

The General Equilibrium & Welfare Economics



Paper: Intermediate

Microeconomics- II

Lesson Name: General Equilibrium & Welfare Economics

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The General Equilibrium & Welfare Economics

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1. Learning Outcomes

This unit primarily deals with the nuances of welfare economics along with different mathematical representations of market and competitive equilibrium situations. We shall go on to learn concepts like First Fundamental Theorem of Welfare Economics, Second Fundamental Theorem of Welfare Economics, Walras' law, the implications of Walras' law etc.

2. Introduction:

Welfare economics deals with that branch of economics that involves *normative* issues i.e. normative evaluation of markets and economic policy. It purposes not to describe how the economy works but to assess *how well* it works.

Adam Smith argued in his famous book "Wealth of Nations" that individuals who pursue their self-interest operating through market go on to promote the welfare of others and welfare of the society as a whole.

So, the idea of welfare is one of the prime themes of economics. In the last unit i.e. the lesson – **General Equilibrium and Efficiency Analysis**, we saw the fact that Pareto efficiency does not talk about distribution of welfare across people but rather it only discusses the fact about the constituting factors about that one person who will eventually enjoy a Pareto efficient allocation.

So to include society's value of commodities under alternative resource allocations we need to engage in what is called as welfare economics. Theory of welfare economics provides a method for delineating important conceptual issues as regards to welfare issues that all societies are facing in one way or the other.

Three concepts of social welfare given by Professor Graff

1. **Paternalist Concept of social Welfare:** According to this concept, the preferences of the individual members of the society may be ignored and the state or a paternalist authority to a dictator uses its own ideas about social welfare; social welfare increases when that paternal authority or the dictator thinks it so.
2. **Paretian Concept of social welfare:** This concept is given by V. Pareto and his followers. According to this concept, welfare of the society is simply the sum total of the welfare of different individuals comprising it
3. **Concept of Social Welfare Function:** This theory is propounded by Bergson and Samuelson; they have described the utility functions of the various persons in the

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society with the help of a social welfare function. These economists are of the opinion that changes in social welfare cannot be assessed without making interpersonal comparisons of utility and therefore without making value judgments.

3. Welfare Economics

In economics the question of 'how' is dealt in what is called positive economics e.g.-how prices of production and factors are determined and further how an allocation of resources is made on the basis of it etc. But, the question that whether any allocation of resources is efficient or not falls into the realm of welfare economics.

Here, efficiency refers to an economic situation where resource allocation maximizes social welfare. We also deal with those criteria that may help us evaluate alternative states and policies to achieve efficiency and social welfare. Thus, the norms hence achieved in welfare approaches to economics guarantee the optimal allocation of economic resources of the society and nation.

Now, there exists inter-relationships amongst the various parts of economy i.e. change in one part affects the resources allocation in other parts. Thus, it becomes a central problem of Welfare economics as to whether a particular change suggested in resource allocation will increase or decrease social welfare or not. But, then social welfare cannot be measured objectively as it involves making inter-personal comparison of utilities of different individuals of society which may have different preferences due to different tastes etc.

Now, Pareto criterion was brought in as a solution to this problem according to which – any change that makes at least one individual better off without making any other worse off leads to improvement in social welfare. This helps us to define the state of maximum social welfare or what is called Pareto optimality. We have seen the condition of Pareto optimality in the previous unit.

But, Pareto criterion does not embrace those changes in economic state which make some better off and others worse off. This involves inter-personal comparison of utilities but this was not included by Pareto, he rather proposed new welfare economics that necessarily avoids inter-personal comparison of utilities and value judgments.

The other answer was provided by Kaldor and Hicks through welfare criterion called **Compensation principle** that did not involve *inter-personal comparison of utilities and value judgments*. Thus Kaldor-Hicks along with Scitovsky contributed into what is known as new welfare economics.

The welfare economics formulated by Pareto was based on social optimum that involved the concept of ordinal utility and hence was free from inter-personal comparison of utilities and value judgments. His aim was to determine a value free objective criterion for social welfare.

