THE CONTRIBUTION OF CONTEMPORARY ECONOMISTS FROM 1950 TO 1988

BY

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DEPARTMENT OF ECONOMICS
SCHOOL OF SOCIAL SCIENCE

A DISSERTATION

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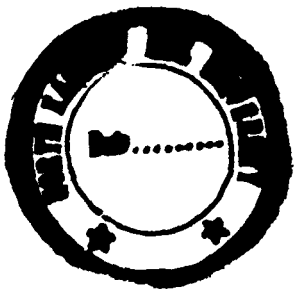

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SUPERVISOR'S CERTIFICATE

This is to certify that this dissertation entitled **The Contribution of Contemporary Economists from 1950 to 1988** submitted by Mr. Purushottam Bhandari for the award of the degree of Master of Philosophy in Economics, is an original piece of work carried out by him under my supervision. This work or part thereof has not been submitted for the award of the degree of any other University nor has it ever been published anywhere.

The dissertation, in my opinion, is worthy of being considered for the award of the Degree of Master of Philosophy.

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Bhandari

July 31, 1900

PURUSHOTTAM BHANDARI

DEDICATED TO

MY

FATHER

Who, though, is no more in this world ....

CONTENTS

Chapter I

INTRODUCTION AND METHODOLOGY

Ours is an age of economists. It is an era where we find tremendous changes in the economic policies and their applications. A modern economic policy must be founded on modern view.[1] No government can get along without the economists who are to be consulted on all economic issues ranging from managing the nation's money supply to redesigning our welfare programmes. The contribution of classical economists like Adam Smith's Laissez-faire policy, Ricardo's rent and comparative cost, Malthus' popultion theory, J.B. Say's law of markets are not in a position to provide suitable policies to the complex problems of modern world. Similarly, the neo-classical theories of Marshall, Pigou, Pareto and others are less effective in the present situation. Marshall's view of the relations between important economic quantities such as consumption, investment, taxes and national income differed from ours.[2] Futher, Keynes' tools to solve Economics of Depression are inadequate in the modern world. So, in this dissertation a humble attempt is made to highlight the contribution of sixteen distinguished contemporary economists from 1950 to 1988. The contribution can be classified in different fields, viz. Economics of Information and Non-Market-Decision Making, Economics of Disequilibrium, advances on the Economics of Equilibrium, Development of Radical Economics.

In contemporary modern world, the contribution of economists focusses all types of economic activities of a particular country. It also tells us how the different economic systems namely capitalism, socialism, mixed economy, works. The knowledge of economics is helpful to bankers, agriculturists, industrialists, labour leaders, social scientists, politicians, planners and others. To

a layman the knowledge of economics enables him to divide his total income among different components like saving, investment and consumption. The nature of modern economic thinking can be undertood by quoting Lord Keynes - "The object of our analysis is not to provide a machine, or a method of blind manipulation, which will furnish an infallible answer, but to provide ourselves with an organised and orderly method of thinking our particular problems; and after we have reached a provisional conclusion by isolating the complicating facts one by one, we can go back on ourselves and allow, as well as we can, for the probable interactions of factors among themselves".

Objectives

In this dissertation an attempt is made to focus the contribution of contemporary economists. Their names are George J. Stigler, James Buchanan, Herbert A. Simon, Robert W. Clower, Axel Leijonhufvud, G.L.S. Shackle, Georgescus-Roegen, Janos Kornai, K.J. Arrow, Debreu, Harrod Roy, Hicks, Paul A. Samuelson, Lawrence R. Klein, Mrs. Joan Robinson, and Michio Morishima. A critical study was taken by Stigler, Buchanan and Simon regarding the Economics of Information and Non-Market Decision Making. A new area has clearly been explored by contemporary economists in the Economics of Disequilibrium - the contribution of Clower, Leijonhufvud, Shackle, Kornai and Georgescus-Roegen would be incorporated in this area. Similarly, the Economics of Equilibrium has been analysed by notable economists, viz. Arrow, Debreu, Harrod, Hicks, Samuelson, Klein and Solow. The Development of Radical Economics is a new field in modern

Economic literature which has been explored by contemporary economists like Mrs. Joan Robinson and Morishima.

So far there has been no attempt at consoldidating the various contribution made by the contemporary economists towards economic thought and doctrines relating to the contemporary periods thereby provide the most required and essential literature in this respect.

Our hypothesis is that contemporary economists have made significant contribution to rational thinking. It is in this area that our attempts would be made more focussed by recording the contribution made by contemporary economists during the period from 1950 till recent times.

