the factors of production become variable.

## \* Short run

- We assume atleast one of the factors of production to be constant. Others are variable.
- When we produce output, then we engage factors of production to produce output.
- Let  $Q$  = quantity of output be a function of Land, Labour and eg capital.  
$$Q = f(\text{Labour, Capital, Land})$$
If  $Q$  is a short run production function then atleast one of the 3 factors must be constant.
- If 1 factor is fixed and others are variable then there will be 2 types of costs incurred by the firm:
  - (i) Fixed cost - it arises from the constant / fixed factor of production.
  - (ii) Variable cost - it arises from the variable factor.
- ∴ There will be total fixed cost curve & total variable cost curve from which average fixed cost, average variable cost, marginal fixed cost & marginal variable cost is found out.
- E.g. If a firm keeps a plant fixed (capital



is fixed) but it keeps adding labour. Then this is the case of short run. But in the long run, the company can change the plant, setup a new plant and can add labours also. i.e. all the factors can be variable in the long run.

- In perfectly competitive market, new firms can enter & existing firms can leave freely. But in short run, the time period under study is so small such that neither existing nor firms can leave & nor new firms can join.
- In short run, the ~~tech~~ state of technology remains constant, the only way to change output is by increasing labour. Labour is considered to be the variable factor.

### \* Long Run

All the factors are variable in the long run.

In perfectly competitive market, new firms can enter and existing firms can leave only in the long run, because it is very big time period.

In the long state of technology as well as labour can change.

### \* Firm's Production Function

$$Q(\text{Quantity}) = f(\text{Labour, Capital})$$

1. In short run,  $Q$  is a function of labour given capital.

- Input-output relationship is described by the firm's production function.
- It is the relation b/w the physical input & physical output.

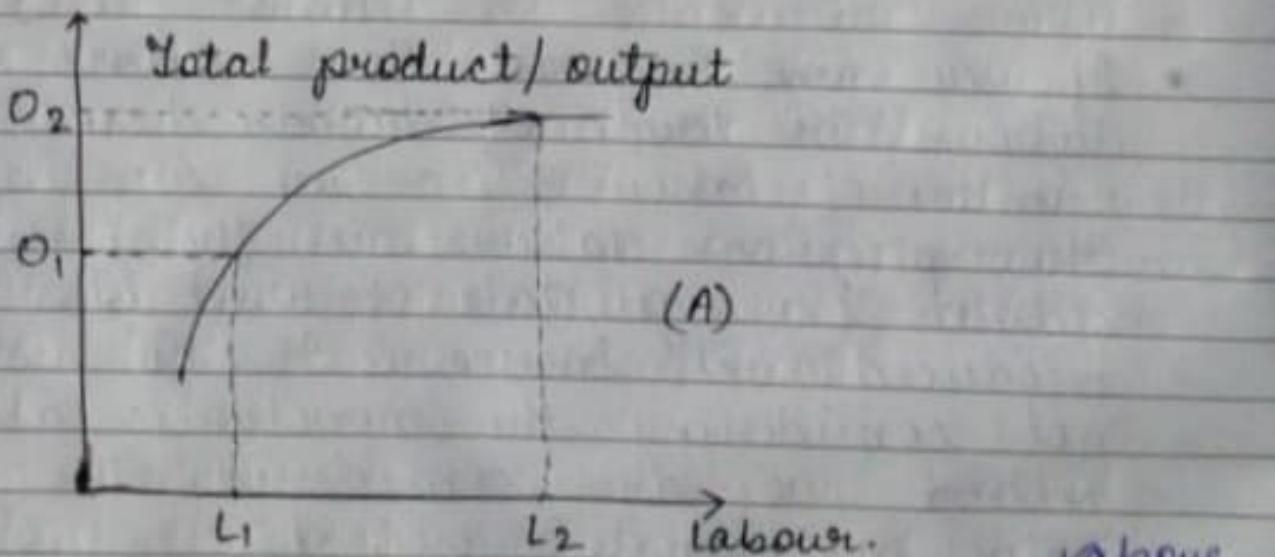
$$Q = F(L) \text{ given } K. (\text{capital})$$

↳ Labour

- If we keep increase the amount of labour (in terms of labour hours or number of labours) i.e. we are increasing the physical labour. So, the physical output (e.g. quintals of ~~wheat~~ wheat produced) will increase. In this we are not considering the monetary value. Instead we are considering the physical values of input & output.



- Short-run production function or law of variable proportion: amount of labour is changing keeping the capital constant i.e. their ratio is changing.
- If it is short run production function, as we keep increasing labour by the variable factor keeping the fixed factor unchanged, the total product produced will increase at an increasing rate initially, then it will increase at a decreasing rate then finally it will decrease.
- Initially it will increase proportionately then it will increase less proportionately and then it will decrease.

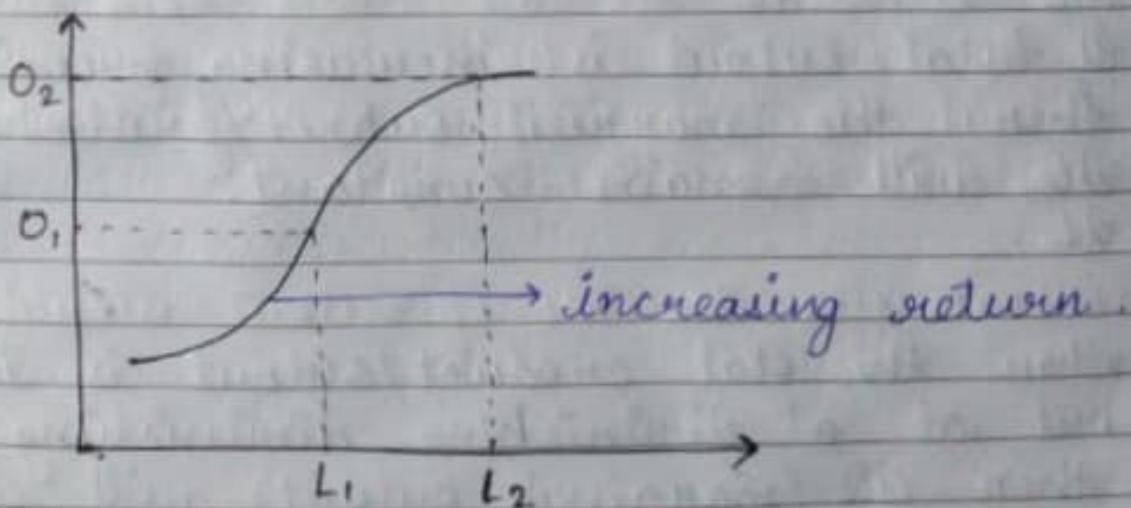


- Linear portion in part (A) of the following figure shows proportional returns. Output varies proportionally with labour input



upto  $O_1$  or upto labour input  $L_1$ .

- Beyond  $L_1$  (from  $L_1$  to  $L_2$ ), the output will increase but less than proportionately (when input is doubled, output will be less than doubled).
- The non-linear portion of the total product curve, starting at  $L_1$  illustrates the stage of diminishing returns.
- In the initial phase, the output can also give increasing return i.e. it can increase more than proportionately. In this case, initially it will be concave upward & then it will be concave downward. The part which is concave upwards represents increasing return i.e. each extra labour will contribute more than what the previous labour contributed.



- Till  $L_2$ , the output was increasing with increasing or diminishing return but at  $L_2$ , it has reached maximum i.e.  $O_2$ . Now, if we increase the amount of labour beyond  $L_2$ , then the total output will decrease.
- Rules of production function are applicable to all individual firms as well as industries.

↳ Increasing proportionately - Proportional return ( $L_1$ )  
↳ Increasing less than proportionately - Diminishing return ( $L_1 \text{ to } L_2$ )  
↳ Decreasing - Negative return (beyond  $L_2$ )

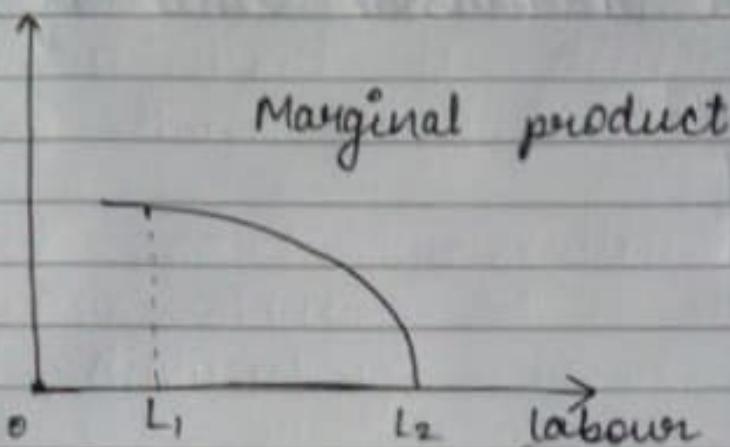
Firms operate at 2<sup>nd</sup> stage.

► Firm wants to maximize profit & in order to do so, it tries to maximize the output as well.

If total output is increasing proportionately then the marginal output / product,  $\frac{dQ}{dL}$  will remain constant.

When the total product / output is inc. but at a diminishing rate, then  $\frac{dQ}{dL}$  (marginal output) will decrease.

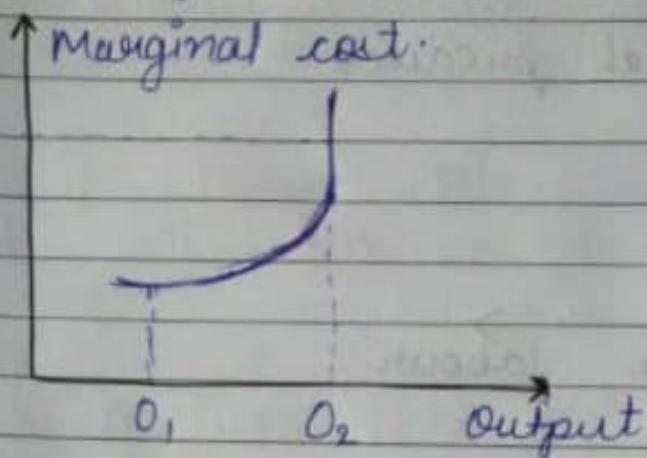
but will remain +ve. But beyond  $L_2$ , the total product will decrease, marginal output/product will be -ve.



- From the production function in Part A, it is clear that in the short run the firm under no circumstances would hire beyond  $L_2$  amount of labour.
- Increment in total product resulting from the addition of a unit of labour is the Marginal Physical Product of Labour ( $MPP_L$ )
- $MPP_L$  diminishes as labour input increases from  $L_1$  to  $L_2$  and finally becomes zero when labour input reaches  $L_2$ .

## Marginal cost

- Marginal cost (MC) is the cost of producing an additional unit of output



- MC in this case is composed entirely of labour cost and it equals the money wage ( $w$ ) divided by ~~MPP<sub>L</sub>~~ MPP<sub>L</sub> at any level of output

$$MC = \frac{w}{MPP_L}$$

- MC is same at all levels from output  $O$  to  $O_1$ . If the firm were to expand output beyond  $O_1$  the MPP of labour would start declining.
- Consequently, the MC of output would start rising.

A firm continues adding labour as long as the output is increasing, so it does not realise when it reaches the diminishing return stage, so the firm operates on the diminishing return stage ( $L_1$  to  $L_2$ ) without realising it but it never goes beyond  $L_2$  to reach negative return stage.

Is it a rational behaviour to ~~ope~~ on account of a firm to operate at the diminishing return stage?

It is a rational behaviour because, even in the diminishing return stage, the company can make profit if the total product (output) is still increasing at a diminishing rate. Therefore, as long as the total product is increasing, maximum profit can be attained.

Maximum profit is not only about quantity, it depends on revenue as well which price \* quantity and it is also dependent on the cost.

$$\text{Profit} = \text{Revenue} - \text{cost}$$

- According to classical economics, firms produce operate at the diminishing return stage.
- According to classical economists, physical productivity of labour diminishes when more amount of labour is employed to produce output.

## Marginal cost

A Marginal cost function is derived from the production function.

(+vely)

Marginal cost curve is upward sloped when marginal product curve is -vely sloped.

Marginal physical product productivity of labour is the slope of the total product curve w.r.t labour i.e. the change in physical change in output w.r.t one unit change in labour.

Marginal cost is the additional cost incurred by engaging one additional unit of labour

$$MC = \frac{W}{MPP_L}$$

Similar to price of products, the wage rate is also ~~determined~~ decided by the industry, therefore it is fixed, it cannot be changed by individual buyers and sellers. No matter how much of labour is demanded or supplied, the wage rate remains the same.

