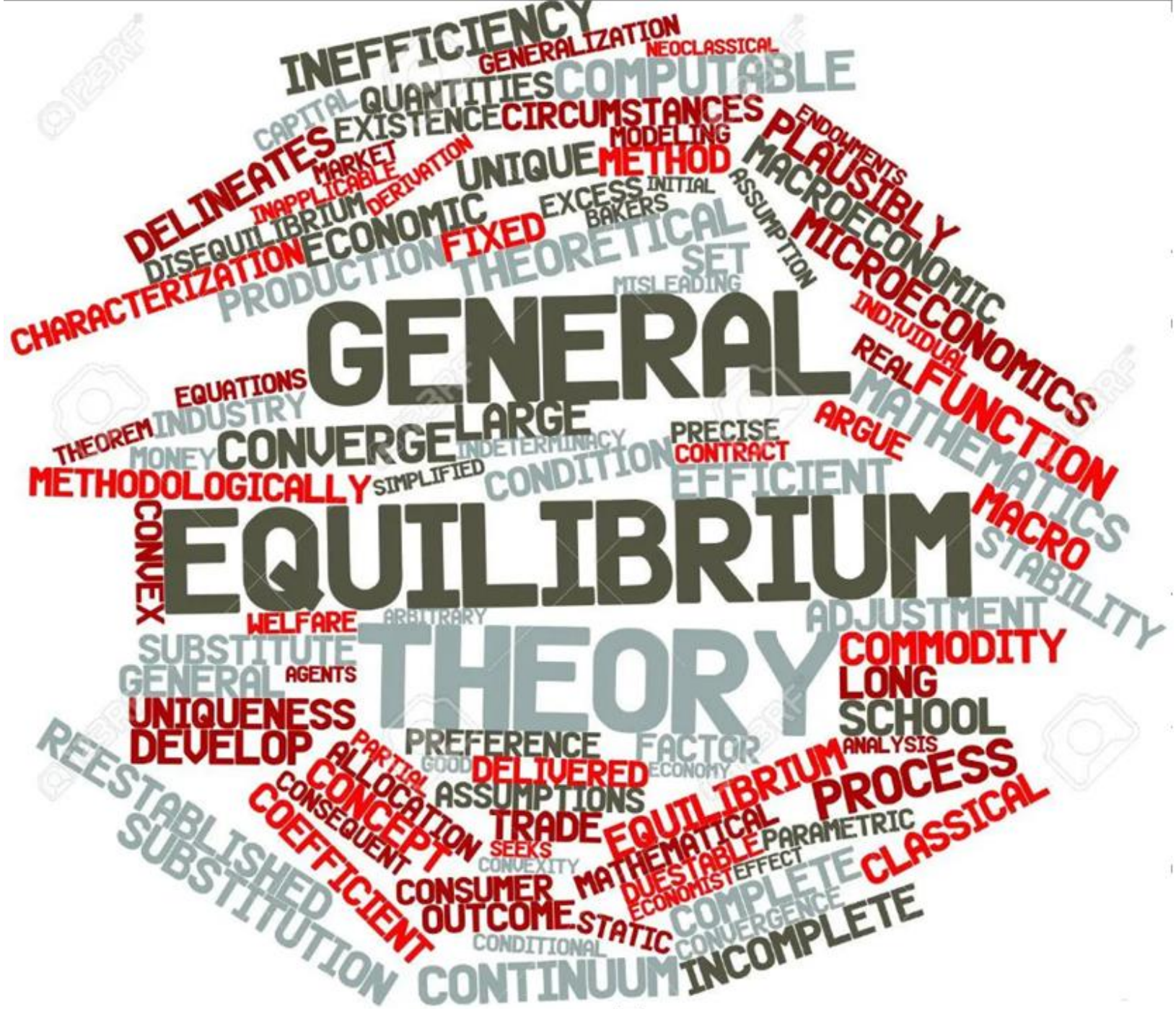
General Equilibrium Analysis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MARKET
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DERIVATION
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EXCESS
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ECONOMIST
COMPLETE
OUTCOME
STATIC
CONVERGENCE
INCOMPLETE
SUBSTITUTION
CONDITIONAL
CONTINUUM

Partial Equilibrium

- ✓ **Partial equilibrium approach:** Decisions in a particular segment of the economy are evaluated in isolation of what is happening in other segments, under the ceteris paribus assumption.
  - ➢ Consumer maximises satisfaction subject to a budget constraint.
  - ➢ Firms maximise profit, subject to the technological constraint of the production function.
  - ➢ Worker(s) determines his supply of labour by maximising satisfaction derived from work-leisure opportunities, subject to a given wage rate.