Methodology

The methodology used in this dissertation will be the historical method. Historical method is relevant to the study of the present problem. This approach involves a critical and intensive investigation of material which already exists. In this context we can quote from P.V. Young - "The past, if it can be located, contains the key to the present, though today is different from yesterday, it was shaped by yesterday. Today and yesterday will probably influence tomorrow".[3] The main aim of this dissertation is to apply the technique of reflective thinking to economic problems still unsolved by means of discovery of the past trends of events, facts and attitudes. It involves very intensive use of library materials. The various sources of data collection are :

1. Authorative books and economic journals
2. Accessible documents, papers and literature
3. Autobiographical records and dictionaries
4. International encyclopedia of social sciences.

Chapterization

The whole work consists of six chapters :

The first chapter introduces the sixteen contemporary economists under review along with the scope and objectives as well as the methodology of the work.

In chapter two we discuss the contribution of three contemporary economists, viz. George J. Stigler, James Buchanan and Herbert A. Simon to the Economics of Information and Non-Market Decision-Making.

Chapter three discusses the contribution of five other distinguished economists, namely; Robert Wayne Clower, Axel Leijonhufvud, George Shackle, Janos Kornai and Georgescu-Roegen to the Economics of Disquilibrium.

In chapter four we discuss the contribution of Kenneth J. Arrow, J.R. Hicks, Gerald Debreu, Lawrence L. Klein, Robert Solow and Paul Anthony Samuelson ~~in~~ to Advances to the Economics of Equilibrium.

In chapter five we discuss the contribution of two radical economists, namely Mrs. Robinson and Michio Morishima.

The concluding chapter gives the Summary of the discussion and the conclusion that emerges therefrom.

Notes and References

1. Pen, Jan, Modern Economics, Translated from Dutch by Trevor S. Preston, Harmondsworth, Penguin, 1965 (reprinted), 1972, p.11.

2. Ibid., p.9.

3. Young, P.V., Scientific Social Survey and Research, Prentice Hall of India Private Ltd., 1988, p.148.

Chapter II

ECONOMICS OF INFORMATION AND NON-MARKET-DECISION MAKING

Information theory is a formal mathematical theory, a branch of the theory of probability. As such, the theory is self-contained, it does not require verification by the experiment (Frick, 1959). Cherry Colin (1957), On Human Communication (1961), has charted the development of the theory of information within the field of communication. Information is measured in terms of what actually is communicated under a defined set of circumstances rather than in terms of what actually is communicated at a particular moment.[1] Recently information theory has been applied to Economics and a new branch of Economics has been developed and known as "Economics of Information". The chief contributors in this field are G.J. Stigler (1961); R.A. Jenner (1966); A. Rees (1966); G. Tullock (1966), H. Demset (1969) and others.

Let us now define the new branch of knowledge - the Economics of Information. It deals with the processes by which information is produced, diffused, stored and is used. Stigler wrote : "One should hardly have to tell academicians that information is a valuable resource : Knowledge is power. And yet it occupies a slum dwelling in the town of economics. Mostly it is ignored : the best technology is assumed to be known; the relationship of commodities to consumer preference is a datum. And one of the information producing industries advertising is treated with a hostility that economists normally reserve for tariffs or monopolists."[2]

Economics of Information recognises that an economic system is activated by decisions which link information flows to objectives. This new branch of Economics has further contributed in analysing consumer behaviour, Engel (1967), research and development, employment and monetary theory (Shackle, 1965),

national economic planning (Grossvud, 1968), economic development (Kunkel, 1970) and welfare economics. It has provided new tools to study some unsolved problems of economics such as oligopoly behaviour and inter-temporal welfare comparisons.

To analyse non-market decision-making it is necessary to define the term 'market' and the term 'decision'. A market can be defined as a situation where demanders and suppliers are in contact with each other. A market needs not to be a building (like the stock exchange) or the traditional saturday morning market.[3] Decision-making as defined by Encyclopedia of the Social Sciences "is a social process that selects a problem for decision and produces a limited number of alternatives, from among which a particular alternative is selected for implementation and execution.[4]

The origin of decision-making in Economics has its beginning in the eighteenth century work of mathematical economists, Bernouli (1738). More attention was directed to economic decisions under uncertainty by Fisher (1906), Hicks (1936) and Hart (1940).[5] Modern contribution in decision-making process in Economics are available in the works of Von Neumann and Morgenstern (1944), "Theories of Games", Herbert A. Simon (1947), Milton Friedman (1948) and others.

A few of the contemporary economists of the twentieth century such as Buchanan, Becker, Coase, Demsetz, Posner, Simon and others have been of the view that Economics can be to some extent studied by non-market decision-making. For example, Coase's two articles, "The Nature of the Firm" (1937)

and "The Problem of Social Cost" (1960); Demsetz's brilliant paper "Towards a Theory of Property Right" (1967); James Buchanan "Public Choice Theory"; and Herbert A. Simon's Administrative Behaviour (1947), Public Administration (1950), Organisations (1958) are the studies of the Economics of the Non-Market Decision-Making.

In this chapter, we propose to discuss the contribution of three economists, namely, George J. Stigler, James Buchanan and Herbert A. Simon who have made pioneering contribution in this field.