W → Marginal cost of labour

MC → Marginal cost of output

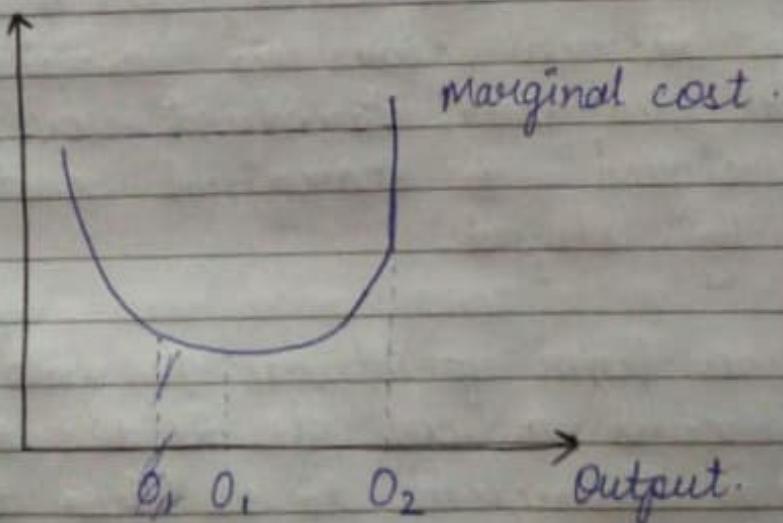
Marginal cost is the slope of the total cost function, change in total cost resulting from one unit change in ~~labour~~ output.

$$MPP_L = \frac{dQ}{dL} \quad MC = \frac{dC}{dL}$$

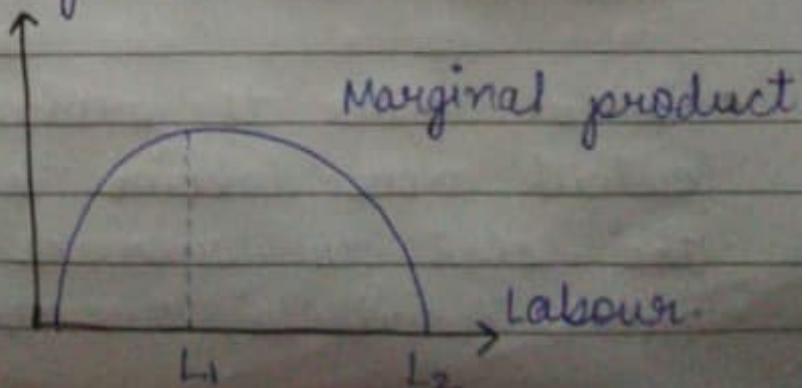
$$MC = \frac{dC}{dQ} \quad W = \frac{dC}{dL}$$

When one unit more output is produced then the additional cost incurred to produce that output is the marginal cost.

If we consider the increasing return stage (upto  $L_1$ ) then in the marginal cost curve, we will get a falling part.



And the marginal product curve will become ~~inverted~~



Because if we consider increasing return in output, then initially output will increase with increasing slope, so the marginal product curve will be positively sloped. & will keep increasing & in the diminishing return stage, marginal product will decrease and in the proportional return stage in between, marginal product will remain same constant.

If ~~the~~ and correspondingly in marginal cost, in increasing return marginal cost will be decreasing & in diminishing return, marginal cost will be rising.

But in classical economics, only diminishing return stage is considered in which marginal product curve is negatively sloped & marginal cost curve is positively sloped.

Example: If a firm produces 10 unit output then it incurs a cost of Rs 100 (at ₹10/unit) if output is increased to 11 then the total cost increases to 110, ∴ marginal cost here is ₹10.

So, in order to produce one unit more output, more labour has to be engaged & the cost to produce that one extra unit output will be the ~~cost~~ wage payed to



that labour.

$w$  = wage payed to the labour to produce that extra amount of ~~per~~ output.

The extra labour engaged is contributing to the output, that value is MPPL

$$MC = \frac{w}{MPPL}$$

$\therefore$

- Let  $w = ₹20$ , if we engage an extra unit of labour, then 20 rupees is paid to the labour and that extra unit of labour contributes to output to the tune of 10, i.e. 10 units of extra output is produced when 20 rupees is paid.

$$MC = \frac{20}{10}$$

- Extra unit of output produced involves an extra cost of 10 rupees.

### \* Derivation of the Demand curve for Labour

We are eventually trying to derive the aggregate supply curve for output, in order to derive it, we need demand and supply curve for labour.

In order to derive the above curves, production function is needed which has 3 stages but w.r.t. to classical economists, firms in the economy operate in the diminishing return stage i.e. the

marginal productivity of labour decreases but remains positive and the marginal cost curve is positively sloped.

To derive demand curve for labour:

(i) Who demands labour?

The demand for labour is made by the firms/employers i.e. those who produce output.

- Demand for labour is made by those who produce output of supply of labour is made by the owners of labour i.e. the household sector.
- The output is supplied by the employers/firms and the output is demanded by the household.
- The quantity of output produced by the firms is decided by the profit maximizing rule of the firms i.e. the firm is a profit maximizer.
- But the consumers demand the goods & they demand the goods on utility maximizing rules. i.e. consumers are utility maximizer.
- In the output market, the amount of

output supplied by the firms will depend on their profit maximizing rule & how much output the consumers will demand will depend on their utility maximizing rules.

- In the labour market, the rule is reversed as labour is demanded by the firm, but the goal of the firm is still maximizing its profit. Labour is supplied by the household sectors. But as the households are consumers so the utility maximization rules will apply.
- How much the ~~lab~~ firms will demand of labour will be governed by the profit maximizing rules of firms & the supply of labour by households will be governed by the utility maximizing rules of households.
- Demand of a firm for labour.

#### Assumptions:

- (i) This is for short run, therefore the only variable factor is labour, other factors are constant.
- (ii) A single output  $Q$  is produced under perfect competition. Hence, price is given for all the firms. Therefore, the product is homo

homogenous for and identical for all the firms and there are large number of firms and the price is same for all the firms.

(iii) Goal of the firm is profit maximization. They will engage that amount of labour which will maximize their profit.

(iv) Labour market is perfectly competitive. Hence price of labour  $w$  is given for all firms. Labours are not unionised, i.e. there ~~is no~~ is no single labour union (large number of buyers & sellers of labour). Each household is allowed to sell its own labour to the firms.

If ~~there~~ there is labour union then it is an imperfection because it can bring unemployment. ~~The~~

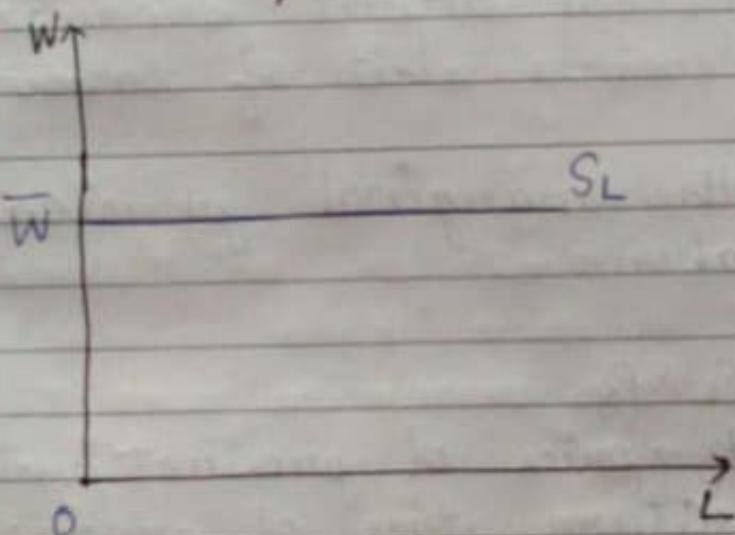
(v) Hence, the supply curve of labour to a firm is perfectly elastic.

Demand curve of output is a horizontal straight line which implies  
marginal revenue = marginal cost = ~~per~~  
average revenue = price  
This curve is perfectly elastic.

Similarly, in the context of labour market

the supply curve is a horizontal straight line i.e. perfectly elastic. which implies that any amount of labour can be employed by the firm without changing the price (wage rate)  $w$ .  $w$  is decided by the industry on the basis of total demand and supply of labour. It is not affected by individual firms.

- Individual firms are price takers wrt labour



This assumption is an indirect consequence of assuming perfectly ~~some~~ competitive market.

- (vi) There is a given state of technology. State of technology changes in long run with the given state of technology, there is only one production function.

$$Q = f(l)$$
 given capital

and capital is based upon the given state of technology. If the state of technology changes then the same labour

- will become more productive. ∵ the output curve will shift towards right on left.

∴ we consider, there is diminishing marginal productivity of labour.

- Slope of the production function is  $MPP_L$

$$\frac{dQ}{dL} = MPP_L$$

- It is the physical output produced by engaging one extra unit of labour.

- Value of ~~is~~ the marginal physical product of labour.

$$VMP_L = MPP_L \times P_Q$$

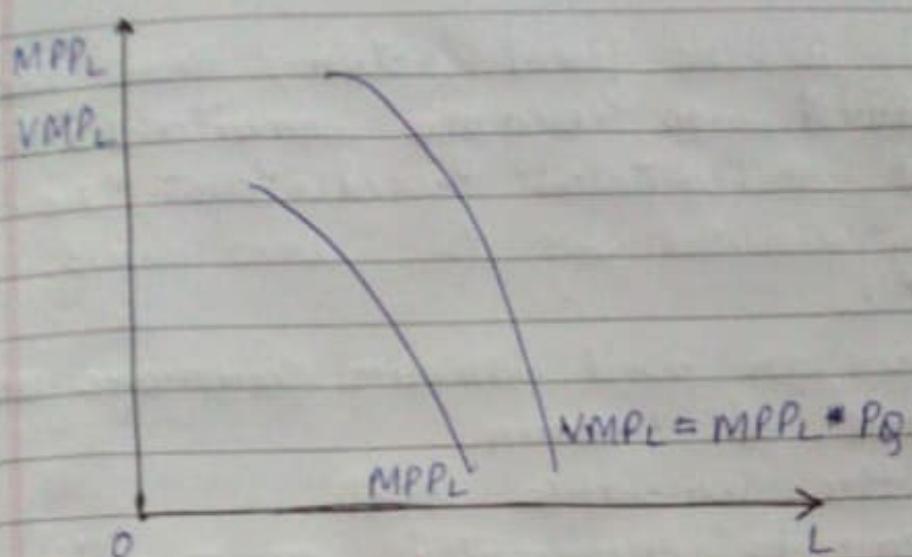
$P_Q \rightarrow$  price of product/unit

- In diminishing return stage of production,  $MPP_L$  is decreasing.

$MPP_L$  is a real value i.e. it is the physical quantity of output contributed by engaging one extra unit of labour.

- Price of a product is fixed (given) for a particular product.

- If one extra unit of labour contributes 10 units to output & price is ₹10/unit, then  $VMP_L = 100$ .



## Derivation of the equilibrium of a firm

- In this we can derive the amount of labour a firm can employ in order to attain equilibrium (maximize profit).

Equilibrium of ~~the~~ firm  $\Rightarrow$  attainment of maximum profit.

Equilibrium for consumer  $\Rightarrow$  attainment of maximum utility

- production function

$Q = f(L) \times$   $\rightarrow$  function of labour given capital.

- cost function

$$C = WL + F$$

It has 2 components:

- Fixed cost
- variable cost

- If capital is the fixed factor, then the cost incurred to engage capital is the fixed cost.  $\rightarrow F$  (Total fixed cost)

$$WL = W * L$$

$W \rightarrow$  wage per unit labour (average wage)

$L \rightarrow$  Amount of labour

This is the variable cost.

Labour can be represented as number of labour or hours worked by labour, etc.

- The revenue of the firm

$$R = P_Q \cdot Q = P_Q [f(L)]$$

= Price per unit product \* quantity

- The firm wants to maximize profit

$$\Pi = R - C$$

$$\Pi = P_Q [f(L)] - (WL + F)$$

- If we set the first derivative of the profit function w.r.t labour equal to zero, we will get

$$\frac{d\Pi}{dL} = P_Q \left( \frac{dQ}{dL} \right) - W = 0$$

- Rearranging this, we obtain

$$P_Q \cdot MPP_L = W \rightarrow VMP_L = W$$

- The profit maximizing firm will employ that much amount of labour which will equalize  $VMPL$  with  $w$ .
- If  $VMPL > w$ , the firm will be inclined to employing more labour.
- If ~~w~~ In perfect competition,  $w$  (wage of labour) &  $P$  (price of a particular product) are constant. Only  $MPPL$  is decided by the production function, i.e. it can be changed by the firm.
- And we are considering diminishing return, so  $MPPL$  is decreasing but remains positive.
- With increasing amount of labour,  $MPPL$  will keep decreasing therefore,  $VMPL$  will keep decreasing as price is constant.  
 $\therefore$  At some point  $VMPL$  will become equal to  $w$
- The firm will employ labour up to the point where the marginal cost of labour is equal to the  $VMPL$ .

$$MC_L = VMPL$$

$$w = VMPL \text{ where } w = MC_L$$

- The money paid to the last unit of labour is equal to the value of the marginal productivity of labour i.e. The output contributed by the last unit.
  - As we know,  $w$  is constant, therefore  $MPC$  is constant.
  - Firm can maximize profit by 2 different rules:
    - With production of output
    - With the labour employed.
  - i.e. we are trying to find how much product should the firm produce to maximize profit & also how much labour should the firm employ to maximize profit. But these 2 rules give the same result.
  - When a firm maximizes profit by producing  $x$  amount of output, at the same time the firm maximizes profit by employing  $L$  amount of labour.  
respect to
  - Profit is maximized with labour and output at the same time.
- $\therefore \frac{d\pi}{dq} = \frac{d\pi}{dL} = 0$  at the same time

- From the point of view of the output, a firm will produce the amount of output which will make  $MC = MR$ .
- If perfect competition,  $MR = P$ . Hence equilibrium is attained when  $P = MC$ .

$$P_g \cdot MPP_L = VMPL$$

$P_g$  = Marginal revenue of output  
= Average revenue of output

$$P_g \cdot MPP_L = MR_g \cdot MPP_L = MRP_L$$

$MRP_L$  = Marginal revenue product of the labour

$$MRP_L = VMPL \text{ (In perfect competition)}$$

- But in monopoly  $MR_g \neq P_g$ ,  $MR_g < P_g$   $\therefore$  in this  $MRP_L$  is diff from  $VMPL$  but in perfect competition  $MRP_L$  is same as  $VMPL$ .
- In perfect competition

$$MC_L = MRP_L = VMPL$$

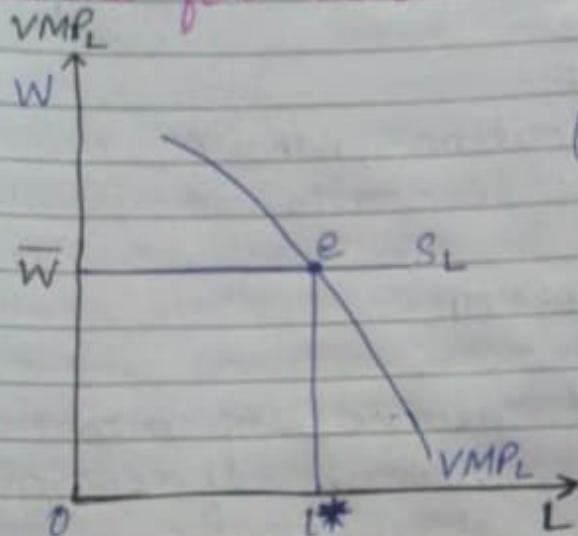
In perfect competition,  $MR = P$ .