- ✓ The basic characteristic of a partial equilibrium approach is the determination of the price and quantity in each market by demand and supply curves drawn on the ceteris paribus clause.

- ✓ Each market in the Marshallian methodology is regarded independently of the others. The interrelationship between the various factor markets and commodity markets were left out of the analysis.

Are markets independent?

Are constituents in an economic system independent?

Moving towards General Equilibrium Approach

- ✓ A fundamental feature of any economic system is the interdependence among its constituent parts.
- ✓ The markets of all commodities and all productive factors are interrelated, and the prices in all markets are simultaneously determined.

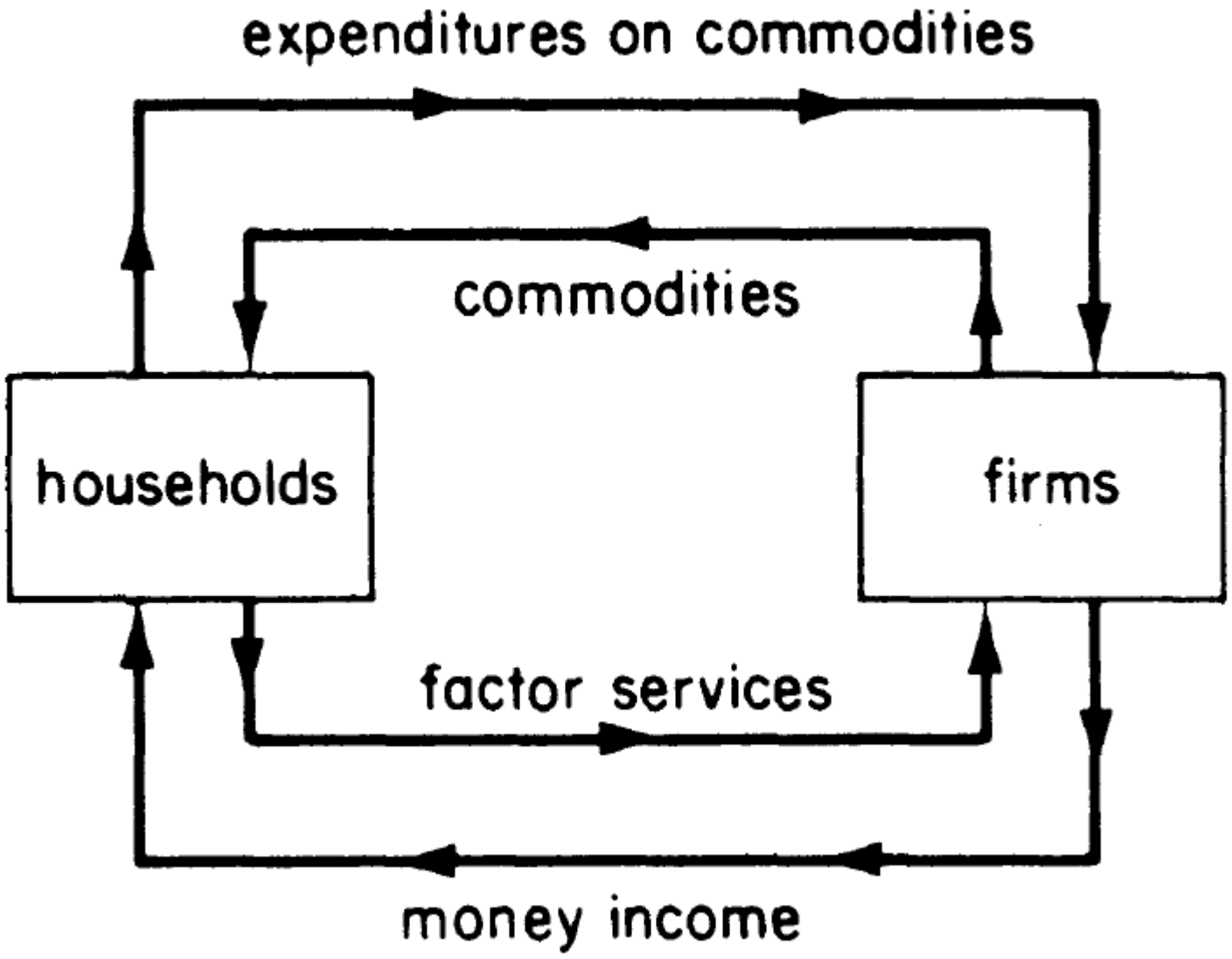
Example:

Consumers' demands for various goods and services → Consumer's Income amounts

of resources they own and factor prices → Demand & Supply of the various inputs

Demands for the final goods → Consumers' Incomes.

Circular Flow



- ✓ The **real flow** is the exchange of goods for the services of factors of production: firms produce and offer final goods to the household sector, and consumers offer to firms the services of factors which they own.

- ✓ The **monetary flow** is the real flow expressed in monetary terms. The consumers receive income payments from the firms for offering their factor services. These incomes are spent by consumers for the acquisition of the finished goods produced by the business sector.

Moving towards General Equilibrium Approach

- ✓ An economic system consists of millions of economic decision-making units who are motivated by self-interest.
- ✓ Each one pursues his own goal and strives for his own equilibrium independently of the others. In traditional economic theory the goal of a decision-making agent, consumer or producer, is maximization of something.
- ✓ The problem is to determine whether the independent, self-interest motivated behaviour of economic decision-makers is consistent with each individual agent's attaining equilibrium.
- ✓ A general equilibrium is defined as a state in which all markets and all decision-making units are in simultaneous equilibrium.
- ✓ **General equilibrium theory deals with the problem of whether the independent action by each decision-maker leads to a position in which equilibrium is reached by all.**

Introduction to General Equilibrium Analysis

- ✓ A general equilibrium exists if each market is cleared at a positive price, with each consumer maximising satisfaction and each firm maximising profit.

- ✓ The scope of general equilibrium analysis is the examination of how this state can, if ever, be reached, that is, how prices are determined simultaneously in all markets, so that there is neither excess demand nor excess supply, while at the same time the individual economic units attain their own goals.

- ✓ General equilibrium emerges from the solution of a simultaneous equation model, of millions of equations in millions of unknowns. The unknowns are the prices of all factors and all commodities and the quantities purchased and sold.

- ✓ The most ambitious general equilibrium model was developed by the French economist Léon Walrasin in 1874.

The Walrasian System

- ✓ Leon Walras, *Elements d'Economie politique pure* (Lausanne, 1874). First translated in English by William Jaffe (Allen & Unwin, 1954) as *Elements of Pure Economics.*

- ✓ Walras argued that all prices and quantities in all markets are determined simultaneously through their interaction with one another.

- ✓ In the Walrasian model the behaviour of each individual decision-maker is presented by a set of equations.

- ✓ For each consumer we have a set of equations consisting of two subsets:
  - one describing his demands of the different commodities, and
  - other his supplies of factor inputs.

- ✓ The behaviour of each firm is presented by a set of equations with two subsets:
  - one for the quantities of commodities that it produces.
  - other for the demand for factor inputs for each commodity produced.

- ✓ The solution of this system of simultaneous equations defines the 'unknowns' of the model, namely the prices and quantities of all commodities and all factor inputs.

The Walrasian System: Markets & Equations

- ✓ In a general equilibrium system of the Walrasian type there are as many markets as there are commodities and factors of production.
- ✓ For each market there are three types of functions: demand functions, supply functions and a 'clearing-the-market' equation, which stipulates that the quantities demanded be equal to the quantities supplied.
- ✓ In a commodity market the number of demand functions is equal to the number of consumers, and the number of the supply functions is equal to the number of firms which produce the commodity.
- ✓ In each factor market the number of demand functions is equal to the number of firms multiplied by the number of commodities they produce. The number of supply functions is equal to the number of consumers who own the factors of production.
- ✓ A necessary condition for the existence of a general equilibrium is that there must be in the system as many independent equations as the number of unknowns. Thus the first is to describe the economy by means of a system of equations, defining how many equations are required to complete the system.