CEORGE J. STIGLER

Life Sketch

George J. Stigler was born in Renton, Washington in 1911. He took his Bachelor's degree from the University of Washington in 1931, his Master's degree from North-Western University in 1932.[6] He received his Doctoral degree from the University of Chicago under the supervision of Prof. Frank Knight. He became a Professor at Brown University in 1946. He served as President of the American Economic Association and the History of Economic Society in 1977. He also received honorary degree from five American and European Universities. He was rightly honoured with Nobel Prize in Economics in 1982 for his research on the working of industry and the role of the government regulation in the economy. He also made pioneering studies in the industrial organisation, price theory, the functioning of markets and the causes and effects

of price regulation.

His Works

Stigler's main publications are Production and Distribution Theories (1941), Roofs or Ceilings (1946), The Theory of Price (1946), Capital and the Rate of Return in Manufacturing Industries (1963), The Intellectual and the Market Price (1963), Essays in the History of Economics (1965), The Organisation of Industry (1966), The Citizen and the State (1975), The Economist as Preacher (1982), The Behaviour of Industrial Peace (1968) co-author with J.K. Kindah.

His Contribution

Price Variation

Stigler contributes Price Variation and Advertising aspects of the Economics of Information.

The most important contribution of Stigler in Economics thought is a new branch of Economics which is popularly known as "Economics of Information". He said that a number of problems in Economics are neglected because of ignorance of knowledge. He systematically analysed one important problem of information - the ascertainment of market price. Price variation is a common phenomena in different markets. It is difficult for one individual to know all the prices which various sellers or buyers quote at any given time in the market. It can be possible only in a completely centralised market. Even for homogeneous

goods price dispersion is ubiquitous, of course, ignorance in the market is due to price dispersion. If we include the terms of sale within the concept of the commodity, then it is practically impossible to have absolute homogeneity in the commodity; under such circumstances dispersion is a biased of ignorance. It is a wrong notion to accept that all dispersion is due to heterogeneity. The prices quoted by sellers will be a frequency distribution of any time. If any buyer needs a particular commodity from the first seller then he has to pay whatever price is asked for by the seller. But if the dispersion of price quotations of sellers is at all large, it will pay, on average, to canvass several sellers. Economists have not thoroughly studied the frequency distribution of asking and offering prices in order to support any hypothesis as to their nature.

Let us analyse the fact that if 'sellers' asking prices are represented by 'P' which are uniformly distributed between zero and one, it can be mathematically explained as follows :

1. The distribution of minimum prices with n search is

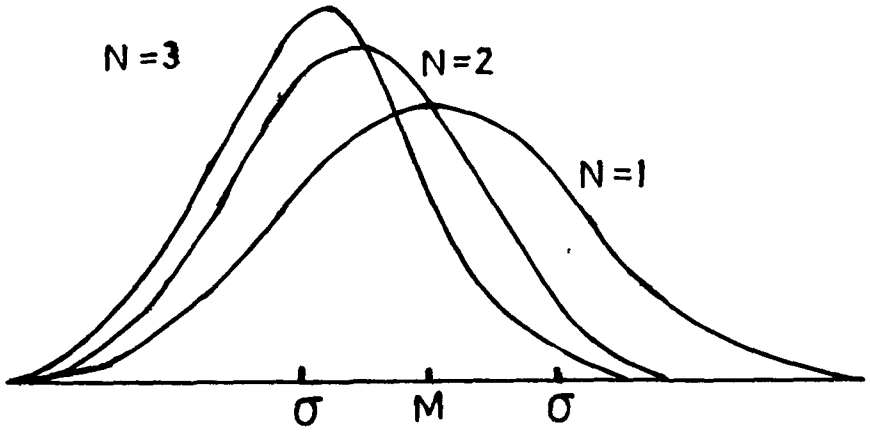
$$n(1-P)^{n-1} \qquad (1)$$

2. The average minimum price is

$$\frac{1}{n+1} \text{ , and}$$

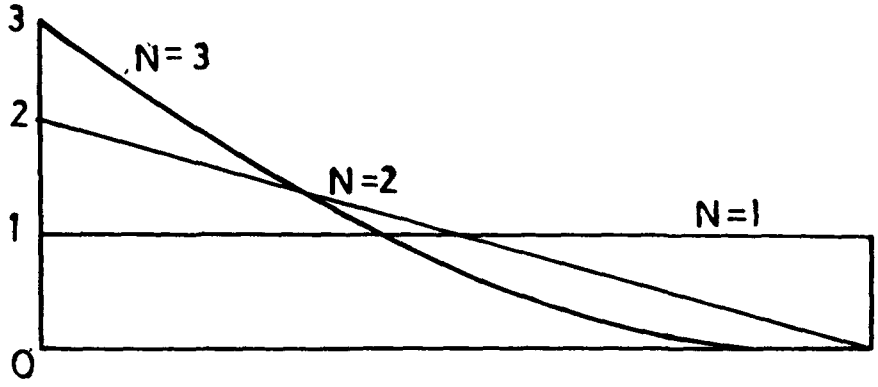
3. The variance of the average minimum price is