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As we saw in the last unit, Pareto criterion simply states that an economic change that harms no one makes some one better off increases social welfare. The problem here is this does not apply to those economic changes that will harm some and benefit others. This might be a desirable situation in a capitalistic economy where inequality prevails. Thus if one rejects the inter-personal comparison of utilities then Pareto criterion fails.

We saw the same situation in the Edgeworth box diagram in the form of contract curve i.e. if one moved on from one tangency to the other on the contract curve the Pareto criterion fails to tell us the changes in the levels of the social welfare. Further on the same contract curve there could be numerous Pareto optimal points.

So to fill this lacuna **Kaldor, Hicks and Scitovsky** further developed the new welfare economics. They propounded another criterion called as **compensation principle** and tried to measure the situation in which some individual gets better off at the cost of some other i.e. others becoming worse off and still overall economic welfare is maintained. This principle has following assumption:

1. The satisfaction of an individual is independent of others
2. Each individual is the best judge of his own welfare
3. There does not exist any externalities of consumption and production
4. The tastes of individuals remain constant
5. The problem of production and exchange can be separated from the problems of distribution
6. Utility can be measured orderly.

These scholars wanted to develop a value free objective criterion of measuring the social welfare.

4. Kaldor's Welfare Criterion

Kaldor tried to measure the welfare implications of movement in either direction on the contract curve in terms of Edgeworth box diagram. He argues that if a certain change in economic policy makes some people better off and others worse off than a change will increase social welfare if those who gain from the change could compensate the loser and still be better off than before. In other words, a change in economic policy be called an improvement if those who gain evaluate their gains at a higher figure than the value which the loser set upon their losses.

In this way for Kaldor, if any policy change benefits any one section of the society to such an extent that it is better off even after the payment of compensation to the other

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section of society. Out of the benefits received, than that change leads to an increment in the social welfare.

Prof. Hicks taking Kaldor postulation further tried to evaluate the change in social welfare in a situation that benefits some people and harm the other. According to Hicks criterion, if A is made so much better by the change that he could compensate B for his loss and still have some thing left over, than this reorganization is an improvement of economic situation.

Thus Hicks criterion is a position from loser's point of view while Kaldor's criterion was formulated on gainer's point of view and hence both are the same and therefore this is combinedly called as **Kaldor-Hicks criterion of social welfare**.

Let's understand Kaldor-Hick's criterion using utility possibility curve. Let's suppose two individuals Mr. X and Mr. Y whose ordinal utility is presented along X and Y axis respectively. DE is the utility possibility curve that represents various combination of utility of the two individuals Mr. X and Mr. Y.