The Walrasian System: Equations in 2x2x2 Model

An economy consists of **two consumers**, A and B, who own **two factors of production**, K and L These factors are used by two firms to produce **two commodities**, X and Y.

In this simple model we have the following 'unknowns' and equations:

Unknowns		**Equations**	
quantities demanded of X and Y by consumers	**2 x 2 = 4**	demand functions of consumers	**2 x 2 = 4**
quantities supplied of K and L by consumers	**2 x 2 = 4**	supply functions of factors	**2 x 2 = 4**
quantities demanded of K and L by firms	**2 x 2 = 4**	demand functions for factors	**2 x 2 = 4**
quantities of X and Y supplied by firms	**2**	supply functions of commodities	**2**
prices of commodities X and Y	**2**	clearing-the-market of commodities	**2**
prices of factors K and L	**2**	clearing-the-market of factors	**2**
Total number of 'unknowns'	**18**	**Total number of equations**	**18**

IT'S SO HARD

CAN WE SKIP TO THE GOOD PART?


can we skip to the good part

Graphical Illustration of a 2 x 2 x 2 GE Model

- ✓ Three static properties are observed in a general equilibrium solution, reached with a free competitive market mechanism:
  a) Efficient allocation of resources among firms (equilibrium of production).
  b) Efficient distribution of the commodities produced between the two consumers (equilibrium of consumption).
  c) Efficient combination of products (simultaneous equilibrium of production and consumption).

- ✓ These properties are called marginal conditions of **Pareto optimality or Pareto efficiency**.

- ✓ A situation is defined as **Pareto optimal** (or efficient) if it is impossible to make anyone better-ofT without making someone worse-of.

- ✓ There is a convenient graphical tool known as the **Edgeworth box** that can be used to analyze these efficiency conditions.

Equilibrium of Production (Efficiency in Factor Substitutioo)

- Equilibrium of production requires the determination of the efficient distribution of the available productive factors among the existing firms (efficiency in factor substitution)..

- Given that K and L are limited in supply, their use should produce the greatest possible output.

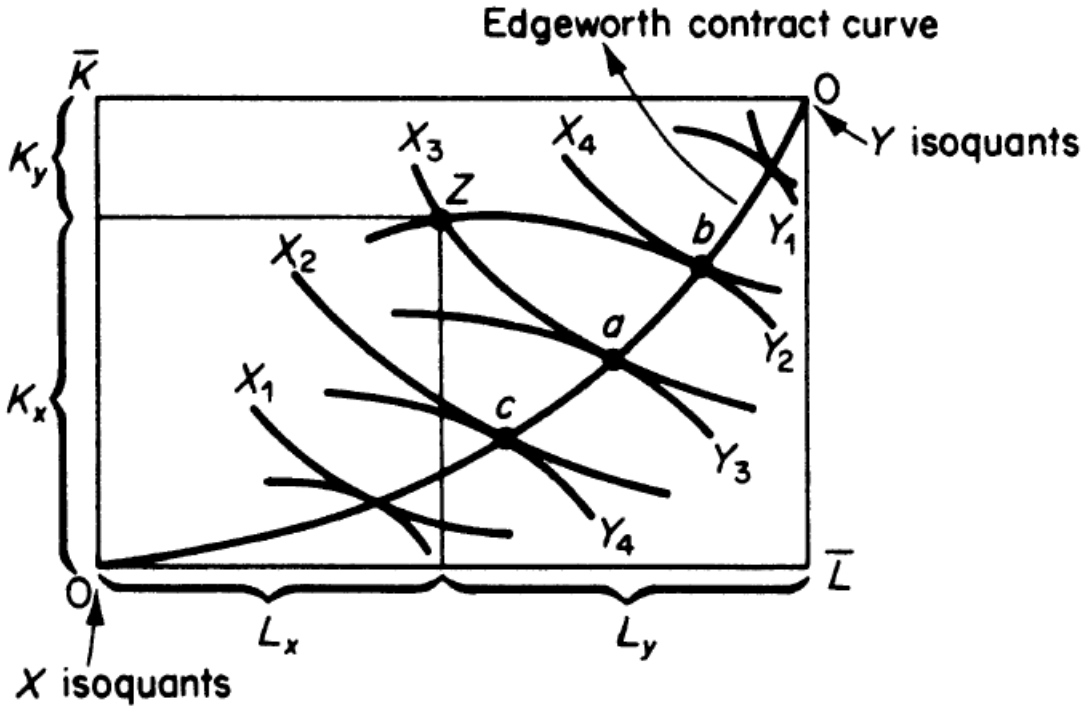
- An allocation of inputs is efficient if the produced combination of X and Y is such that it is impossible to increase the production of one commodity without decreasing the quantity of the other.