Hence equilibrium is attained when  $P = MC$ .

$$\text{AS } MC = \frac{W}{MPP_L} \Rightarrow P = \frac{W}{MPP_L}$$

$$W = P \times MPP_L \Rightarrow W = VMPL.$$

## Derivation of an Individual Firm's Demand Curve for Labour.



$$\bar{W} = MCL = ACL$$

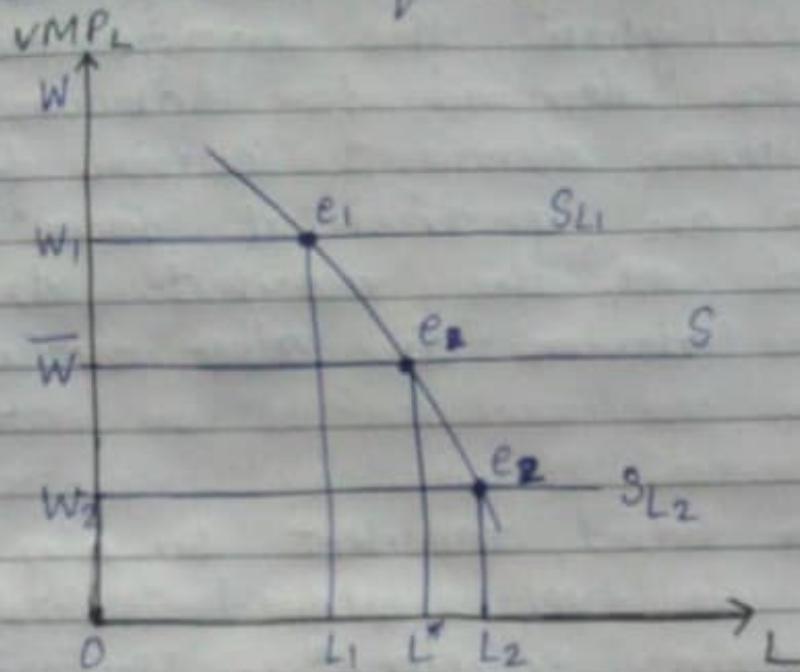
(Average cost of labour)  
• Marginal wage

- $\bar{W}$  → wage decided by perfectly competitive market industry in the labour market on the basis of total demand & total supply (it is fixed/given).
- ∵ Supply curve of labour is a horizontal straight line parallel to L-axis.
- $VMP_L = \bar{W} \times P_g \times MPP_L$
- ∵ the  $MPP_L$  is decreasing ∴  $VMP_L$  will also decrease. (-vely sloped)
- As amount of labour keeps increasing,  $VMP_L$  keeps decreasing

$$\bar{W} = MCL = ACL = MW$$

# Average wage =  $\frac{\text{Total wage}}{\text{Total amount of labour employed.}}$

- Marginal wage  $\rightarrow$  additional wage paid to the additional unit of labour.
- And  $\bar{w}$  is fixed, so is MCL, AWL.
- The firm employs  $L^*$  amount of labour at which eq. is attained i.e.  $\bar{w} = VMP_L$ .



$w = \bar{w}$  Labour =  $L^*$  (equilibrium attained by maximization of profit).

- If  $w$  rises to  $w_1$ , i.e. money wage is increased by the industry.
  - Wage for labour is determined by market demand curve & market supply curve for labour. Market demand curve (-vely sloped), Market supply curve (+vely sloped)
- Market demand curve  $\rightarrow$  Sum total of

individual demand curves for labour at different prices of labour i.e. different wages.

- Other things remaining constant, we assume demand curve for labour is a function of its own price i.e. wage rate. Higher the wage rate, lower is the demand for labour and vice-versa. Hence, demand curve for labour for an individual firm is -ve/-y sloped ~~&~~<sup>and</sup> the market demand curve for labour is also -ve/-y sloped.
- On the other hand, market supply curve for labour is +ve/-y sloped when other things remain constant. Under perfect competition and other assumption we can say, higher the wage rate, higher is the quantity of labour offered for sale & vice-versa.

Supply curve of labour by individual households w.r.t. price of labour is +ve/-y sloped. ∴ Market supply curve will be +ve/-y sloped.

But industry demand curve & ~~or~~ industry supply curve determines the equilibrium wage rate ( $\bar{w}$ ).



- When other things remain unchanged, wage is the only factor to determine demand & supply for labour.
- But if the other factors change then there will be rightward or leftward shift in the demand supply or demand curve for labour.
- If there is higher expectation of profit, as the demand for labour increases given the price, wage will increase. And the workers will the firms tend to accept the wage rate set by the industry.
- The current wage rate is in accordance with the current demand and supply of labour. If there is a change because of change in state of technology, the demand for labour increases, given the supply, the price of labour will rise. Or, if the firm is ready to employ more irrespective of an increased wage rate.
- Therefore, the industry is changing the wage rate in accordance with new market demand and market supply & the new wage rate becomes applicable for every individual firm.



- Therefore, the new supply curve for a firm will become  $S_1$  because of change in wage from  $\bar{w}$  to  $w_1$ . Due to this, the labour employed by firm is reduced to  $L_1$  for attaining equilibrium ( $e_1$ ) or maximizing profit.
- $L_1 < L$  because as the wage rises, the profit maximizing firms will employ less to attain equilibrium.
- But if wage rate decreases from  $\bar{w}$  to  $w_2$ , then the amount of labour employed for attaining equilibrium ( $e_2$ ) or maximizing profit increases to  $L_2$ .
- $L_2 > L$  because as wage rate falls, the profit maximizing firms will employ more to attain equilibrium.
- $VMPl$  curve is the supply curve of labour for an individual firm. Because every point on the curve is a profit maximizing point at any particular value of wage  $w$ .
- Other things remaining constant, demand curve is the relation b/w demand price for labour and the quantity demanded of labour.



- And other things remaining constant, it is expected that there is an increase in demand for labour when the wage rate decreases and vice-versa.
- Higher the wage-rate, lower is the labour demand & lower the wage-rate, higher is the labour demand, therefore there is an inverse relation b/w the wage rate & the demand for labour, ∴ the demand curve of a firm is -vely sloped.
- $\bar{W}$  is money wage & VMP is also the monetary value of output i.e. both are nominal values. ∴ eq. is attained when these 2 nominal values become equal.
- These nominal values can be converted to real values and still the eq. is maintained. It will result in rearrangement of equilibrium.

$$W = P \times MPPL$$

$$MPPL = \frac{W}{P}$$

$MPPL \rightarrow$  real output (physical output)

$\frac{W}{P} \rightarrow$  real wage.

- $VMP_L$  is the demand curve for labour when  $w$  is on the y-axis and both  $w$  &  $VMP_L$  are nominal values.

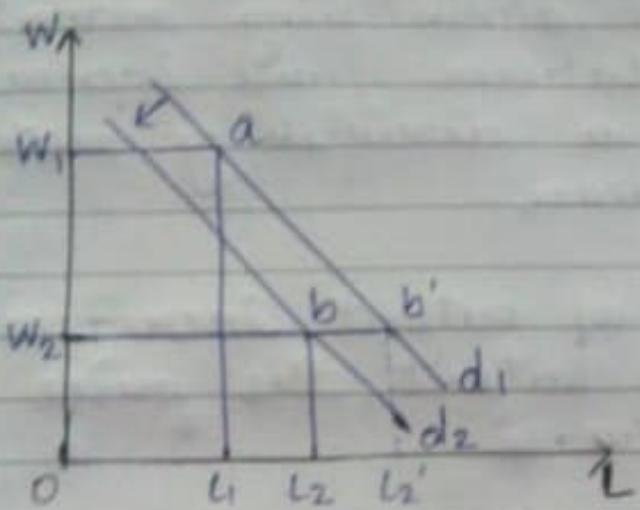
- If we consider everything in real terms then VMP<sub>L</sub> will become MPP<sub>L</sub> & w will become  $\frac{w}{P}$
- In real terms, with real wage ( $\frac{w}{P}$ ) on y-axis, MPP<sub>L</sub> is the demand curve.
- Both demand curves i.e. in real & nominal values i.e.  $\frac{w}{P}$  MPP<sub>L</sub> & VMP<sub>L</sub> respectively are -vely sloped because we consider diminishing return.

### \* Market demand curve for labour

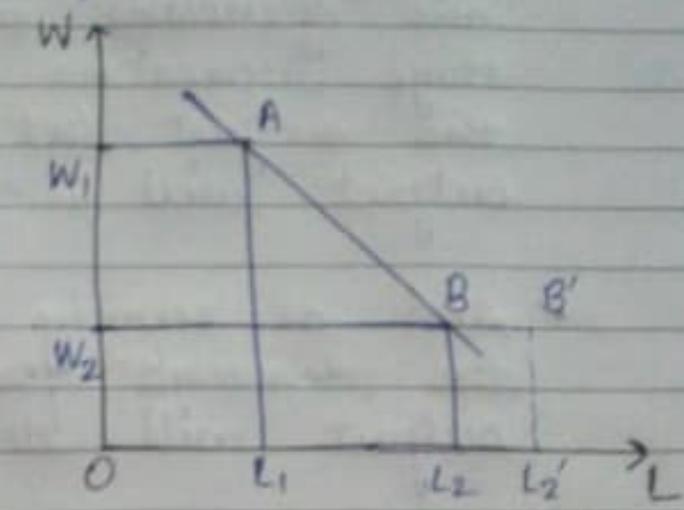
- Individual demand curve is -vely sloped w.r.t product.
- Consumer consumes more of the product when its price decreases, other things remaining constant.
- To arrive at the market demand curve for output a particular product at different prices, we sum up the individual demand curves. ~~to arrive at the market demand~~
- Market demand curve for output is the horizontal summation of individual

demand curve for output

- But market demand curve for labour is not the horizontal summation of individual demand curves because it is labour market, there is some issue which makes it less like the output market.



Demand curve  
for labour of an  
individual firm



Market demand  
curve for labour.

- These demand curves are in nominal terms, therefore  $d$  is  $VMPL$ .
- At demand curve  $d$ , number of labours employed by an individual firm at wage  $w_1$  is  $l_1$  and correspondingly in the market demand curve, at wage  $w_1$ , the sum total of labours employed by all the firms over the country is  $L_1$ .  
e.g. If there are 10 firms each employing  $l_1$  amount of labour at wage  $w_1$ , then

$$L_1 = 10^4 \cdot L_0$$

- When wage rate falls to  $w_2$ , labour employed by a firm does not become  $d_2$ .
- When wage rate will decrease, then labour employed will increase and as the firms are operating on diminishing return stage, increasing labour will increase the output. At a diminishing rate, output will increase.
- And as supply of output increases gives the demand for output, the price for output will decrease.
- d<sub>1</sub> demand curve has been derived at a particular price for a particular output as

$$VMPL_1 = P_1 \times MPP_1$$

$$\therefore d_1 = P_1 \times MPP_1$$

- But as the wage rate decreases from  $w_1$  to  $w_2$ , the price of output will be changed by the industry as the supply of output increases.  $\therefore$  Price of output will decrease. Because of fall in price VMPL will decrease.  $\therefore$  the new VMPL will be to the left of the original MPP<sub>1</sub>.

$$\therefore d_2 = P_2 \times MPP_1 \quad P_2 < P_1$$

Whenever there is decrease in the wage rate from  $w_1$  to  $w_2$ , there is increase in employment from  $L_1$  to  $L_2$  but not to  $L'_2$  because there has been price fall of output. Price of the output falls when there is falling wage rate.

- The price If there has not been price fall for output then the labour would have been increased from  $L_1$  to  $L'_2$ .
- Therefore, correspondingly  $L_2$  is the sum total of labour employed by all the firms at the wage rate  $w_2$ .
- Because of profit maximization rule of firms, they face a -vely sloped demand curve for labour.
- From this we can see, profit maximizing firms can employ more only when wage rate is flexible downward.

### \* Derivation of the Supply Curve of Labour

- The relationship between labour supply and the wage rate defines the supply curve.
- The supply of labour is made by the households and the firms demanded labour.



- Therefore, to decide how much labour should be demanded profit maximization rule of firms is followed.
- To derive supply curve of labour, we apply rule of equilibrium applicable to household i.e. utility maximizing rules.
- Supply curve of labour is positively sloped when wage rate rises more amount of amount of labour is offered for sale i.e. the supply increases and vice-versa.
- Market supply curve of labour is the summation of the individual demand curves supply.

All the individual supplies of labour =

### \* Labour-Leisure trade-off

- Households are the owners of the factors of production including labour and they are also the consumers of goods and services.
- Each consumer is a utility maximizer, therefore, each household is a utility maximizer.