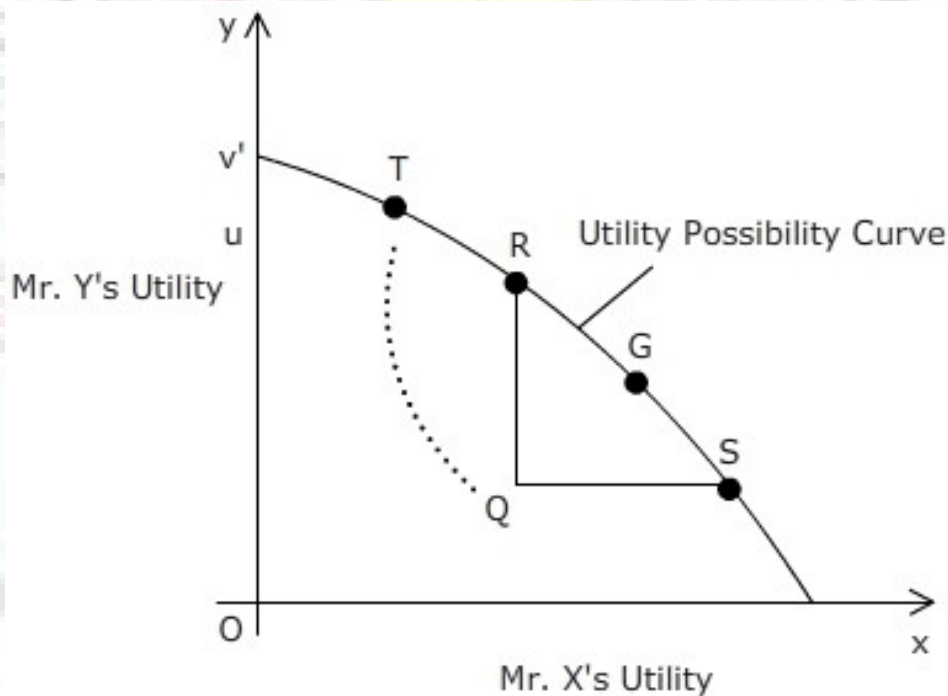


Figure 1

We know that if we moved downward on the utility curve DE, Mr. X utility will increase while that of Mr. Y's will fall. Now, let's suppose Q represents the utility point of Mr. X and Mr. y from certain distribution of income. Let us further assume there is a change brought into economic policy and as an effect the utility points of Mr. X and Mr. Y shifts from Q to T. As a result the utility of Mr. Y increases while that of Mr. X falls; in other words, Mr. Y has been made better off while Mr. X has become worse off.

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Pareto criterion fails here to explain the economic gain or social welfare if at all possible from this movement. It can at best tell us that points such as R,G,S or any point on the segment RS of utility possibility curve DE are socially preferable to point Q.

Well, Kaldor-Hicks' compensation principle answers the social welfare situation that arose out of the movement from Q to T. According to the Kaldor-Hicks criterion, we have to see whether individual X who is a loser is still better off than before or not. At point T, if Mr. Y gave some compensation to Mr. X for the loss occurred, they can move from position T to position R. Here as the back ground explains, Mr. X is well off i.e. similar to his previous position Q, but Mr. Y is still better off as compared to his earlier position Q. It means that due to the policy change that compelled the movements of Mr. X and Mr. Y from Q to T, the gainer Mr. Y compensate the loser i.e. Mr. X and is still better off than what he was previously, at point Q.

In this way Kaldor-Hick's criterion shows that social welfare increases with the movement from position Q to position T, because from T they could move to position R through redistributing incomes or by compensation.

The case of Utility Possibility curve moving outward

When Kaldor-Hicks criterion is applied to this situation (Fig.2) that is due to change in economic policy the utility possibility curve moves outward and two individuals Mr. X and Mr. Y move from a point of lower utility possibility to a point on higher utility possibility, then such a movement will cause improvement in social welfare. This is shown in the following figure:

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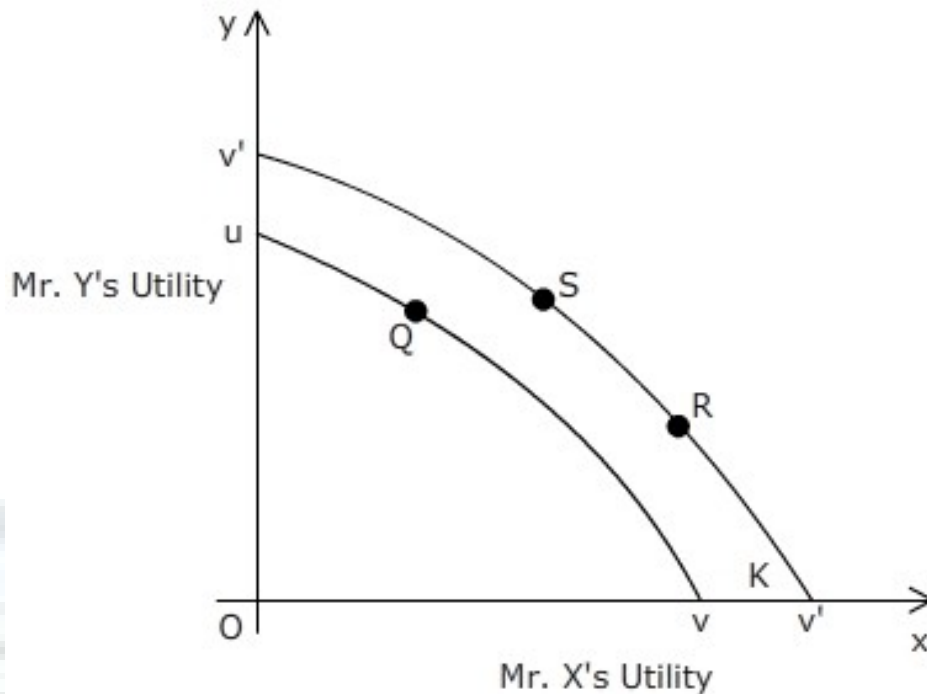


Figure 2

5. Kaldor-Hicks' Welfare Criterion

As shown in the above diagram UV is the original utility possibility curve and Q represents the position at which two individuals are initially placed. Now, suppose UV shifts to a new position $U'V'$ and two individuals are placed at point R .