- Efficient production takes place on the **Edgeworth contract curve.** It is impossible to move to a point off this curve without reducing the quantity of at least one commodity.

- Along the Edgeworth Contract Curve:

  Slope of X Isoquant = Slope of Y Isoquant

$$MRTS^{X}_{L,K} = MRTS^{Y}_{L,K} = \frac{w}{r}$$

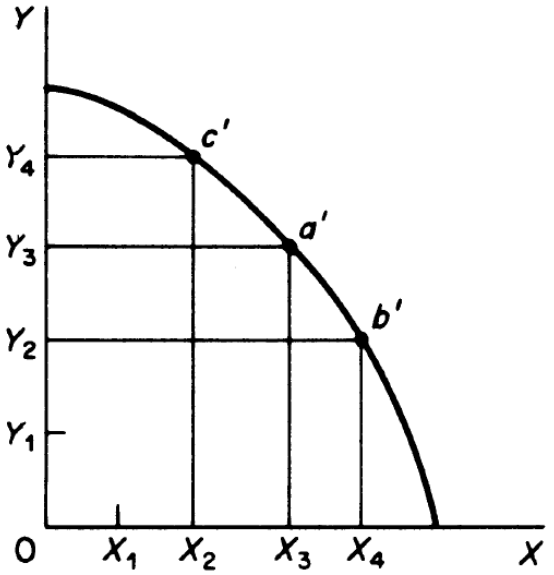


The locus of points of tangency of the X and Y isoquants is called the **Edgeworth contract curve** of production.

This curve is of particular importance because it includes the efficient allocations of K and L between the firms.

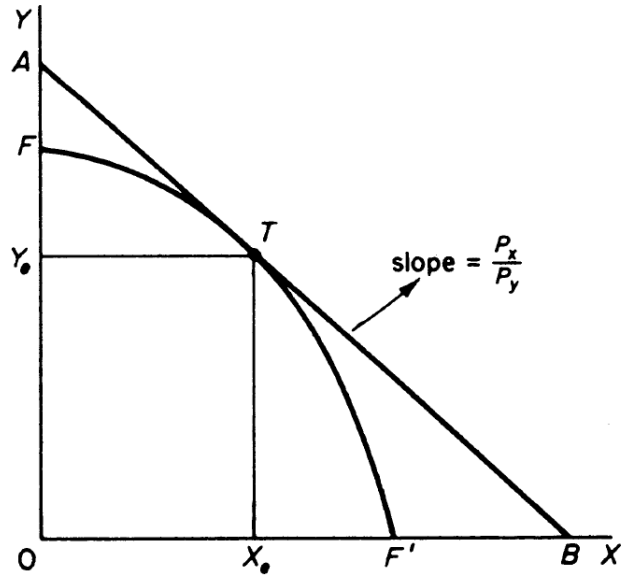
Equilibrium of Production (Efficiency in Factor Substitution)

- From each point of the Edgeworth contract curve of production we can read of the maximum obtainable quantity of one commodity, given the quantity of the other to plot the **Production Possibility Curve.**



- The production possibility curve of an economy is the locus of all Pareto-efficient outputs, given the resource endowment (K and L) and the state of technology.

- The negative of the slope of the production possibility curve is called the Marginal Rate of Product Transformation, $MRPT_{X,Y}$ and it shows the amount of Y that must be sacrificed in order to obtain an additional unit of X.