- Each economic agent is a rational economic agent.
  - A producer is rational when he/she maximizes profit. No other goal is pursued. Similarly, a consumer is rational when he/she maximizes utility. These are the rationality assumptions.
  - A consumer should consume more of a product when its price falls, this is rational behaviour but if the consumer is guided by some other factors and he consumes more of a product even when its price is high then it is irrational behaviour.
  - Households earn its income by selling factors of production including labour. Therefore, in general, when the wage rate is high households will want to supply more labour.
- \* Indifference curve analysis

### Assumptions:

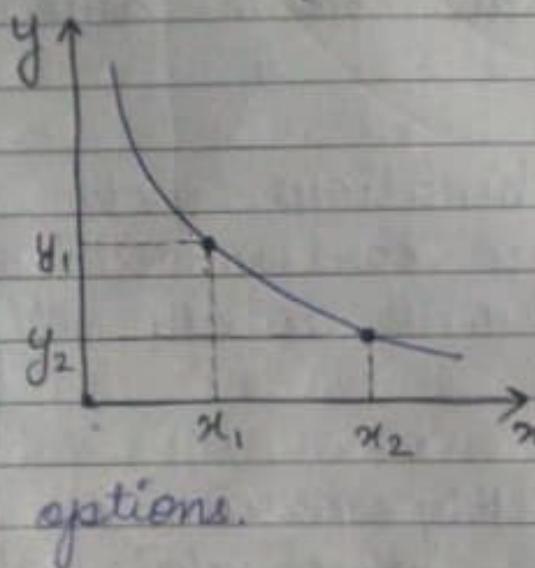
- Individuals (who supply labour) choose between work and leisure.
- When work is supplied then leisure has been sacrificed.

- When one prefers leisure over labour, then he/she is not paid.
- Leisure could arise from various reasons like education, household work, etc.
- In this context, we consider an individual who is capable of supplying labour (to work) and he has the option of choosing leisure as well.
- It is the choice of an individual to decide how much time to give to labour & how much to leisure. So, each individual can have his own set of differences between work & leisure.
- Suppose an individual has 10 options to choose different sets of leisure & labour. One can decide 10 hours of work & 14 hours of leisure, another can decide 12 hours of work, 12 hours of leisure. Thus, each individual can have his own set of differences.
- Therefore, each individual can exhibit a different set of labour & leisure, there can be 10 different sets and they can give the same utility to the consumer.

## Assumptions:

- 1. Individuals choose between work and leisure.
- 2. Work is time spent on a paying job.
- 3. Leisure includes activities where one is not paid like education, rest, work within the household.
- A particular indifference curve shows various combinations of labour and leisure that yield the same amount of total utility.
- As the various combinations yield the same utility to the consumer, so the consumer is indifferent to the different combinations.
- Consumer is a utility maximizer, it implies, a consumer ~~will~~ while choosing a basket of goods to consume at different prices given limited income, then he should choose the best possible combination of the goods so that the consumers utility is maximum.
- Consumers have limited incomes so they only have the liberty to chose which goods to consume, which they should consume in such a way that utility is maximized.

- Let us consider that a consumer has 2 choices as products  $x$  &  $y$ . He wants to choose the products consume the products  $x$  &  $y$  in such a combination, that utility is maximized.
- The combination would take into consideration the preferences of the consumer and the preferences are shown by the indifference curve.

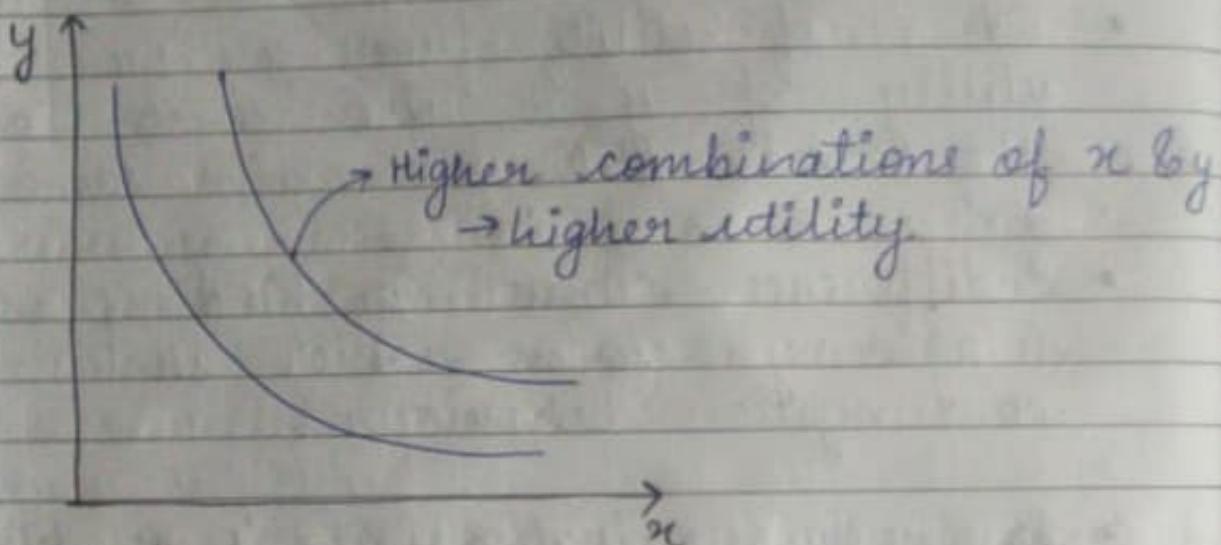


Each indifference curve shows the various locus of combinations of  $x$  &  $y$  which gives the same utility. Hence the consumer is indifferent b/w the options.

- Indifference curve is -vely sloped If a consumer consumes more of  $x$  then he cannot consume more of  $y$ .
- If the consumer consumes more of  $x$ , then he must consume less of  $y$  & if the consumer consumes less of  $x$  then he must consume ~~more~~ more of  $y$ . so that the total utility of both the goods remain same.

- As we move from left to right, quantity more of  $x$  is consumed so the marginal utility of  $x$  decreases but the marginal utility of  $y$  will increase because it is consumed less.
- $\therefore$  Loss of utility from  $x =$  Gain in utility of  $y$  & vice-versa so that the total utility remains same.
- Indifference curve is kind of an imaginary curve which shows the consumption behaviour.
- In certain situations, it is possible that only a particular combination holds, no other combination is possible like complementary goods e.g. sugar & tea. We cannot increase sugar without increasing tea and still having same utility. Both the commodities have to be increased in quantity at the same time. The indifference curve takes the shape of a right angle in such case.
- But in general the indifference curve is ~~more~~ - very sloped & convex to origin & in that case products  $x$  &  $y$  are substitutes to each other. Then so quantities can be varied independently.

- The a particular indifference curve shows a particular level of utility which can be arrived at with the various combinations of  $x$  &  $y$  in that indifference curve.



### The utility of x

- The value of utility of goods consumed by the consumer will depend on the income of the consumer.

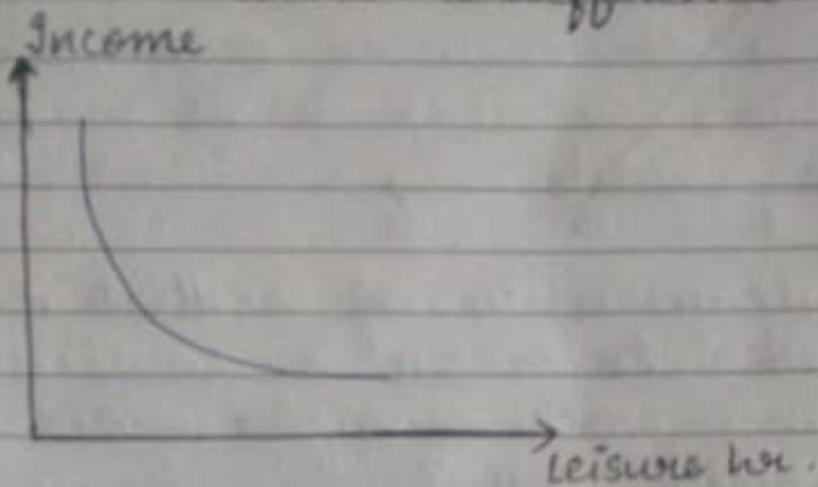
Two indifference curves can never intersect because they are drawn for two different values of utility.

Consumer is free to attain an indifference curve of higher order (higher utility) but it is constrained by the budget line (income) of the consumer.

For a consumer to attain equilibrium

a budget constraint line should be drawn and it should be superimposed with the indifference curve.

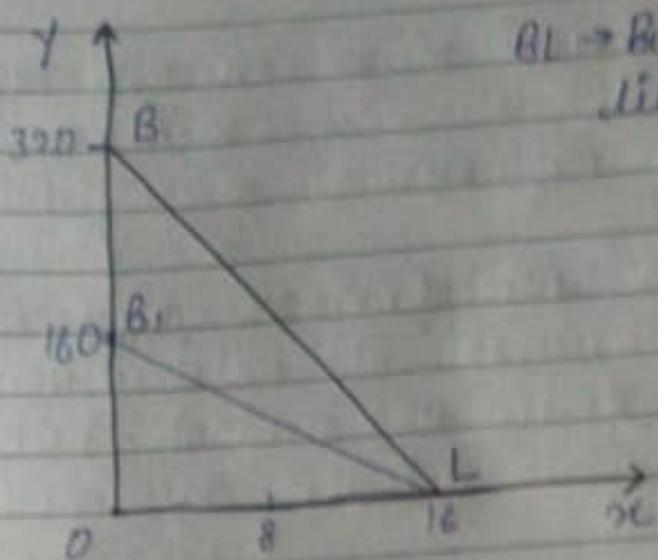
labour-leisure indifference curve.



more hours of leisure implies few fewer hours of work.

The horizontal axis shows hours available available for leisure (and work) for a given period of time.

Vertical axis shows money income



$BL \rightarrow$  Budget constraint  
line or price line.

Maximum quantity of  $x$  that can be consumed =  $\frac{\text{Income}}{\text{price of } x \text{ per unit}}$   
and similar for  $y$ .

Income =  $P_x \times Q_x + P_y \times Q_y \rightarrow$  Budget constraint  
spent ↓ ↓  
Price of  $x$  quantity of  $x$

$P_y \rightarrow$  Price of  $y$

$Q_y \rightarrow$  Quantity of  $y$

$\therefore$  Income spent  $\leq$  Total income available

$\therefore$  The combination of  $x$  &  $y$  that the consumer choose must satisfy the budget constraint.

$\therefore$  If a consumer decides to consume only  $x$ , then the maximum amount he can consume of  $x$  is  $L$  i.e.  $Y(\text{income})$

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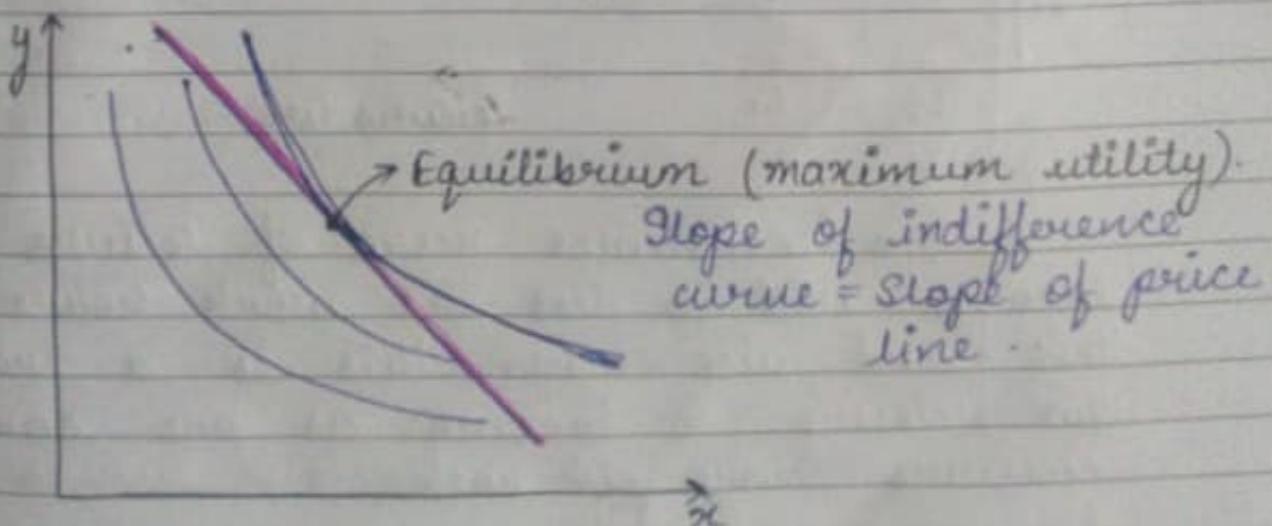
and similarly if the consumer consumes only  $y$  then the maximum amount he can consume is  $y$  (income) i.e.  $B$ .

$P_y$

But the consumer always consumes a combination of  $x$  &  $y$  which lies on the straight line  $LB$ .

$$\text{Slope of } BL = \frac{P_x}{P_y}$$

When the Budget constraint line is superimposed on the indifference curve, then one of the indifference curve becomes tangent to the Budget constraint line and the point at which it becomes a tangent, the consumer attains equilibrium i.e. maximum utility.



At this point, the consumer utilizes the entire income & chooses the best possible

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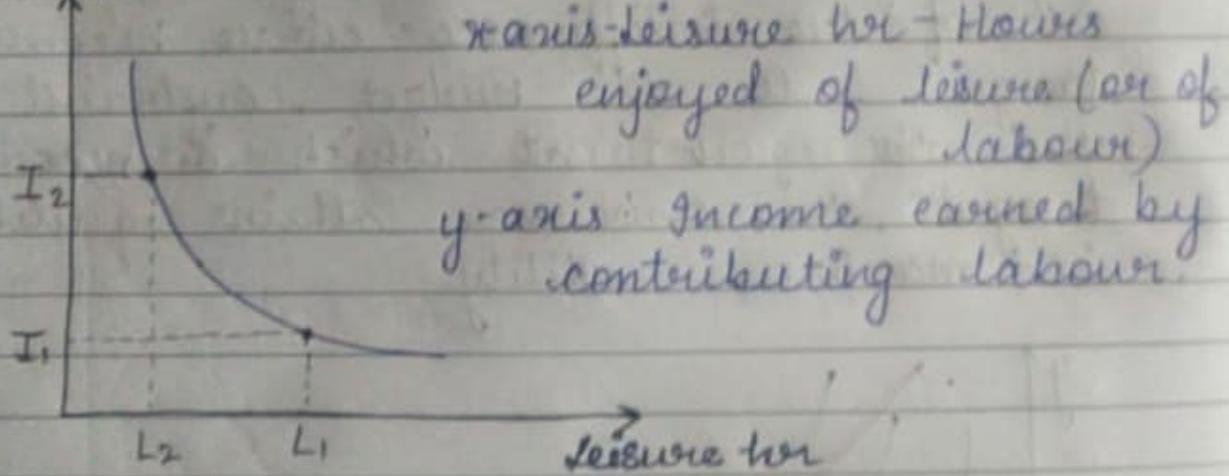
combination of  $x$  &  $y$ . to maximize utility.