Let us analyze this movement from Q on utility possibility curve UV to point R on utility possibility curve $U'V'$. The utility of Mr. X has increased and that of Mr. Y has declined. But according to Kaldor-Hicks' criterion, R denotes greater social welfare as with the new utility possibility curve $U'V'$, it is possible to move through merely distribution of incomes from position R to S and the result is individual Mr. Y is fully compensated for his loss of utility by Mr. X. On the other hand, he stays still better off as compared to his original position at Q . In this way we can conclude the fact that any changes in terms of newer policies that are brought into the economy, which tend to move the individuals from a position on a lower utility possibility curve to a position on the higher utility possibility curve increases the social welfare.

6. Scitovsky paradox

The Kaldor-Hick's criterion leads to contradictory results in certain case; this was shown by Scitovsky in his famous paradox popularly known as of social welfare.

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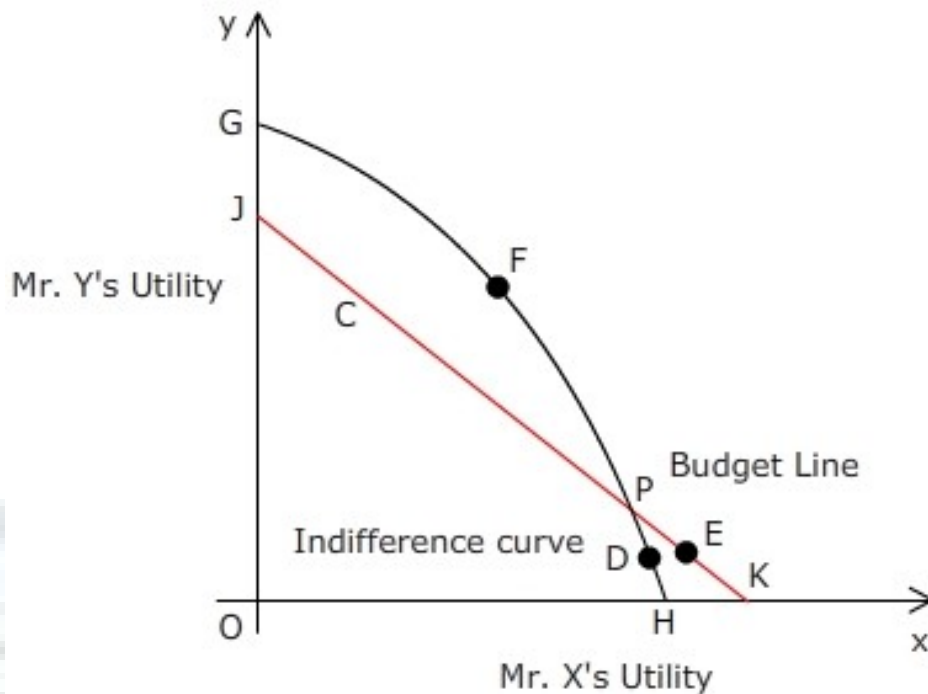


Figure 3

The above diagram shows two possibility curves –JK and GH that intersect at point P. Let C be the initial position on utility possibility curve JK. A policy change occurs and a new utility possibility curve GH is formed and the two individuals Mr. X and Mr. Y's positions change to point D. Clearly D is superior position as compared to C as per Kaldor-Hicks' criterion, as from D a movement to F on utility possibility curve GH could be made through redistribution of incomes or compensation.

But Scitovsky points out the reverse movement from D to C back on curve JK also represents an improvement on Kaldor-Hicks' criterion i.e. position C is socially better than position B. this is because from position C a movement could be made through redistribution of income to position E on the same utility possibility curve JK. At this position i.e. on one hand Mr. X is well off than what he was at position D, on the other hand Mr. Y still remains better off than what he was at position D. In this way we see the movement from point C to point D is due to policy change and is passed by the Kaldor-Hick's compensation criterion; at the same time a movement from D to C is also passed by the same Kaldor-Hicks' criterion.