- At equilibrium,

$$\boldsymbol{MRPT_{X,Y} = \frac{MC_X}{MC_Y} = \frac{P_X}{P_Y}}$$

Equilibrium of Consumption (Efficiency in Distribution of Commodities)

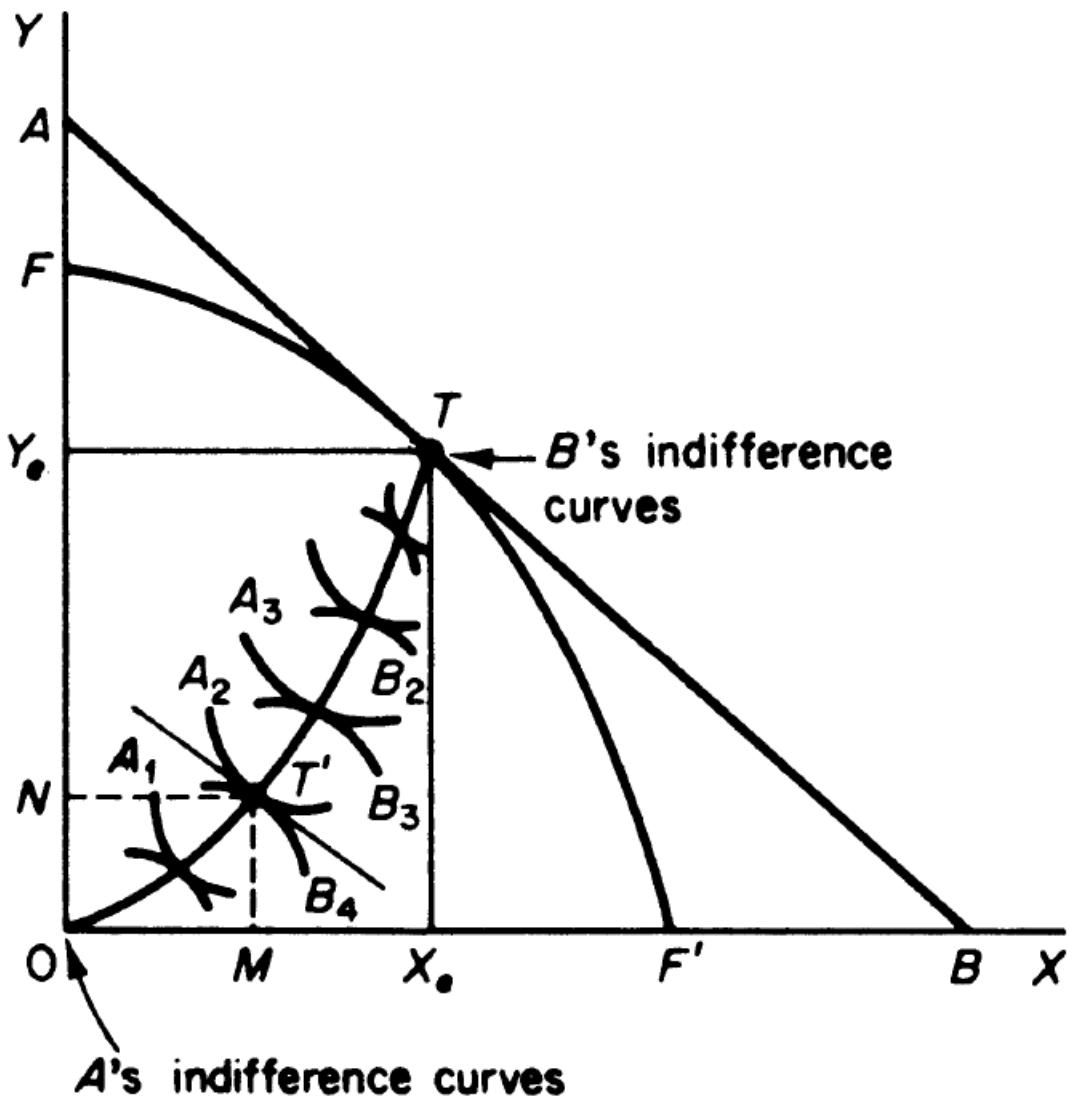
- Consumer maximises his utility by equating the Marginal Rate of Substitution of the two commodities (slope of his indifference curves) to the price ratio of the commodities (slope of budget line).