Indifference curve for labour & leisure.

In this context, the consumer has two commodities to consume that are leisure and income (or work) so he wants to maximize utility.

So, there can be many combinations of leisure & income on a particular indifference curve which gives the same utility.

Income

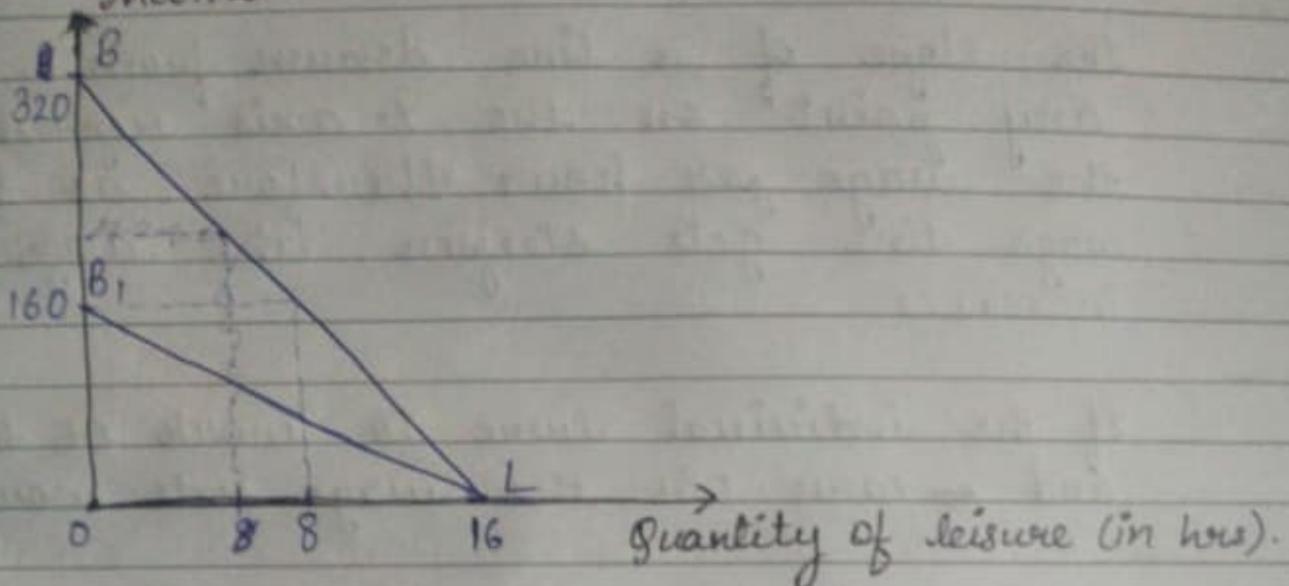


If one consumes more of leisure then income will be less as work hours are less and vice-versa. This is a trade-off b/w leisure & income as one cannot consume more of both.

Previously, it was in the context of the product market, so we determined

or price rate  
the price ratio, and in this context it is  
the wage rate because we consider the  
labour market.

Income



If an individual sleeps for 8 hours, then 16 hours are left and if he decides to sit idle even for those 16 hours then quantity of leisure was 16 hours but income is 0 as work hours are 0. But if one decides to work for the entire 16 hours then he earns 320 units i.e. B amount of income.

$$\therefore \text{Wage per hour of labour} = \frac{OB}{OL}$$

$\therefore$  Wage rate in above case is 20\$/hr.

The wage rate is 20\$/hr on the wage line BL.

If one chooses to have 8 hours of leisure then there is 8 hours of labour, then

the income would be  $20 \times 8 = 160 \$$ .

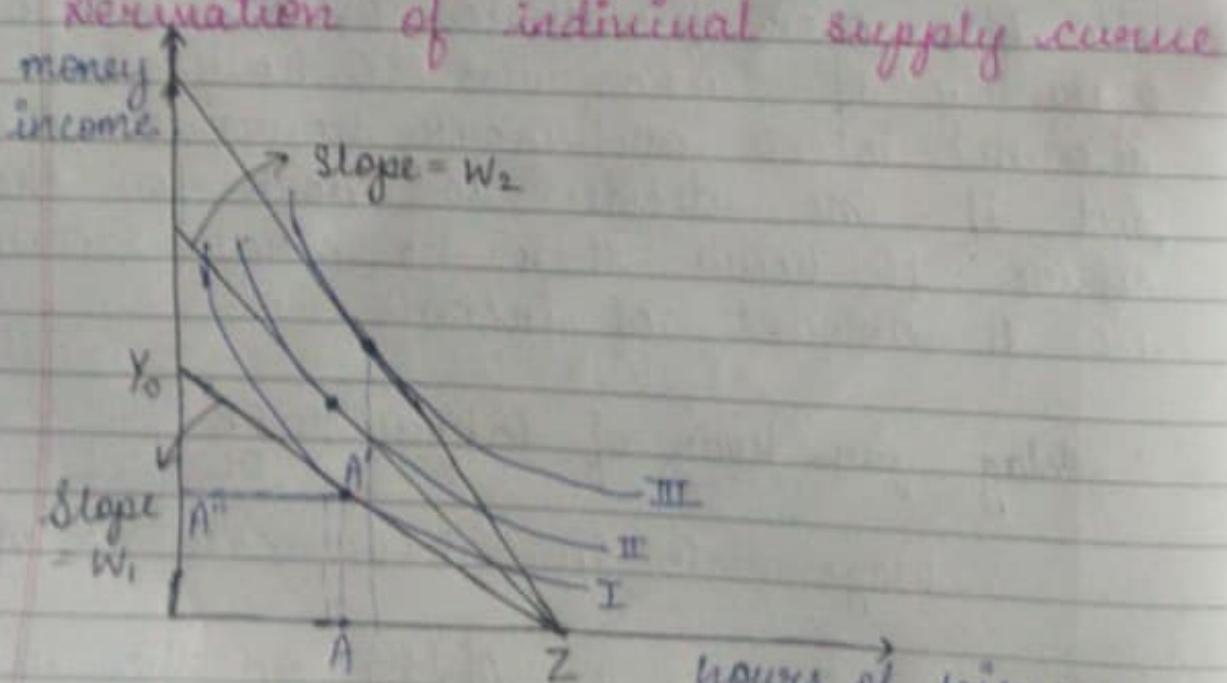
The wage rate for line  $B_L$  is  $10 \$/\text{hr}$ .

The slope of a line drawn from  $L$  to any point on the Y-axis represents the wage per hour. Therefore, as the wage line gets steeper, the wage rate increases.

If the individual were to work  $OL$  hours and earn  $OB_1$ , the wage rate would be

$$W = \frac{OB_1}{OL} = \text{slope of the } LB.$$

Derivation of individual supply curve

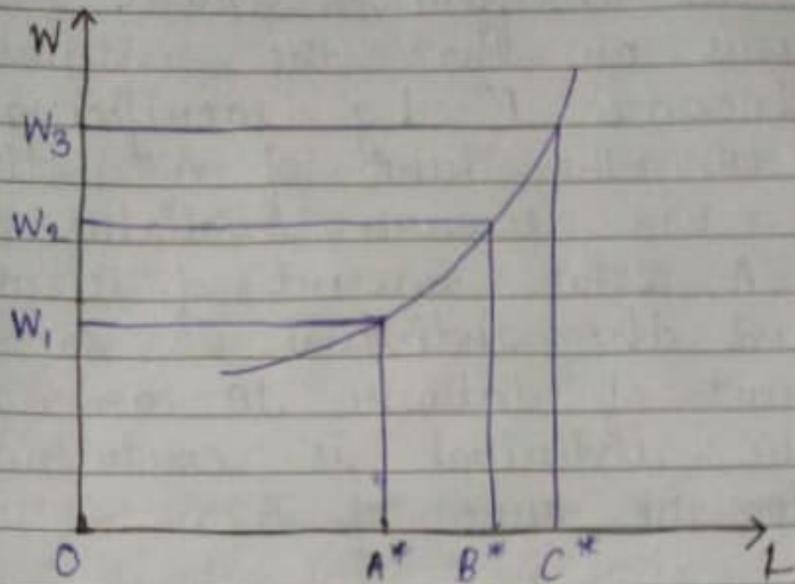


Higher indifference curve represents higher amount of utility and vice-versa.

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- Consider wage line  $ZY$  with slope  $w_1$  is a tangent to indifference curve I at point A'. It shows that the consumer is earning income  $A''$  by sacrificing leisure to the tune of  $AZ'$ , still the consumer has leisure available to the tune of A. Total amount of leisure is  $AZ$  or  $OA$  and the individual is sacrificing  $AZ$  amount of labour to earn income  $A''$  so the individual is contributing labour to the tune of  $AZ$ .
  - Therefore, when the wage rate is  $w_1$ , the consumer decides to contribute labour upto the tune of  $AZ$  amount.
  - When the wage rate rises to  $w_2$ , the point of eq. shifts to B', the new wage line  $B'ZY$  becomes tangent to the indifference curve. At this point the consumer sacrifices more ~~labour~~<sup>leisure</sup> i.e.  $BZ$  and contributes more labour  $BZ (>AZ)$ . Therefore, the amount of labour supplied is increased from  $AZ$  to  $BZ$  as the wage rate rises. and accordingly the amount of leisure is decreased from  $OA$  to  $OB$ , and correspondingly income has increased.

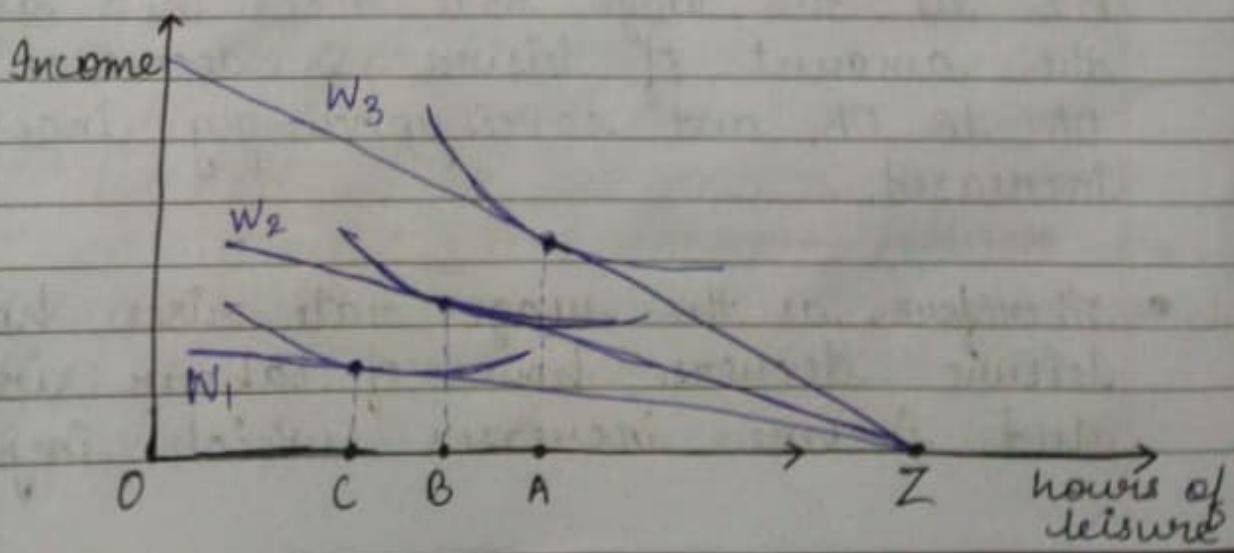
Therefore, as the wage rate rises, hours of leisure decrease, hours of labour increase and income increases which implies