$$\frac{n}{(n+1)^2 (n+2)}$$



(a) NORMAL DISTRIBUTION OF PRICES

NO. OF SEARCHES



(b) UNIFORM DISTRIBUTION OF PRICES

Whatever the precise distribution of prices, it is certain that increased search will yield diminishing returns as measured by the expected return in the minimum asking price. This is obviously true of the rectangular distribution with an expected minimum of $\frac{1}{(n+1)}$ with $\underline{n}$ searches, and also of the normal distributions.

In fact, if a distribution of asking prices did not display this property, it would be an unstable distribution for reasons that will soon be apparent.

For any buyer the expected savings from an additional unit of search will be approximately the quantity, $\underline{q}$, he wishes to purchase times the expected reduction in price as a result of the search,[7] or

$$q \left[\frac{\partial P_{min}}{\partial n}\right] \tag{2}$$

If price dispersion are greater than in such conditions the expected savings from given search will be greater. The saving will be high if expenditure on the commodity is greater. For a consumer, the cost of search is equivalent to the number of sellers approached. There is no equal identity for the cost of search for all consumers taken as a whole. For the high income brackets, time is more valuable excluding differences in tastes. The optimum amount of search can be easily found out if the cost of search is equated to its expected marginal return. Like buyers, sellers can also be engaged in search for unique items. This is empirically an unimportant case. In this case, optimum amount of search can be calculated by equating marginal cost of search to the expected increase in receipts which is strictly parallel to the analysis for buyers. So

far as the unique goods are taken into consideration, the efficiency of personal search both for buyers and sellers is extremely low. Because of high costs of search often transactions are used as a device for identifying potential buyers and sellers.

Advertising

Advertising identifies buyers and sellers and reduces the cost of search. But advertising has its own drawbacks, that is, it is expensive in nature. Specialized traders also provide implicity a meeting place of potential buyers and sellers. Let us take into account dealer markets which are competitive, where there is a substantial centralization of trade activity, in such cases each dealer faces a distribution of buyers' bid and can change his selling prices with a corresponding effect upon purchases. There is even discrimination in each individual transaction so far as the markets for divisible goods are concerned. Under such circumstances the buyer has a maximum price given by the lowest price he encounters among the dealers he has searched, but no maximum price. Every dealer fixes a selling price which is represented by 'P' and makes sales to all those buyers who consider it the minimum price. Asking prices by dealers are uniformly distributed, the number of buyers of a total of Nb possible buyers who will purchase from him is

$$N_i = KNb^n \ (1-P)^{n-1} \qquad (3)$$

Where K is a constant. The number of buyers from a dealer increases.

as his price is reduced, and at an increasing rate. Moreover, with the uniform distribution of asking prices, the number of buyers increases with increased search if the price is below the reciprocal of the amount of search.[8]

Inexperienced buyers pay higher prices in market in comparison to experienced buyers. Because the former lacks sufficient knowledge of market as compared to the latter. In a new market, a buyer is unable to find out the dispersion of prices, so he has to make a number of search; but, in general, one approaches a market with some general knowledge of the amount of dispersion for dispersion itself is a function of the average amount of search, and this in turn is a function of the value of the commodity.

The number of possible searches may be as follows :

1. The larger the fraction of the buyer's expenditure on the commodity, the greater the savings from search and hence the greater amount of search.

2. The larger the fraction of repetitive (experienced) buyers in the market, the greater the effective amount of search (with positive correlation of successive prices).

3. The larger the fraction of repetitive sellers, the higher the correlation between successive prices, and hence, by condition (2), the larger the amount of accumulated search.

4. The cost of search will be larger, the larger the geographical size of the market.[9]

The sources of dispersion of prices are numerous. If there is instability of supply and demand conditions in the market, the dispersion of prices will be very high. Even experienced buyers and sellers are unable to find out proper information in the market because of new entrance of buyers and sellers in the market. Stigler has pointed out that when the size of market increases, the cost of information will be high. Under such circumstances, there will be a set of firms whose function will be to collect and sell market information.

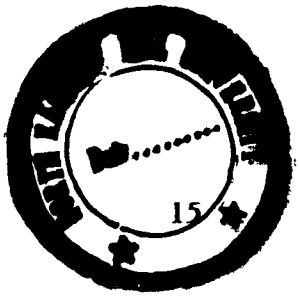
Advertising is an important media through which information is provided to genuine buyers and sellers. The buyers make extensive searches if the flow of information is higher. The use of entertainment to attract buyers to information is a comprehensive phenomenon. When information is supplied in an enjoyable manner, people are willing to pay more for the information.