$$MRS_{X,Y} = \frac{P_X}{P_Y}$$

- Since both consumers in perfectly competitive markets are faced with the same prices the condition for joint or general equilibrium of both consumers is:

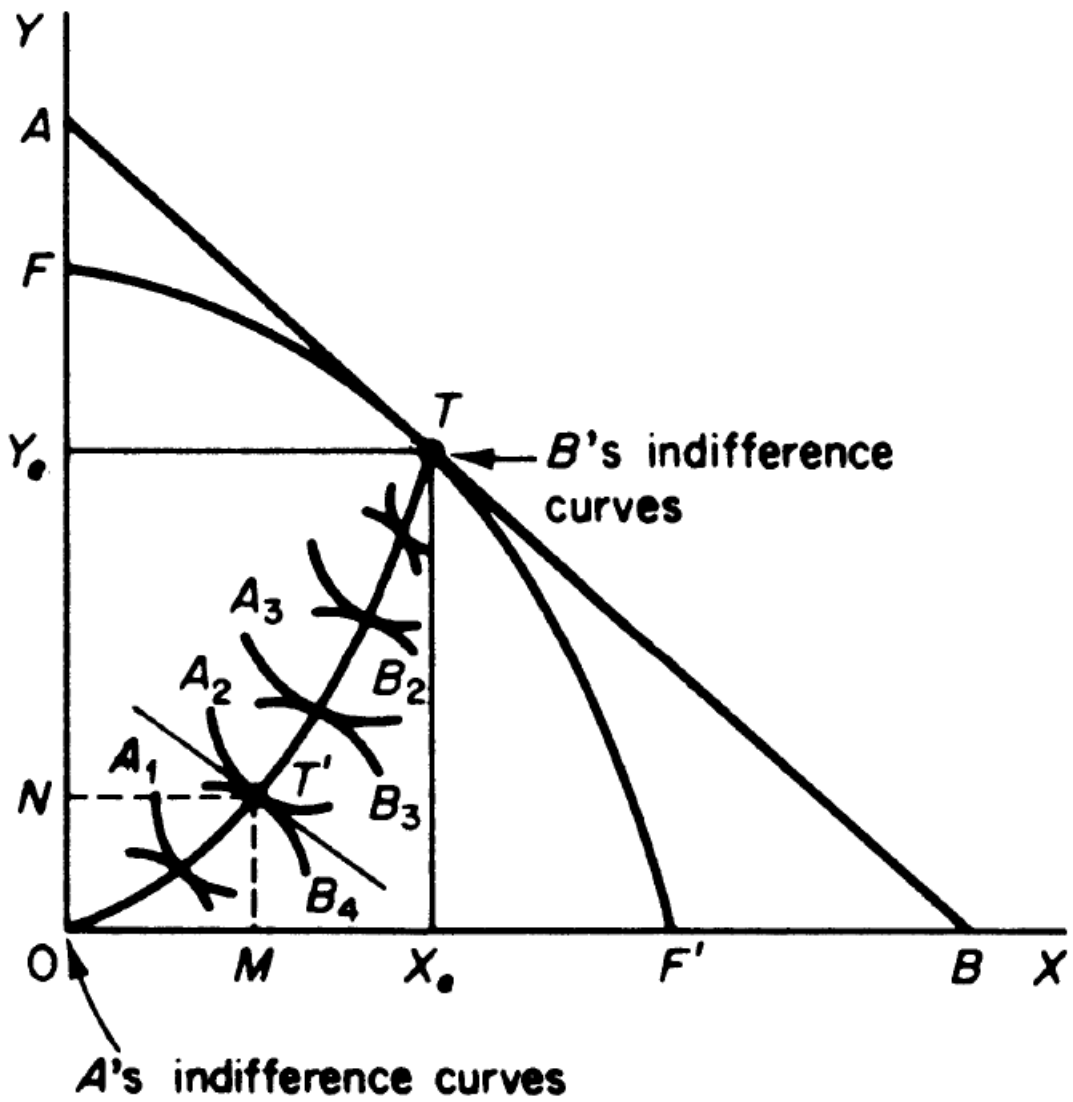
$$MRS^{A}_{X,Y} = MRS^{B}_{X,Y} = \frac{P_X}{P_Y}$$

- A Pareto efficient distribution of commodities is one such that it is impossible to increase the utility of one consumer without reducing the utility of the other i.e. along the **Edgeworth Contract Curve of Consumption**.