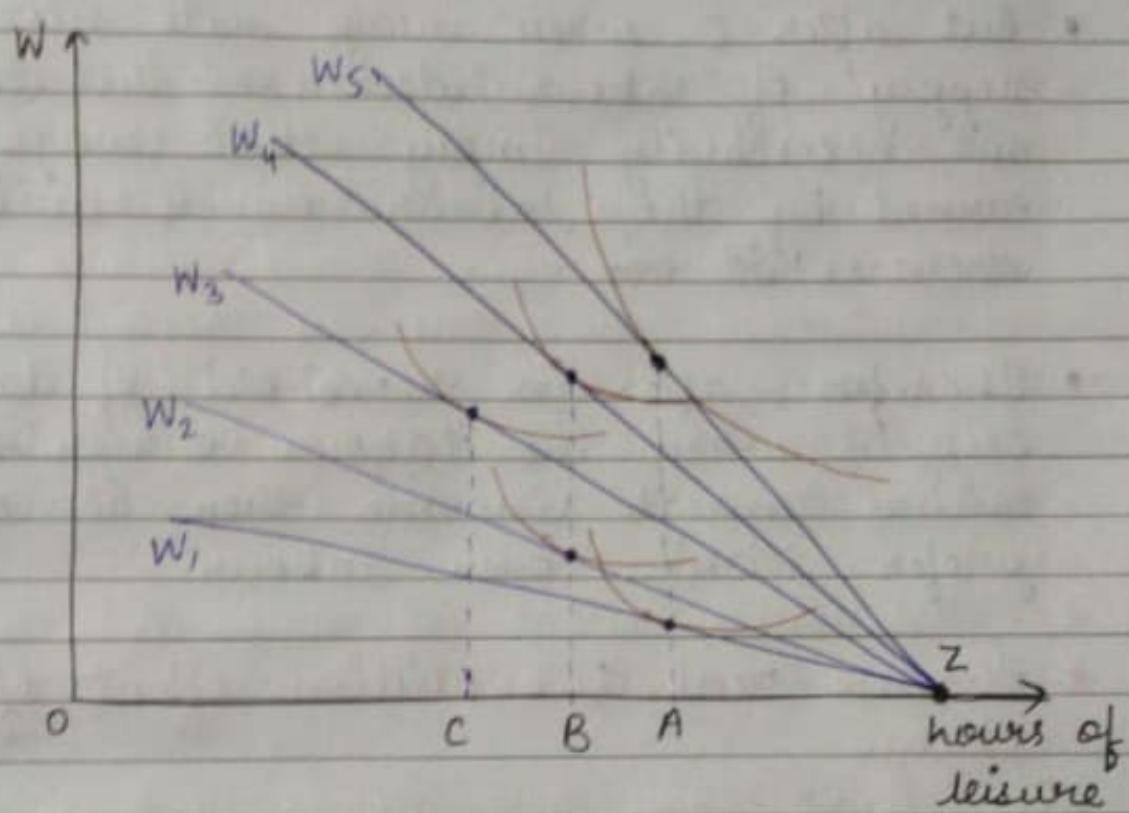
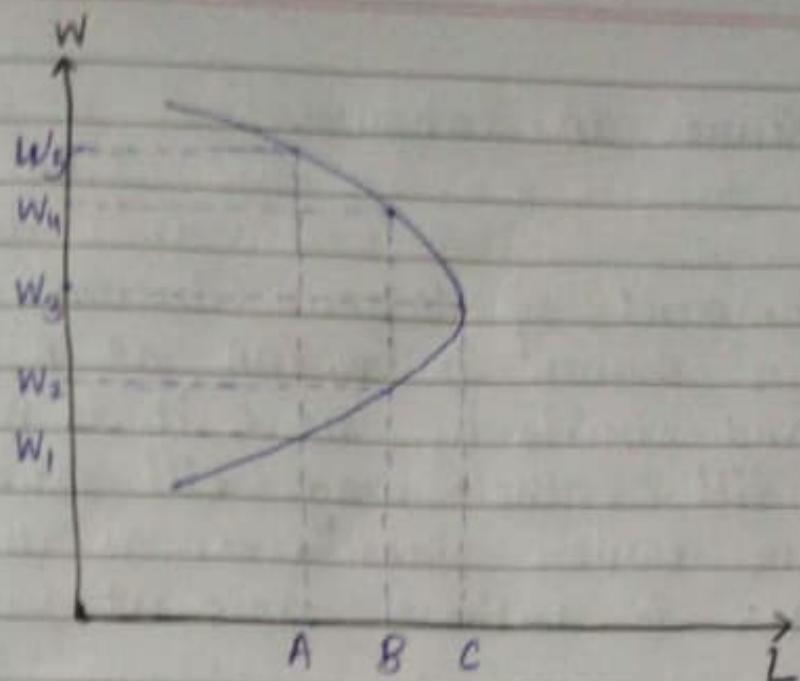
supply of labour increases.



∴ Ultimately:

- \* Demand curve follows the profit maximizing rule of the firm.
- \* Supply curve follows the utility maximizing rules of the consumers.
- \* Backward bending supply curve of labour.





- Till  $C$  as their is increase in labour hours, there is increase in wage but after  $C$  if wage increases then labour is decreasing.
- Till  $w_3$ , the owners of labour prefer labour to leisure & after  $w_3$ , the owners



prefer leisure to labour.

at

- For a amount of labour, income earned by labour owner is  $w_1 \times DA$  at B, it is  $w_2 \times DB$  and similarly at C it is  $w_3 \times DC$ . Therefore, till C, the wage bill earned by the labour owner increases as wage rate rises & labour amount rises.
- But after C, when wage rate rises, the supply of labour decreases but that does not necessarily imply that wage bill earned by the labour owner will decrease.
- Therefore, after a threshold of labour supply, when the labour owner has earned enough income then it can prefer leisure over labour.

### \* Income and substitution effect of wage change

- Income change
- The overall effect of change in wage is either increase in employment or decrease in employment. This overall effect of increase or decrease in employment is a combination of two

effects: income effect & substitution effect.

- The change in desired hours of work resulting from a change in a wage rate is called the **income effect**.
- Therefore, when there is change i.e. in income i.e. change in wage-rate then the number of labour hours are likely to change.
- Leisure is a normal good, so higher income implies a desire for more leisure (fewer hours of work).
- When income rises, people start consuming more of normal goods in place of inferior goods. The graduation of normal & inferior goods varies from person to person.
- When the price of an inferior good decreases, then the real income of the people increase with respect to that good but as the income has increased, so the people can shift & start buying better goods with the increased income. So, when the price of the inferior good falls, its possible that its demand also falls.
- But generally, when the price of a normal

If price of a good falls, its demand increases and if consumer's income increases, the demand for normal good increases while the demand for inferior good decreases.

- Therefore, in case of normal good, the income effect is positive but in case of inferior good, the income effect is negative.
- In case of substitution effect, if any product becomes cheaper then a consumer can substitute other goods with the cheaper good, irrespective of whether the cheaper good is inferior or normal i.e. the consumer would definitely like to consume more of the cheaper good.
- Substitution effect of price is always positive.
- If there are two goods  $x$  &  $y$ , if price of  $x$  falls, then demand for  $y$  will decrease and the consumer would start substituting  $y$  with  $x$  irrespective of whether  $x$  is inferior or normal good.



- When  $x$  is substituted with  $y$ , i.e. price of  $x$  falls then there is a change in relative price i.e.  $P_x$  will decrease as  $P_y$  remains unchanged. And  $P_x$  is decreasing. Therefore, the consumers are more expected to buy more of cheaper goods in comparison to the ~~other~~ other goods. This is caused by substitution effect.
- When price of  $x$  falls with price of  $y$  remaining unchanged and nominal income remaining unchanged, real income of the consumer increases with  $x$ , hence the consumer is ~~more~~ expected to consume more, if  $x$  is inferior good then they will consume more of other goods & if  $x$  is normal good then they will consume more of  $x$ .
- In case of superior or normal good, both income & substitution effects are positive, so when price of that good will decrease, its consumption will increase.
- In case of inferior good:  
If negative income effect > positive substitution effect, then if price of the good decreases, its consumption decreases but if negative income effect < positive

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substitution effect, then if price of the good will fall, its consumption will increase. Therefore, under the mixed effect of income & substitution effect, even the consumption of an inferior good can increase when its price falls.

### \* Income and substitution effect of wage change

- Income effect
- The change in desired hours of work resulting from a change in wage rate.
- Leisure is a normal good, so higher income implies a desire for more leisure (fewer hours of work).
- For a wage increase, income is raised and so the income effect lowers desired work hours and increases leisure hours (i.e. consumption of normal or superior good i.e. leisure).
- Substitution effect
- A higher wage rate raises the opportunity cost of leisure.
- Opportunity cost: It is estimated by the value of the best alternative sacrificed.



- The alternative of labour is leisure, so when leisure is preferred over labour i.e. labour is sacrificed. And the value of the labour sacrificed is rising as the wage rate is rising. Therefore, the opportunity cost of leisure is high. In this case, the product which is consumed more i.e. leisure, its relative price w.r.t. the product which is sacrificed i.e. labour decreases because the wage rate of labour is rising.
- Substitution effect increases the consumption of the good whose relative price decreases w.r.t. the other good. Here, the opportunity cost of leisure is higher, the relative cost of contributing labour can be said to be less w.r.t. that of leisure.
- Therefore, for a wage increase, the substitution effect raises desired work hours.
- Therefore, by substitution effect, leisure is substituted by labour when wage rate rises, so the supply of labour will increase.
- Substitution effect is positive w.r.t. supply of labour.

- Income effect is negative w.r.t supply of labour.

### For wage increase:

- If substitution effect > income effect, hours of work rise. Supply curve will remain upward or +vely sloped.
- If income effect > substitution effect, hours of work fall. Supply curve will become -vely sloped i.e. the supply curve will witness a backward bend. But this will happen after a threshold value of wage rate.

### \* Market Supply Curve of Labour

- In short run, the market supply curve may be backward bending but however in the long run it will be +vely sloped throughout. In the long run, the population will increase, so more young people will join the labour force and the young population prefers to work more (contribute more labour hours) if they are paid higher wages i.e. wage rate is high.
- India is onto the page of demographic dividend. i.e. there are more people

of the working age i.e. b/w 16 to 65.  
 ⑧ People above the age of 65 prefer leisure to labour. Therefore, the young population is willing to contribute more labour when they are being compensated by higher wages.

- But in the short run, the population will not increase i.e. young population will not be increased which can create more labour, and the general population prefer leisure to labour. Therefore, even at a higher wage rate, the general population may not want to contribute more labour because they may already have savings, i.e. the supply of labour can decrease as the wage rate rises in this case and hence the supply curve will become backward bending.
- Backward bending supply curve is common to the developed economies whereas positively sloped supply curve apply to developing economies.
- Because in developed countries, the wage rate & correspondingly income is already very high (especially in comparison to the developing countries). Therefore, in case of developed countries, when wage rate rises after a threshold, then



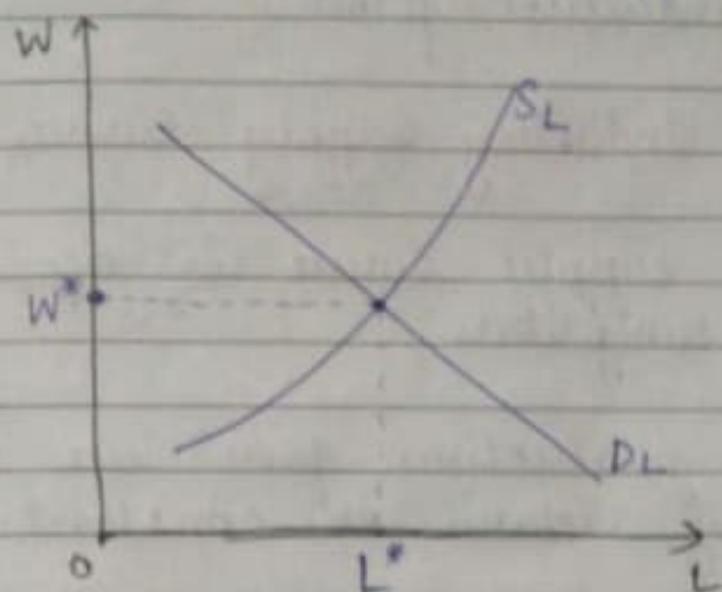
the people start preferring leisure to labour because they are already earning enough and had already contributed enough labour.

- But in a developing country like India, the income of an individual is already low, and the economy wants to develop and correspondingly the individual want to earn more income, therefore, they are willing to contribute more labour if wage rate rises.
- There is general agreement over the shape of the market supply curve.
- In the short-run, it may be backward bending but in the long-run, it may be upward sloped.
- Some of the work-force can take voluntary retirement (in most cases no woman labour in India) then also there is less supply of labour as the workforce population decreases.



## \* Determination of the equilibrium wage rate

- Most of the economies in the world have a <sup>slightly</sup> upward sloped supply curve.



- In this way, the wage rate is determined by the industry on the basis of aggregate demand and aggregate supply and it prevails for all the firms. No individual firm can influence the wage rate.
- Total employment created by all the individual firms =  $OL^*$
- Equilibrium labour demand for an individual is the value at which its ~~pure~~ profit is maximized. and similarly demand of labour is regulated with by the market demand is based utility maximization rule of consumers (labours)



- Therefore at the equilibrium, both the profit & utility are maximized.
- The equilibrium wage rate is applicable to all the individual firms.
- Derivation of Industry Supply Curve.

- The aggregate supply curve is dependent upon the assumptions:

- (i) The kind of production function we consider i.e. diminishing return or constant return
- (ii) Money wage rate is fixed or flexible.

- A/c to classical economics, wages are flexible but it may not be always true. Or maybe the money wage can be flexible upward but not downward.  
A/c to Keys

In the presence of labour unions, it is very difficult to revise the wage rate downwards but they can be revised upward. Therefore, it is flexible only in upward direction.

- Therefore, this in the context of employers or firms is called wage rigidity. i.e. the firms are not able to revise the wage rate downwards to employ more

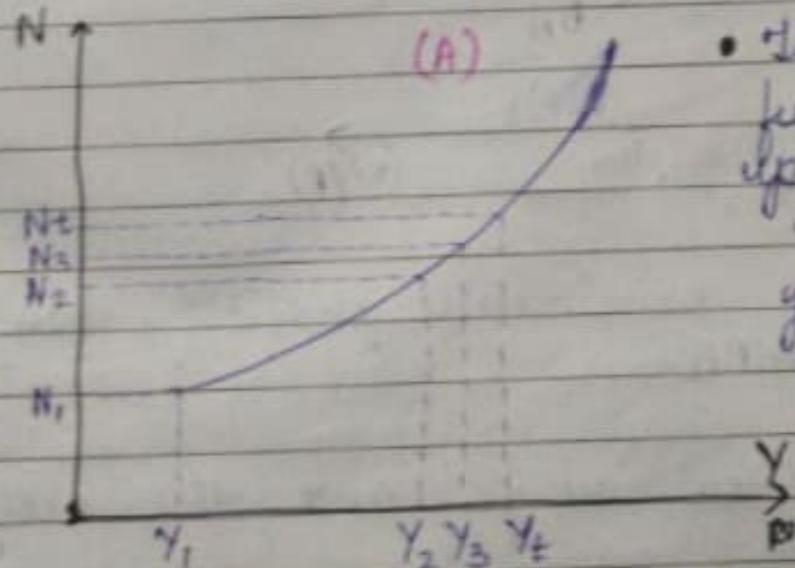


people.