Stigler explained with the help of mathematical formulae that a monopolist advertises in order to make his profits.

$$\Pi = Npq\lambda - (N\lambda q) - ap_a,$$

Where $P = f(q)$ is the demand curve of the individual buyer, $\varphi(Nq)$ is production costs and ap_a is advetising expenditures. The maximum profits conditions are enumerated as follows :

$$\frac{\partial \Pi}{\partial q} = N\left(P + q\frac{\partial p}{\partial q}\right) - \varphi' N = 0 \qquad (1)$$



and

$$\frac{\partial \Pi}{\partial a} = Npq \frac{\partial \lambda}{\partial a} - \phi' Nq \frac{\partial \lambda}{\partial a} - P_a = 0 \qquad (2)$$

Equation (1) as stated above explains the usual marginal-cost-marginal revenue equality, and equation (2) states the equality of (Price-marginal cost) with the marginal cost

$$\left[\frac{P_a}{Nq} \left(\frac{\partial \lambda}{\partial a} \text{ --} \right) \right]$$

of adverising. Let us again explain a simple version of advertisement by a competitive firm. Let us make the assumption that all firms are identical and all buyers have same demand curves and their search are equivalent. We get profit maximization equation :

$$\text{Marginal cost curve} = P \left(1 + \frac{1}{\eta_{qp} + \eta_{kp}}\right), \qquad (3)$$

η_{qp} represents the elasticity of buyer's demand curve and η_{kp} represents the elasticity of the fraction of buyers purchasing from the seller with respect to his price. The latter elasticity is equivalent to the number of search made by a buyer. If asking prices are uniformly distributed, increased search will lead to increased advertisement by low-price sellers and reduced advertising by high price sellers. If the number of firms increases the amount of advertisement decreases. But this argument of Stigler is not applicable everywhere in the complex world of today. Price differences often diminish if the advertise-

ment is very large on the part of sellers. But we do not find equality of prices or no price variation because advertisement does not reach all potential buyers within a fixed time. To provide cent percent information to buyers of all consumption items is a tedious task, it is absolutely impossible.

It may now be concluded that Information Economics is an important branch of Economics which can rationalise our resources and prevent wastage of time. Accurate information makes it possible to create sufficient demand for goods and services which are daily produced in the economy. But the search of information is a complex problem. Hence care should be taken to get accurate information both from the producers and consumers. Better quality of goods commands more reputation which in turn commands a price and economises the number of search. We can avoid ignorance of knowledge of price variation to some degree but it is not possible absolutely to do so in the economic theory of market.

JAMES BUCHANAN

Life Sketch

James Buchanan was born in Murfresboro, Tennessee in 1919. He took his Bachelor's degree from the University of Middle Tennessee in 1940. He received his Master's degree from the University of Tennessee in 1941. He got his Doctorate degree from the University of Chicago in 1948. In 1956, he became a Professor of Economics and Director of the Thomas Jefferson

Centre of Political Economy at the University of Virginia.

His Works

Buchanan main publications are : The Calculus of Consent : Logical Foundations of Constitutional Democracy (1962), Public Finance in a Democratic Process (1966), The Demand and Supply of Public Goods (1968), Cost and Choice (1969), Theory of Public Choice : Political Applications of Economics (1972), The Limits of Liberty (1975), Freedom in Constitutional Contract (1977), Democracy in Deficits : The Political Legacy of Lord Keynes (1977) with R.E. Wagher, and The Power to Tax (1980) with G. Brennan.[10]

His Contribution

Buchanan is the founder of 'Public Choice Theory' in the economic study of non-market decision-making. In other words, he attempts to complete the theory of market exchange with a corresponding theory of the functioning of political markets.

According to him, individuals, separately and in groups, make decisions concerning the use of economic resources. They do so in at least two capacities: first, as purchasers (or sellers) of goods and services in organised markets, and secondly, as 'purchasers' (or 'sellers') of goods and services through organised political processes.[11] He gives us the term 'public goods' which he defines, as those goods which are provided by 'collective organisation'. Decisions are

assumed to be made on the preferèd quantities of public services one at a time; and the costs of each service are assumed to be measured in one tax. Historically, legislative bodies through which the preferences of the individual citizens are most directly represented, have exercised more control over revenue or tax decisions that they have over expenditure decisions. Surprisingly, little recognition has been given, in the final analysis, so far as the 'costs' of those public goods and services are concerned which provide benefit to the same people who pay taxes.