Equilibrium of Consumption (Efficiency in Distribution of Commodities)

- For a given product-mix (a point on PPC: point T) there is an infinite number of possible Pareto-optimal equilibria of distribution.
- With perfect competition, only one of these points is consistent with the general equilibrium of the system.
- This is the point of the contract curve where the $\boldsymbol{MRS^{A}_{X,Y} = MRS^{B}_{X,Y}}$ of the consumers is equal to the price ratio of the commodities $\left(\frac{P_X}{P_Y}\right)$.
- At T', this equilibrium condition is satisfied.



Simultaneous Equilibrium of Production and Consumption (Efficiency In Product-mix)

- For Equilibrium of Production: $\boldsymbol{MRPT_{X,Y}} = \frac{\boldsymbol{P_X}}{\boldsymbol{P_Y}}$

- For Equilibrium of Consumption: $\boldsymbol{MRS^{A}_{X,Y}} = \boldsymbol{MRS^{B}_{X,Y}} = \frac{\boldsymbol{P_X}}{\boldsymbol{P_Y}}$

- The General Equilibrium of the system as a whole requires the fulfilment of a third condition:

$$\boldsymbol{MRPT_{X,Y}} = \boldsymbol{MRS^{A}_{X,Y}} = \boldsymbol{MRS^{B}_{X,Y}}$$

- Since the $\boldsymbol{MRPT}$ shows the rate at which a good can be transformed into another in production, and the $\boldsymbol{MRS}$ shows the rate at which the consumers are willing to exchange one good for another, the system is not in equilibrium unless the two ratios are equal.

- In this case, production sectors' plans are consistent with the household sectors' plans, and the two are in equilibrium.

General Equilibrium Analysis: Real World Models

- ✓ Leon Walras was never able to prove the existence of a general equilibrium.
- ✓ In 1954 Arrow and Debreu provided a proof of the existence of a general equilibrium in perfectly competitive markets, in which there are no indivisibilities and no increasing returns to scale.
- ✓ In 1971 Arrow and Hahn proved the existence of a general equilibrium for an economy with limited increasing returns and monopolistic competition, without indivisibilities.
- ✓ Until the 1970s general equilibrium analysis remained theoretical. Advances in computing power and the development of input–output tables, made it possible to model national economies, or even the world economy, and attempts were made to solve for general equilibrium prices and quantities empirically.
- ✓ **Applied general equilibrium (AGE)** models were pioneered by Herbert Scarf in 1967, and offered a method for solving the Arrow–Debreu General Equilibrium system in a numerical fashion.
- ✓ **Computable general equilibrium (CGE)** models surpassed and replaced AGE models in the mid-1980s, as the CGE model was able to provide relatively quick and large computable models for a whole economy, and was the preferred method of governments and the World Bank.
- ✓ **Dynamic Stochastic General Equilibrium (DSGE**) is similar to that of a CGE model but also account for random shocks occurring in the model due to market uncertainties.

General Equilibrium Analysis: Schools of Thought & Criticisms

- ✓ Keynesian and Post-Keynesian economists criticize general equilibrium theory specifically, and as part of criticisms of neoclassical economics generally. Specifically, they argue that general equilibrium theory is neither accurate nor useful, that economies are not in equilibrium.

- ✓ Robert Clower and others have argued for a reformulation of theory toward disequilibrium analysis to incorporate how monetary exchange fundamentally alters the representation of an economy as though a barter system.

- ✓ While general equilibrium theory and neoclassical economics generally were originally microeconomic theories, new classical macroeconomics builds a macroeconomic theory on these bases.
  - In new classical models, the macroeconomy is assumed to be at its unique equilibrium, with full employment and potential output, and that this equilibrium is assumed to always have been achieved via price and wage adjustment (market clearing). The best-known such model is **real business-cycle theory**.

Thank You...!!!