7. Scitovsky's double criterion of Welfare

After showing contradictory results in Kaldor-Hicks welfare criterion as explained above, Scitovsky formulated his own criterion of welfare which is called Scitovsky's double criterion.

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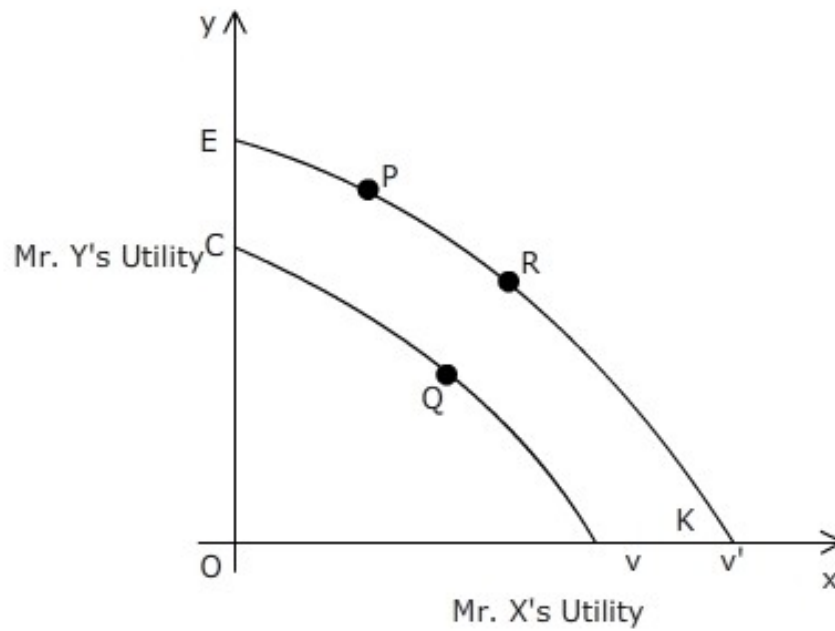


Figure 4

The double criterion fulfills both the tests i.e. on one hand Kaldor-Hicks welfare criterion and on the other, the reversal test. As shown in the above diagram. There are two utility possibility curves CD and DF; they do not intersect.

Let Q be the initial position on utility possibility curve CD and a movement is made to P on utility possibility curve EF due to change in economic policy. On Kaldor-Hicks criterion, it is an improvement because P lies on utility possibility curve EF and a movement P to R could be made through redistribution of income. R is a better position than Q as utility of both the individuals i.e. Mr. X and Mr. Y is greater on R than Q.

Now, let's check the reversal test i.e. whether a movement from G back to original position Q passes the Kaldor-Hicks criterion or not? It is evident that from R we cannot move on utility possibility curve CD and be socially better off than P. we find that movement from Q to P passes the Kaldor-Hicks criterion, the reverse movement from P to Q does not pass the same Kaldor-Hicks criterion hence the double criterion is satisfied.

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8. Fundamental Theorems of Welfare Economics:

The First Fundamental Theorem of Welfare Economics

According to the first fundamental theorem of welfare economics, perfectly competitive equilibrium is Pareto optimal. This is also called the *Invisible hand theorem* after Adam Smith's famous formulation in his famous book "Wealth of Nations" that "*Individuals who pursue their self-interest, they operating through market promote the welfare of others and welfare of the society as a whole*". Thus individual consumers seek to maximize their own satisfaction and producers pursue to maximize their own profits. Even though promoting the interests of the society as a whole is not a part of their intention but they are led by the invisible forces of market system to promote the interest of the society as a whole -

Following are the conditions for this theorem.