We should try to make as much sense as is possible out of collective choice processes in democratic political organisation. Whether or not suitable models can be developed, we know directly or indirectly that individual do participate in fiscal choice. They make decisions, they elect representatives who make promises on fiscal matters; they occasionally vote in referenda; they support one political party or another; they join pressure groups; they write speeches; they write books; they talk to their neighbours. If this is acknowledged then the influence of institutions on their behaviour can scarcely be defined. Different institutions will tend to produce differing patterns of response.[12] It is widely recognised that even in day-to-day market choices, the individuals may not be in command of anything approaching complete knowledge about the alternatives that he faces. There are serveral reasons for this ignorance. First of all, given the fact that securing information is costly, the optimal degree of investment in search may produce results that fall for short of genuine omniscience. Secondly, choice may be such that uncertainly cannot be eliminated

under maximum investment in information gathering. Thirdly, the individual may operate under all illusion that he is more informed than he actually is; it may be wholly impossible, for the external observer of individual choice behaviour to make distinctions between several situations. If any one of them, the rationally motivated behaviour of the individual may produce results that are not desired or intended.

Buchanan has not difficulty in showing that the growth of government activity in recent years has departed widely from his 'optimal' constitution and his writings, therefore, abound in suggestions for additional constitutional constraints on government and its multifarious agencies. Indeed, he has called for a 'constitutional revolution' to reassess the entire spectrum of constitutional rights of individuals.

In conclusion, it may be said that Buchanan's contribution to economic theory has its own significance so far as public choice theory is concerned. The decision-making process for the use of public goods and services should be based on democratic process. Individuals are likely to make wrong investment-decisions in public goods because of costly information and uncertainty. Hence, it is necessary for any type of economic system to make decision on the investment in public goods by duly elected and represented government.

HERBERT A. SIMON

Life Sketch

Herbert A. Simon was born in 1916 in Milwaukee, Minnesota. He received his B.A. in 1936 from the University of Chicago. After submitting dissertation on Decision-Making in Organization, Simon obtained his Ph.D. degree in Political Science from the University of Chicago in 1943. That dissertation with modifications and additions was published in 1947, under the title Administrative Behaviour; a study of decision making process in administrative organization. He got his Professorship in Political Science in 1947 from Illinois Institute of Technology. He received a number of honorary degree from various universities of the world. He was honoured with Nobel Prize in Economics in 1978 for his life times study of administrative behaviour and decision-making in large organisation. The Nobel Committee acknowledged that "modern business, economics and administrative research are largely based on Simon's ideas". The Swedish Academy of Social Sciences described Simon as "one of the greatest of inter-disciplinary researchers".

His Works

Simon's main publications are Administrative Behaviour (1947), Public Administration, Models of Man (1956), Organisations (1958), New Sciences of Management Decisions (1960); The Shape of Automation of Man and Management (1965), The Sciences of Artificial (1969), Models of Discovery (1977), Models

of Bounded Rationality and Other Topics in Economic Theory (1982).[13]

His Contribution

Administrative Behaviour

According to the Neo-Classical Theory of the Firm, the assumption is that the main objective of a firm is maximisation of profit. But Simon puts forward the argument that in a complex world of today, businessmen are unable to get sufficient information to make decisions that maximise profits. They merely seek to reach satisfactory targets in their decision-making process. Simon's interest in decision-making has also led him into the fields of Political Science as well as into Psychology and Computer Sciences.

In Simon's masterpiece Administrative Behaviour he attacked the usefulness of existing administrative theory in public administration and other organisations such as commercial industrial, military and private non-profit organisation. His main motive was to conduct a set of tools, a set of concepts, and a vocabulary suitable for describing an organisation and the way an administrative organisation works. In administrative organisation we study the decision-making processes of the executives. At present greater attention has been paid to the functioning of our society's organisations. Its large corporations and Governments organisation theory is utmost important to administrators, executives and behavioural scientists. Professor Simon explicity discusses the nature of organisation, of the administrative process, of the nature of decisions, and the

elements of value and fact entering into decisions. To achieve either some objectives or goals, the individual behaviour within the administrative organisation is taken into account. It helps us to bring an integration in the pattern of behaviour. The role of administration will be valueless in the absence of the integration of individual behaviour of the employees. Decision leads to the selection of final goods. Through the medium of organization, loyalty, efficiency criterion and training also influence in the decision whenever the same elements are involved in large number of decisions. Training may supply the trainee with the facts necessary in dealing with these decisions. It may provide him a sort of reference for his constructive thinking. It may teach him 'approved solutions, or it may indoctrinode him with the values in terms of which his decisions are to be made.[14] In a business organisation we find three types of participants - entrepreneurs, employees and customers. Bernard insisted that customers are an integral part of the system of organisation of behaviour. Entrepreneurs decisions are ultimately control the activities of the employees. Employees contribute their time and efforts to the organisation.