- Therefore, fixed money wage can be considered as a wage that is flexible upward but not downward.
- If fixed money wage and diminishing  $MPPL$  is considered, then the supply curve of output will be +vely sloped until full employment of labour is reached.
- Supply curve for output can be derived under 3 conditions:

- (i) Classical scheme
- (ii) Keynesian scheme
- (iii) Intermediate between the two

### \* Production function



• This production func<sup>n</sup> is concave upwards because  
 x-axis  $\rightarrow$  ~~income~~<sup>output</sup>  
 y-axis  $\rightarrow$  Employment or number of labour employed

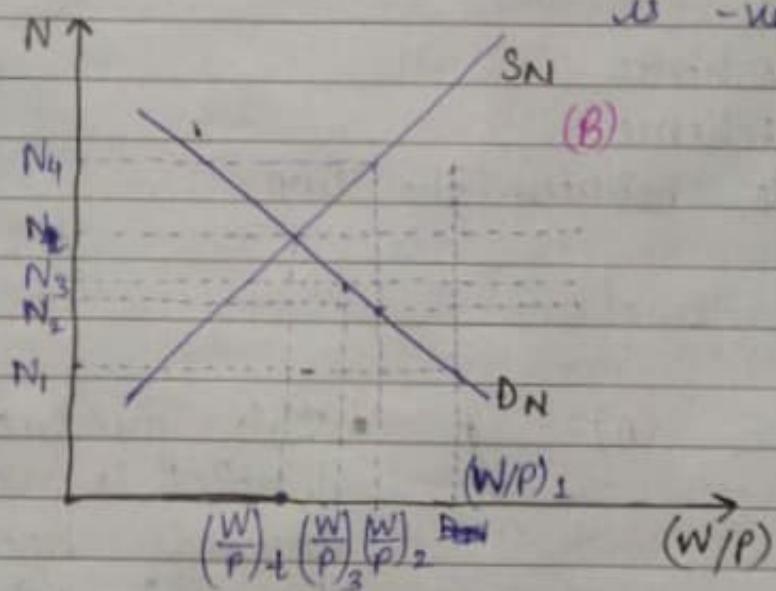
- We are assuming diminishing return stage of the production function or diminishing

MPP.

- Given the production func<sup>n</sup>, MPPL i.e.  $\frac{dQ}{dL}$  is -vely sloped

The value is +ve but slope is -ve.

- Therefore, in the production func<sup>n</sup>, as the amount of labour increases, the output increases less than ~~proportionately~~ proportionately.
- As number of labour employed i.e. N increases, its physical productivity (MPPL) decreases, i.e. demand curve for labour is -vely sloped.



- Firm attains maximum profit, when  $\frac{W}{P} = MPP$ .
- $\frac{W}{P}$  is the real wage and the output on the axis is the real physical output.

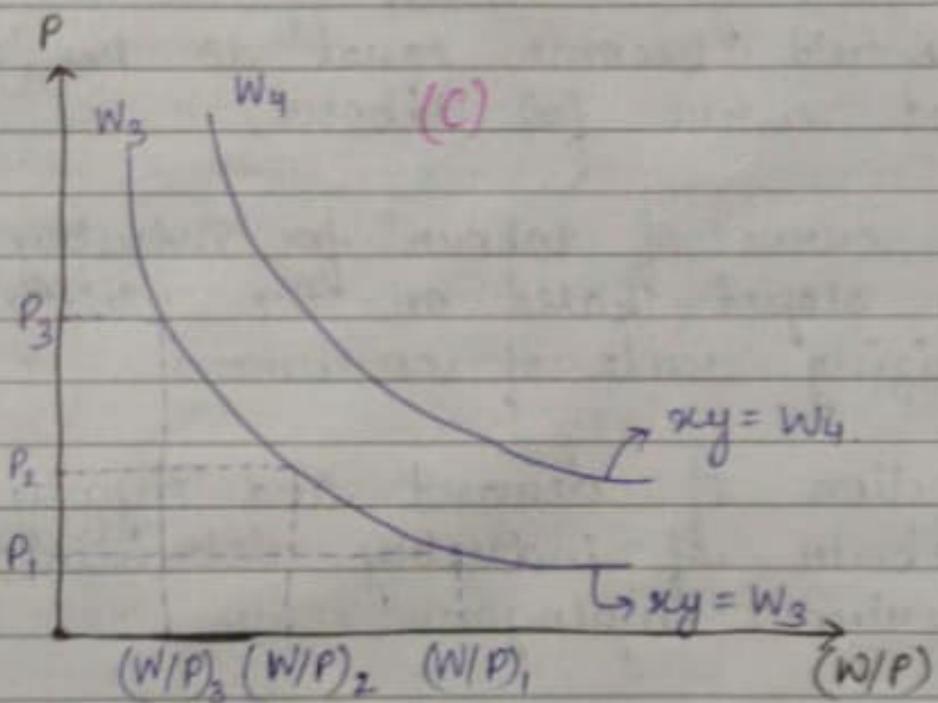


- We are now representing all the values in real terms.
- The demand curve for labour is the sum total of  $MPP_i$  across all the firms.
- N<sub>i</sub> amount of labour employed corresponds to  $(W/P)$ , amount of real wage, therefore  $(W/P)$ , should become equal to sum total of  $MPP_i$  of all the individual firms for all the firms to attain equilibrium for maximum profit and correspondingly, the industry to attain equilibrium.  $(W/P_i)$  should become equal to  $D_N$  (Industry demand curve for labour).
- Supply curve of labour for industry is +vely sloped based on the utility maximizing rule of consumers.
- Intersection of demand and supply curve of labour of industry determines the equilibrium employment.
- Given each amount of labour employed, correspondingly there is an amount of output produced. For N<sub>i</sub> amount of employment, wage rate is  $(W/P)$ , and corresponding to N<sub>i</sub> amount of employment, the amount of output to be produced is Y<sub>i</sub>.

Corresponding to each  $(W/P)$ , there is an  $MPP_L$  which decides the amount of labour to be demanded to maximize profit. Therefore, each point on the demand curve of the labour is a profit maximizing point corresponding to a particular real wage  $(W/P)$ . As  $(W/P)$  changes,  $MPP_L$  changes to make  $\frac{W}{P} = MPP_L$

If real wage decreases, more amount of labour is employed and vice-versa.

$$\text{Equilibrium: } \frac{W}{P} = MPP_L$$



For a ~~concave~~ wage curve, for every point on a particular curve, the product of the x & y coordinates is constant



## \* Production function.

- (i) Part (A) is the aggregate function or total product curve for the economy as a whole.
- (ii) If the composition of aggregate output is fairly stable then the aggregate production function will show a range of proportional returns followed by a range of diminishing returns essentially as shown for the individual firm.
- (iii) When a single firm or industry attempts to expand its output further and further, it runs into short run barriers of fixed plant and equipment. The same thing happens in an attempt to expand aggregate output.

## \* Demand for labour

- (i) Part B shows the curve of  $MPP_L$  and is labelled DN.
- (ii) The axes of Part B have also been reversed but the meaning of MPP curve remains the same.
- (iii) Due to diminishing returns,  $MPP_L$  decreases as we move up the vertical axis of Part B to larger amounts of labour.
- (iv) Employers will maximize profit by hiring labour up to the point at which  $w = (P \times MPP_L)$  or  $w = MPP_L$ .



## \* Supply of labour

- (i) The other curve in part B is labelled as SN, & is the supply curve of labour.
- (ii) The model shows that the supply of labour is also the function of real wage ( $w/P$ ).
- (iii) The basis of classical postulate is the unpleasantness of more work. Hence, a larger real award is ~~more~~ necessary to induce labour to provide an even larger supply of labour services.
- (iv) Firms will not hire more labour at a lower money wage rate if the prices of goods at which they can sell their output fall proportionally with money wage rate.
- (v) Workers also will not supply more labour at a higher money wage if the prices of the goods purchased rises with their wages proportionally.
- (vi) Hence, Supply curve is a direct function of real wage and demand is an inverse function of real wages.

## \* Money wage rate

- (i) Part C depicts a relationship between labour's wage rate and price.
- (ii) To maximize profit, in the short run a single firm will expand output to



the level at which  $MC = P$ .

(iii) ~~Because~~ Because  $MC = \frac{W}{MPP_L}$

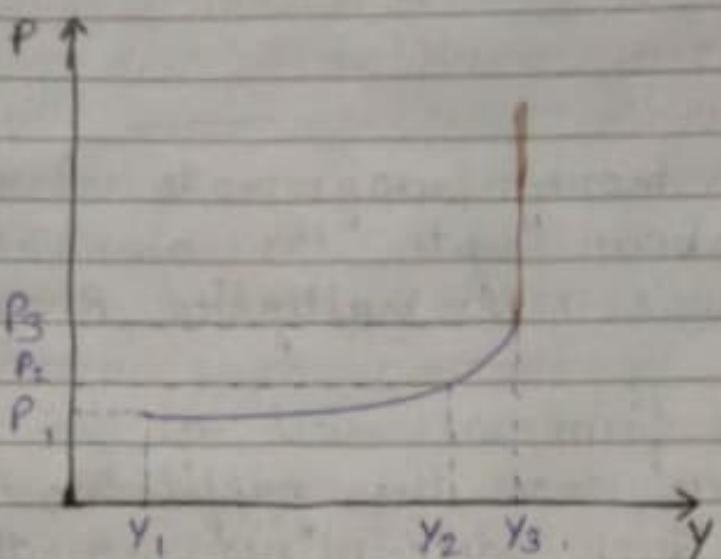
the profit maximizing output will be at

$$P = \frac{W}{MPP_L} \quad \text{or} \quad \frac{W}{P} = MPP_L$$

- (iv) For a fixed money wage rate ( $w$ ) the firm will hire labour upto the amount at which labour's MPP multiplied  $P$  equals the given  $w$ .
- (v) For a single firm as well as for a single industry, once the profit maximizing output has been determined for the fixed wage rate, more labour will be hired and more output will be produced only if the forces within the market produce a rise in  $P$ .
- (vi) The amount of labour employed by the firm can then expand until the  $MPP$  multiplied by  $P$  is equal to the unchanged  $w$ .
- (vii) Part C mainly gives us various combinations of  $P$  and labour's  $MPP$  whose products equal  $w$ .
- (viii) Money wage curve is a rectangular hyperbola.
- (ix) The general equation for this function is  $ab = x$  where  $x > 0$ .

(x) For the money wage, the specific equation is  $\frac{(W)}{P} P = W$  or  $(MPP_L) P = W$

### Aggregate supply curve



- Each firm in the industry operates in short run with fixed factors and fixed technology. For this ~~reason~~ reason firm's supply curve eventually slope upward to the right.
- Demand curve of labour determines employment not the supply curve of labour.
- When a firm attains equilibrium or maximizes profit by employing labour, it doesn't imply that there is full employment.
- Each level of employment corresponds to a real wage, as the real wage keeps changing, the firms changes the level



of employment in order to attain equilibrium.

- But when firms employ labour, output is produced and the demand curve for labour determines the output produced not the supply curve.
- Suppose at wage rate  $(\frac{W}{P})_2$

Supply of labour > Demand of labour  
therefore, there is unemployment. So, even if the firm is maximizing profit, there can be unemployment.

- For labour employed  $N_1$ , output produced is  $y_1$  and price is  $P_1$  such that  $(\frac{W}{P})_1$  becomes equal to the  $MPPL$ .
- When the number of labours increase, the output increase but at a less than proportionally because we are considering diminishing returns. Therefore output curve is concave upwards.
- We are considering rigid money-wage i.e. money wage can be greater than or equal to  $W_3$  but not less than that.



- When the firms employ more,  $MPP_L$  decreases and money real wage also decreases but the money wage still remains unchanged.
- When  $MPP_L$  is less, then the firm should pay less real wage but to decrease real wage without changing money wage, price should ~~decrease~~ increase.
- When more when  $MPP_L$  decreases due to increase in number of labours, therefore in order to maximize profit, the firm should employ that much amount of labour such that  $MPP_L = \text{new real wage}$ , real wage must decrease. price increases.
- Therefore, aggregate supply curve of output is positively sloped till  $Y_1$  amount of output i.e.  $N_1$  amount of labour employment at which supply of labour becomes equal to demand of labour.
- After  $N_1$  amount of labour, the demand of labour will increase via the money wage increasing i.e. the wage curve shifting to  $W_2$  or further because demand for labour  $>$  supply for labour. as  $w$  will increase, price will also increase.