- 1) All market concerned are in equilibrium simultaneously i.e. General competitive equation exist
- 2) 2nd order condition for equation must be fulfilled i.e. Consumer's preferences (indifference curve) are convex to the origin and producer's production sets (isoquant curve) are convex to the origin. This implies that consumer's MRS or producer MRTS must be diminishing at the equilibrium point.
- 3) The production transformation curve must be concave to/in the relevant region.
- 4) Externalities in productions and in consumptions do not exist. It implies that consumption, production choices by any firm does not affect the production possibility of another form or in case of consumptions, consumptions decisions of a consumer do not affect consumption possibilities of a consumer.

Second order conditions for Fundamental Theorem of Welfare Economics

Second order conditions imply that consumers' marginal rate of substitution and producers' marginal rate of technical substitution must be diminishing at or near the equilibrium point. It may be noted that many areas of production there prevail increasing returns to scale. In case of increasing returns to scale equilibrium will not exist as this will lead to the violation of the condition.

Third order conditions for Fundamental Theorem of Welfare Economics

Third condition required for the fulfillment of fundamental theorem of welfare economics is that externalities in production and externalities in consumption do not

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exist. In case these externalities in production and consumption exist, the competitive equilibrium will not achieve Pareto-optimality from the social point of view.

9. Mathematical Representation of Walras' Law

Let there be two consumers, A & B and their endowments for goods 1 and 2 are

$Y_A = (Y_A^1, Y_A^2)$ & $Y_B = (Y_B^1, Y_B^2)$, respectively.

(X_A^1, X_A^2) denotes an allocation to consumers A.

(X_B^1, X_B^2) denotes an allocation of consumers B.

An allocation is feasible if and only if

$$X_A^1 + X_B^1 \leq Y_A^1 + Y_B^1 \text{ \&}$$

$$X_A^2 + X_B^2 \leq Y_A^2 + Y_B^2$$

For any positive prices (p_1, p_2) each consumer spends all of his budget

For consumer A: $P_1 X_A^1 + P_2 X_A^2 = P_1 Y_A^1 + P_2 Y_A^2$ (1)

For consumer B: $P_1 X_B^1 + P_2 X_B^2 = P_1 Y_B^1 + P_2 Y_B^2$ (2)

Adding equation (1) and (2)

$$P_1(X_A^1 + X_B^1 - Y_A^1 - Y_B^1) + P_2(X_A^2 + X_B^2 - Y_A^2 - Y_B^2) = 0$$

This says that for a combined market value of excess demand is zero for any positive prices p_1 & p_2 - This is Walra's Law

10. Implication of Walra's Law

Suppose market is in equilibrium for commodity A.

i.e. $X_A^1 + X_B^1 - Y_A^1 - Y_B^1 = 0$

then $P_1(X_A^1 + X_B^1 - Y_A^1 - Y_B^1) + P_2(X_A^2 + X_B^2 - Y_A^2 - Y_B^2) = 0$

Implies: $X_A^2 + X_B^2 - Y_A^2 - Y_B^2 = 0$.

This mathematical equation explains that if a given market is in equilibrium then other markets must also be in equilibrium for the two given commodities.

In this way the implication of Walras' Law could be put in very simple words that if one market is found to be in equilibrium for any two given goods then other markets must also be in equilibrium for any two - commodity exchange economy.

Walra's Law is an identity; i.e. a statement that is true for any positive prices (p_1, p_2) , whether these are equilibrium prices or not.

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The second implication of Walra's: For some prices P_1 & P_2 there is an excess quantity supplied of commodity 1?

Putting it mathematically,

$$X_{A'}^1 + X_{B'}^1 - Y_A^1 - Y_B^1 < 0.$$

$$\text{Then, } P_1(X_{A'}^1 + X_{B'}^1 - Y_A^1 - Y_B^1) + P_2(X_{A'}^2 + X_{B'}^2 - Y_A^2 - Y_B^2) = 0$$

$$\text{Implies: } X_{A'}^2 + X_{B'}^2 - Y_A^2 - Y_B^2 > 0.$$

This derivation explains that an excess supply in one market implies an excess demand in the other market for any two commodity exchange economy.