Administrative Principles

According to Simon, there are four accepted administrative principles: 1) administrative efficiency is increased by a specialization of the task among the group; 2) administrative efficiency is increased by arranging the members of the group in a determinate hierarchy of authority, 3) administrative efficiency is increased by limiting the span of control at any point in the hierarchy to

a small number; 4) administrative efficiency is increased by grouping the workers, for the purpose of control according to a) purpose, b) process, c) clinentele or d) place.[15] So far as administrative efficiency is concerned, administrative efficiency is increased by a specialization of the task among the group in the direction that will lead to greater efficiency. It also increases by arranging the members of the organisation in a determinate hierarchy of authority in order to preserve 'unity of demand'. Administrative efficiency is enhanced by keeping at a minimum the number of organisational levels through which a matter must pass before it is acted upon. Good administration is that which attempts rationally to maximise the attainment of certain ends with the use of scarce means. Administrative theory must be interested in the factors that will determine with what skills, values and knowledge the organisation member undertakes his work. Every decision involves two elements viz. i) factual and ii) value. In principle, factual propositions may be tested to determine whether they are true or false, whether what they say about the world actually occurs, or whether it does not.[6] But in reality decisions are more than factual propositions because they have an ethical as well as a factual content. We can derive factual propositions from ethical ones by any process of reasoning. It is also not possible to compare ethical propositions from facts. As a result of this there is no tool to test rationally or empirically the correctness of ethical propositions. Judgement plays an important role in decision-making process. Value judgement has been more fully explored by administrative discretion. There are two types of management - public and private management. In the former,

final responsibility for determining objectives rests with legislative body. In the latter it rests with the Board of Directors, and ultimately with the stock-holders.

So far as rationality in administrative behaviour is concerned, the administrator should select the effective means. Rationality behaviour also involves a listing of the consequences in their order of preference, and the choice of the strategy which corresponds to the alternative highest on the list.

Rationality

Rationality deals with the selection of referred behaviour alternatives in terms of some system of values whereby the consequences of behaviour can be evaluated. Knowledge is the means by which all the possible consequences of a behaviour will follow. The ultimate aim of knowledge is to discover a single unique possibility which is consequent of each behaviour alternative. Knowledge about the consequences of behaviour is thus identified as a primary influence on choice. The second influence is found to lie in the preferences of the behaving individual for one set of consequences as compared with others. The problem of choice is one of describing consequences, evaluating them, and connecting them with behaviour alternatives. Means and ends are not always related to facts and values but still there is some relationship between the two sets of terms. A means-end chain was defined as a series of causally related elements ranging from behaviour to the values consequent on them.

An individual cannot reach a high degree of rationality because of a large number of alternatives. Rationality implies a complete, and unattainable, knowledge of the exact consequences of each choice. Generally organisation behaviour is oriented towards the organisation objective. But sometimes organisation objective changes in response to the influence of those for whom the accomplishment of that objective secure personal values.

We shall now discuss how the role of authority influence in the decision-making process. There are two aspects of influence viz. external and internal. Let us assume that decision is a set of premises - value premises and factual premises. In case of individual decision over a particular course of action, some of the premises upon which this decision is based may have been imposed upon him by the excise of the organisation's authority over him, some may have been the result of his training, others of his desire for efficiency, still others of his organisational loyalty, and so forth.[17]

There is unity and coordination of behaviour so far as behaviour of organised human groups is concerned. Floyd H. Allport terms it 'group mind' in his book Institutional Behaviour. In the complex form or organisation, individual set himself a general rule which permits the communicated decision of another to guide his own choices without deliberation on his own part on the expediency of those premises.

Simon defines authority as 'the power to make decisions which guide the actions of another', the exercise of authority in a group makes possible

a large degree of separation of the decision making processes from actual performance or what might be called vertical specialization in decision-making. Simon mentioned three important functions of an authority viz., i) it enforces responsibility of the individual to those who wield the authority; ii) it secures expertise in the making of decisions and iii) it permits coordination of activity. Four methods are generally use to prevent conflicts in authority. They are (a) An individual may receive orders from several superiors, but in case of a conflict there is one and only one whom he is supposed to obey; (b) In case of conflicts an individual should obey the orders of only one authority; (c) Division of authority each unit in the organisation is assigned some specified area over which it has exclusive authority, and the decisional premises of any individual that fall within this area are subject to that authority; (d) A system of rank an individual is subject to the authority of all often individuals of a certain rank. If he receives conflicting orders, he follows the last one received, but is bound to bring the conflict to the attention of the person issuing the order.[18]

There are two types of organisation - formal and non-formal. The schemes of formal organisation itself prescribes the lines of authority and division of work that shall be followed in carrying-out the work of the organisation. The informal organisation implies the interpersonal relationship in the organisation that affect decisions within it but either are omitted from formal scheme or not consistent within that scheme.

Communication

Communication plays a vital role in decision-making process. It can be defined as any process whereby decisional premises are transmitted from one member of an organisation to another. There will be no organisation without communication. It has dual function (i) transmitted to a decisional centre, (ii) from decisional centre to other parts of the organisation. There are two types of communication, viz. formal and non-formal. Media of formal communication are (i) Oral communication takes place between individuals and their immediate superiors or subordinates; (ii) · Memoranda and letters; (iii) Paper flow, (iv) Records and Reports, and (v) Manuals. Informal communications is built around the social relationships of the members of the organization. Individuals may, develop this system as a means of increasing their own power and influence in the organisation. Training provides as a means for communicating decisional premises to organisation members.