- But there will be no increase in output because the labour is already fully employed.
- Aggregate supply curve is positively sloped under the assumptions of fixed money wage and diminishing MPPL.
- **Perfectly Inelastic Aggregate Supply Curve**
- If we assume that there is no trade unions or other labour market imperfection then money wage rate can be flexible downward.
- Labour market imperfection can occur in many ways like asymmetric information, few sellers or buyers of labour, etc.
- Labour trade unions or labour market imperfections cause can cause wage rigidity
- If supply of labour is higher than demand of labour then competition for jobs will increase and money wage rate will fall.
- If demand of labour is higher than the supply of labour then competition among

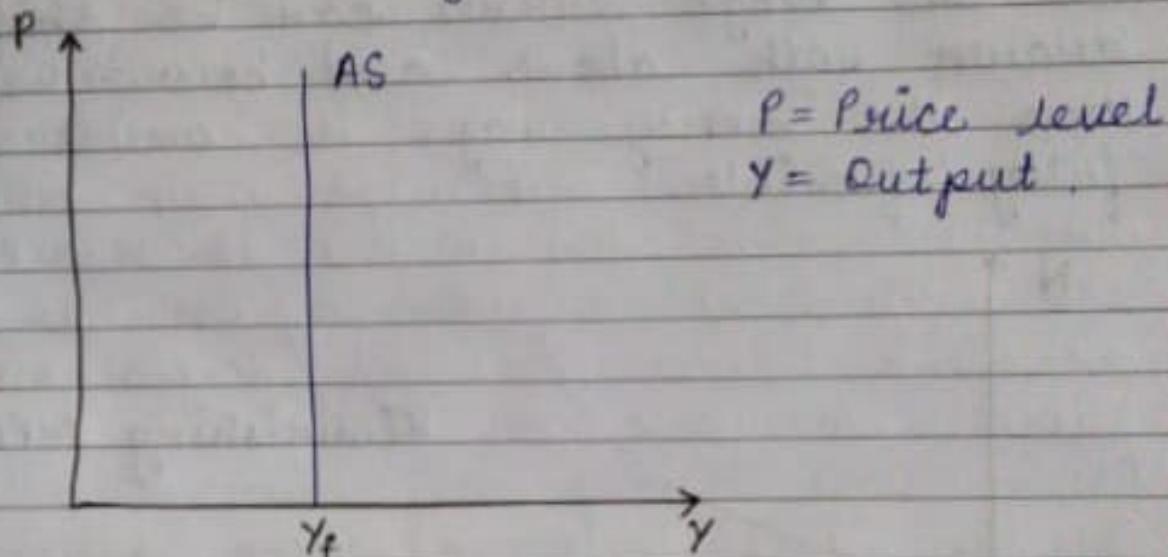


the employees employers and the wages will be pushed upwards.

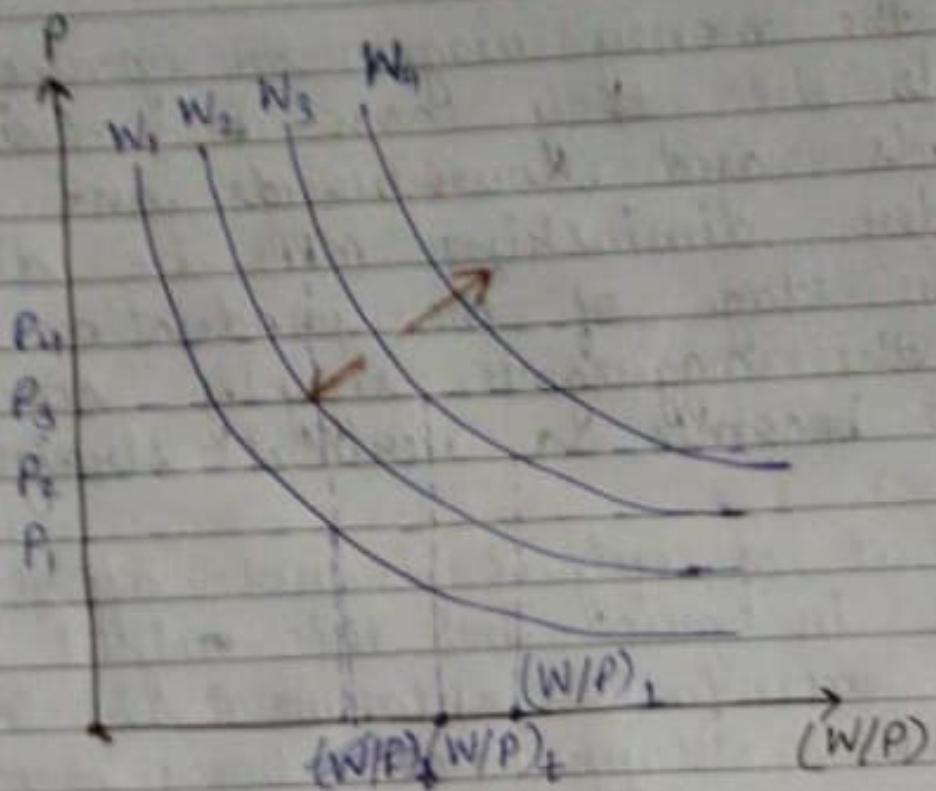
- If supply of labour > demand of labour, then the competition is among the workers wage rate will fall.
- When there is presence of labour unions, then they get a right to bargain with the employers and make the wage rate rigid even at high employment, but practically high wage rate & high employment are not possible at the same time.
- This case is based on classical assumption i.e. labour market is perfectly competitive.
- Wage is decided on the basis of market demand and market supply of labour. If supply of labour increases, given the demand for labour, wage rate increases & vice-versa decreases.
- Wages are completely elastic i.e. if there is unemployment, then there is an automatic fall in the wage rate.
- We also assume diminishing MPP.



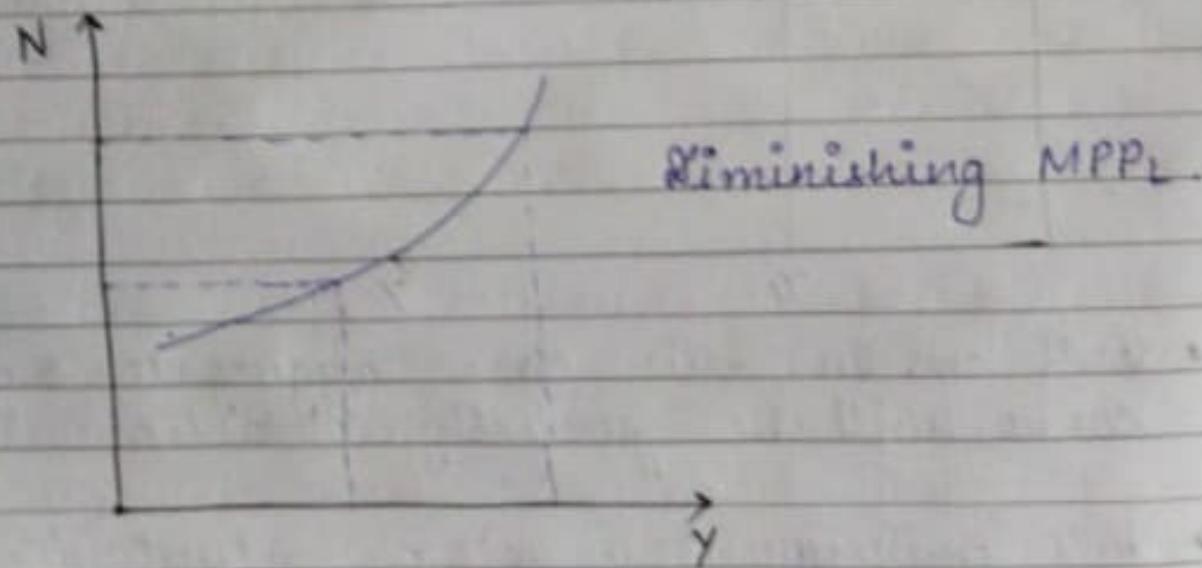
- When the money wages are perfectly flexible i.e. they can be revised both upwards and downwards and we consider diminishing MPPL i.e. diminishing return stage of the production function, then the aggregate supply curve of output becomes a vertical straight line.
- Amount of output is not affected by change in price and this output is the output at full employment i.e. demand for labour = supply of labour & all the workers willing to work are employed

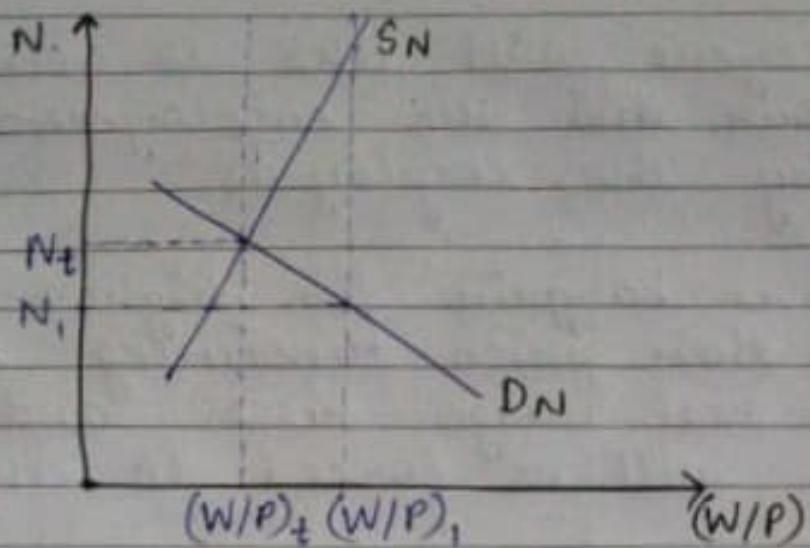


- In this case, aggregate supply curve will be perfectly inelastic.
- Full employment level of output is shown in the above figure.  
The main difference between the last aggregate supply curve and this one is that it is perfectly inelastic throughout.



- Now the wage curves can be shifted drawn both above and below  $W_3$ . Hence the money wage is considered fully flexible.





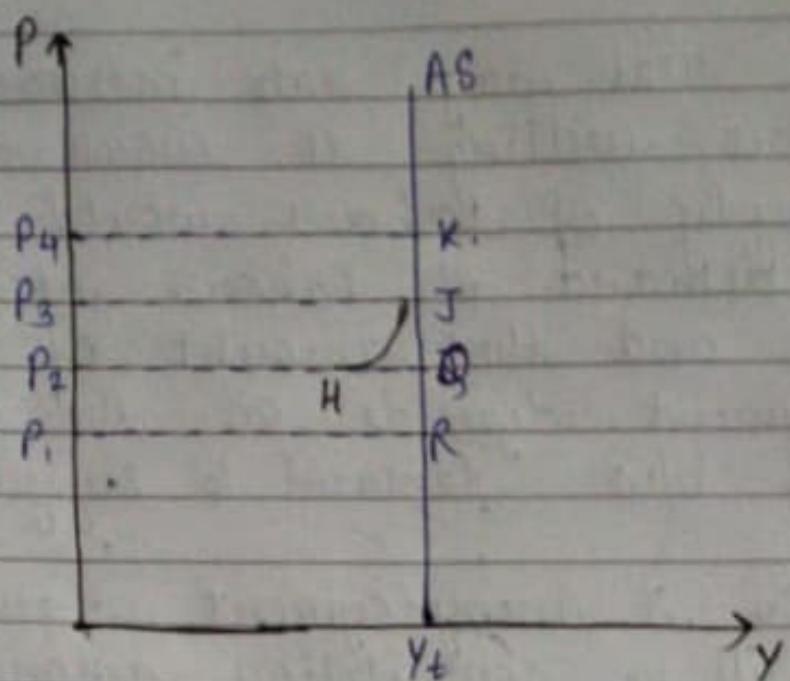
- Assume that the money wage is  $w_3$ , the wage rate is  $(w/p)_t$ , price is  $P_3$ .
- We have to find out the  $(w/p)$  with full employment ( $N_t$ ).
- For  $N_t$  employment, output produced is  $y_t$  which is the full employment output (i.e. all workers willing to work are employed).
- If the price falls from  $P_3$  to  $P_2$  with money wage remaining  $w_3$  then the real wage will increase, which will cause unemployment because the employers will not be willing to employ more labour at higher real wage rate.
- When the real wage rises, the suppliers will want to supply more labour &



the employers will like to employ less labour and the employment is decided by the employers.

- If employers bargain for higher money wage, ~~for~~ then price remaining same, money  $\rightarrow$  real wage rises and the employers will be forced to employ less.
- Or if money wage remains same & the price falls, i.e. demand for the good has fallen, ~~for~~ now they are paying same wage as they paid earlier but they are selling each unit of product at a lower price.  
 $\therefore$  In terms of real wage they are paying more as it has increased, so the employers would employ less to maintain ~~labour~~ maintain maximum profit or  $\frac{W}{P} = MPPL$ .
- If the wage rate increases from  $(W/P)_1$  to  $(W/P)_2$ , employment will come down to  $N_1$ .
- Number of people willing to work is represented by the supply curve of labour. The ~~or~~ difference b/w demand and supply curve for labour is the degree of unemployment.

- When the real wage rate increases, more people are willing to work, therefore, ~~the~~ supply of labour would increase & the demand of labour would decrease, and the amount of unemployment depends on the relative difference b/w demand & supply.
- When there is unemployment, there will there will be competition among the workers to get work & they will be ready to work even at a low wage rate. Money wage will start falling until it becomes equal to  $(W/P)_t$ .
- Due to fall in P, there will be excess supply to of labour. Workers will compete for jobs. Money wage will decline to  $W_3$  from  $W_2$ . This change will be proportional to change in P. Hence,  $(W/P)_t$  is maintained.
- A/c to classical economics, if the price is rising then the money wage should rise & if the price is falling then the money wage should fall, i.e. money wage should be flexible so that proportionality can be maintained b/w money wage & price.



- As  $(W/P)^t$  can be maintained for different prices,  $N^t$  can be maintained and correspondingly  $y_t$  can be maintained same.
- When we are moving from point J to Q then there can be a lag and we can an upward sloped AS curve.
- It is possible that the workers may not immediately accept lower wage.
- When the price falls from  $P_3$  to  $P_2$ , then the money wage falls but the fall in money wage may not be instantaneous there can be a lag. In this lag, there will be an upward sloped supply curve.
- When the price falls, real wage has increased, but money wage can remain rigid for sometime because the workers



may not be immediately ready to accept a lower wage and during this time and as long as real wage remains high, the producers will be able to produce and sell less, and unemployment will arise. Gradually, labour will accept the lower wage so that everybody is employed.

- Initially they will accept because they are guided by Money Loosen, i.e. they think higher wage is always beneficial. But at the end we attain the full employment output  $Y_t$ .