Resource allocation is Pareto Efficient

From microeconomic consumer theory, we know that: $MRS_{xy}^{PersonA} = \frac{P_x}{P_y}$

Since prices are the same for all people: $MRS_{xy}^{PersonA} = MRS_{xy}^{PersonB}$

Therefore, economic theory gives us the first part of Pareto efficiency

11. General Implications of Walras' Law

The major implications of Walras' law lie in the fact that if there is an excess of demand in a given economy over supply for any single commodity then there must lie a respective excess of supply over demand for minimal of one other commodity; else the aggregate value of commodities that the agents wish to supply could not be equal to that aggregate value of commodities, which the agents wish to demand. In other words we can say that irrespective of the fact that the markets are in equilibrium or not, the aggregate value of the excess demands and the excess supplies must equal to zero over all markets taken together.

Thus, the statement of Walras' law refers to all markets (i.e. markets for final goods and services, markets for raw materials, labor, money, bonds etc.). Here, one should not get confused with Say's law, or its versions, according to which, there can never be a situation in which there is an excess supply of final goods and services taken alone. However, Walras' law asserts the logical impossibility of oversupply in all markets taken together but at the same time it does not rule out the possibility of an oversupply in one or a particular market, like that of the market for final goods and services, taken alone.

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12. Conclusion : Social Welfare Function and the Criticism

The Concept of '**Social Welfare Function**' was coined by A. Bergson in his article '*A Reformulation of Certain Aspects of Welfare Economics*'. Prior to this various concepts of social welfare had been given by different welfare theorists but they failed to provide a satisfactory solution to the problem of maximization of social welfare and measurement.

Jeremy Bentham talked of welfare in terms of '**the greatest happiness of the greatest number**'. Analysis of Pareto optimality maximizes social welfare by satisfying various marginal conditions of production, distribution and allocation of resources among products. But unfortunately they are not fulfilled due to the existence of various externalities and imperfections in the market. Moreover, Pareto optimality analysis fails to measure the changes in welfare resulting from any change which benefits one section of society and harms the other.

Further, Compensation principle as given by Kaldor-Hicks-Scitovsky attempts to measure the changes in social welfare resulting from such economic changes which harm some and benefit others through hypothetical compensating payments. Compensation theorists claimed to give a value-free objective criterion based on ordinal concept of utility but, this is based upon implicit value judgments and does not evaluate changes in social welfare satisfactorily.

Bergson and Samuelson have attempted to give new approach to welfare economics and have succeeded in rehabilitating welfare economics. They have given a concept of social welfare function that considers only the ordinal preferences of individuals. According to them, welfare economics is essentially a normative study. But the approach to study it must be scientific despite the fact that the use of value judgments in it is unavoidable.

Social welfare function is an ordinal index of society's welfare and is a function of the utility levels of all individuals constituting the society.

Following are the features of Bergson-Samuelson Social Welfare function are worth noting:

- 1) The social welfare function is based on explicit value judgments and involves interpersonal comparisons of utility in ordinal terms.
- 2) The maximum social welfare position is completely determined as a result of the introduction of value judgments regarding distribution of welfare among individuals.
- 3) The social welfare function is not based on any unique value judgments. Instead, any set of value judgments can be used by a welfare economist to construct a social welfare

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function. Thus, it is not any unique function but changes with the change in value judgments.

- 4) Once the social welfare function has been decided upon by value judgments, the maximization technique is used to obtain the maximum social welfare position at which allocation of resources is Pareto optimum and also the distribution of goods and services is equitable. Thus, both efficiency and equity are achieved so that social welfare may be maximized.
- 5) Used along with the Pareto optimality analysis the concept of social welfare function enables us to find a unique optimum solution which combines economic efficiency with distributive justice.

Prof. Amartya Sen's Critique: judging welfare or well-being in terms of utility is of limited significance. Prof. Sen criticized modern welfare economics and social welfare function on the ground that utility is not a true indicator of well-being. "A difficulty with welfarism arises from the particular interpretation of well-being that utility provides. To judge the well-being of a person exclusively in the metric of happiness or desire-fulfillment has some obvious limitations. These limitations are particularly damaging in the context of interpersonal comparisons of well-being".

13. Review Questions

1. What is horizontal and vertical equity?

Sol: Horizontal equity is identical treatment of identical people. Vertical equity is different treatment of different people to reduce the consequences of these innate differences.

2. What is Pareto Efficient allocation?

Sol- if for a given set of consumer tastes resources and technology it is impossible to move to another allocation which would make some people better off and no body worse off. It is independent of value judgment.

3. What does the welfare theorem states?

Ans: It states that any competitive equilibrium is Pareto efficient

4. What are the major assumptions of the Ist welfare theorem?

Ans: a. Consumers only care about their consumption not about what other's consume

- b. Agents behave competitively

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5. What are consumption externalities?

Ans: if an agent cares about what other agent consumes it is called consumption externalities. When consumption externalities exist equilibrium may not be Pareto efficient.

6. What is the importance of 1st Welfare theorem?

Ans: it gives us a general mechanism that can ensure Pareto efficient outcomes especially when there are thousands and millions of people in the world. If people just know the price of the good they are interested in buying they can know their demands.

7. What does the 2nd Welfare theorem states?

Ans: Under certain conditions every Pareto efficient allocation can be achieved as competitive equilibrium. Price plays 2 roles- allocative and distributive. Allocative shows relative scarcity while distributive shows how much each person can buy.

8. What is Arrows impossibility theorem?

Ans: It shows that there is no ideal way to aggregate individual preference into social preferences.

9. What are value judgments in welfare economics?

Ans: Value judgment in welfare economics refers to ethical beliefs of people about what is good or bad. For example if A chooses good X over good Y it shows that his welfare lies in choosing good X than good Y.

10. What is new welfare economics?

Ans: Kaldor and Hicks laid the foundation of new welfare economics which is supposed to be free from value judgments.

11. What is compensation principle?

Ans: Enunciated by Kaldor and Hicks, the compensation principle deals with new welfare economics. If a change in economic organization increases the welfare of some people and reduce the welfare but those who gain in welfare are able to compensate the losers and still be better off than before, change will lead to increase social welfare.

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14. Exercise

1. What are social welfare functions?
2. What do you understand by the term welfare economics?
3. What is fundamental theorem of welfare economics? How does Prof. Amartya Sen criticize it?
4. Show that a general competitive equilibrium is also Pareto optimal.
5. When perfectly competition is an ideal market form as it ensures the attainment of Pareto efficiency. Examine critically.
6. What are the main features of Bergson-Samuelson Social Welfare function?
7. Verify Walras's law mathematically.
8. Criticize Kaldor-Hicks law with the help Social welfare function.
9. What do you understand by Scitovsky paradox? Explain with graph.
10. What is Scitovsky's double criterion of welfare? Explain giving appropriate example.

15. Glossary

Welfare: It represents a situation of economic wellbeing of an individual, group, or that of an economy as whole. It is generally conceptualized through utility functions that represent real national income.

Pareto criterion: A situation of improvement in social welfare, it represents a change in allocation due to certain policy changes in an economy in which, an Individual gets better off without making any other worse off.

Invisible hand theorem: Also known as the fundamental theorem of welfare economics, it States that a perfectly competitive equilibrium is Pareto optimal.

Walras' Law: Following from the budget constraints of market participants, Walras' law tells us the property of a general equilibrium in which if all but one of the markets is in equilibrium, then automatically, the remaining market is also in equilibrium.

Compensation principle: Given by Kaldor, it states that when the production of wealth goes up, some income distribution could be found that makes some people better off and no one worse off than before.

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Scitovsky's Double Criterion: A change is an improvement if the gainers in the changed situation are able to persuade the losers to accept the change and simultaneously losers are not able to persuade the gainers to remain in the original situation.

Social welfare function: Social welfare function is an ordinal index of society's welfare and is a function of the utility levels of all individuals constituting the society. It goes on to show that a maximum social welfare position could be determined with an introduction of value judgment on the distribution of welfare amongst individuals.

Walrasian adjustment: It is a market adjustment mechanism in which price rises when there is excess demand and falls when there is excess supply.

Walrasian Auctioneer: A hypothetical entity that facilitates market adjustments when in disequilibrium. It announces prices and collects information about supply and demand at those prices without any disequilibrium transactions actually taking place.

Welfare criterion: It is a criterion in which it is judged that whether an economy or one state of the world is better than the other on quantitative basis.

Welfare economics: The branch of economics that deals with economic welfare, competitive general equilibrium to the efficiency and various allocations that promote wellbeing.

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