Training is applicable to the process of decision wherever the same elements are involved in a large number of decisions. It provides a higher degree of decentralisation of the decision-making process by bringing the necessary competence into the very lowest levels of the organisational hierarchy.

A person identifies himself with a group when, in making a decision, he evaluates the several alternatives of choice in terms of their consequences for the specified group. Identification is an important mechanism for constructing the environment of decision.

The psychological base of identification involves at least three elements: i) personal interest in institutional success, ii) a transfer of public agencies of a private management philosophy and iii) limitations upon the area of attention which prevent more than a restricted sphere of values from coming within its purview. New techniques must be developed and improved for measuring the success of particular administrative arrangements.

Simon's ideas have greatly influenced teaching methods in business schools. He along with Allen Newell of the Rand Corporation, decided that the right way to solve administrative decisions problem was to stimulate it with computer programme. He has developed computer, programmes that could solve problems in a humanoid fashion. These experiments are called "artificial intelligence." As a result of his investigation in artificial simulation of human thought processes, his work fell primarily within the academic disciplines of psychology and computer science.

In the words of Professor Mark Blaug "psychologist regard him (Simon) as a psychologist, computer scientists regard him as a computer scientist, and economists regard him as an economist. To call him a 'social scientist' is no less than he deserves, he is a living denial of the proposition that there is no alternative to intellectual specialization."

In the end, we may say that Simon's contribution to the contemporary economic theory is a master-piece. Decision-making process is not a single

variable but a set of variables like authority, rationality, efficiency, communication, coordination, etc. It is equally inevitable in any economic system whether it is a capitalist or socialist or mixed or an under-developed economy, to maximise production and minimize cost, inefficiency, wastage of resources and time; there should be democratic process, proper and correct decision-making. However, decision in administrative department should not be taken haphazardly to avoid evil consequences.

In the preceding pages we have discussed the contribution of three economists - George J. Stigler, James Buchanan and Simon A. Herbert in the context of economics of information and non-market decision making. It is a growing branch of knowledge which must draw the attention of all students of economics. Information and non-marketing decision-making must, therefore, be included as an additional variable in production function and price behaviour in all types of economic activities.

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Chapter III

ECONOMICS OF DISEQUILIBRIUM

In this chapter we are mainly concerned with the Economics of Disequilibrium. Recently, many economists have switched over to the theory of disequilibrium as against the erstwhile equilibrium analysis. Disequilibrium is the state of a system in which equilibrium has not been attained. The opposing forces which act on the system are not in balance, so there is a tendency for at least some of its endogenous variables to change over time. Disequilibrium is usually associated with the mutual inconsistency of the plans of economic decision-takers so that at least some of these plans are not realized and are eventually revised. For example, a market will be in disequilibrium if the total quantity which buyers plan to buy at the ruling prices exceeds the quantity which sellers plan to sell. In the event some buyers will not be able to realise their plans, prices will be bid up, and all sellers and buyers will revise their plans accordingly. A question of great interest for all economic systems is whether characteristics of the system are such that process of plan revision will lead towards or away from an equilibrium, and this is the subject matter of stability analysis. Where the disequilibrium adjustment process leads towards an equilibrium, the system is called stable, while the term unstable is applied to the converse case. The nature of disequilibrium phenomena can be understood by quoting Janos Kornai "the disproportional dominating the investment market is the kernel, the starting point of a broad group of phenomena : the general disequilibrium between demand and supply".[1] Shortage phenomenon in German literature is called 'Mangel-wirtschaft' which means shortage economy or disequilibrium. Traditional price theory and equilibrium theory simply call it excess demand others use the expression 'sellers market' emphasising that in this case of disequilibrium the seller dominates the market and the buyer is at his mercy.

In this chapter we will include the contribution of five distinguished economists, namely Robert Wayne Clower, Axel Leijonhufvud, George Shackle Janos Kornai and Georgescu-Roegen.

Clower managed to account for Keynes' "unemployment equilibrium" by introducing a new concept of "dual hypothesis". He also introduced a new concept, namely 'notional demand' and reintroduced 'effective demand'. The concept of effective demand was popularised by Keynes. Leijonhufvud does not accept the idea that Keynesian economics is an 'equilibrium economics'. He argued that the whole Keynesian economics should belong to disequilibrium economics. Shackle's contribution is also included in the category of disequilibrium. Janos Kornai criticised Walras's 'General Equilibrium Theory', Georgescu-Roegen introduced a new concept of 'Bio-economics'. In the following pages we will discuss each of the above concepts in detail.

ROBERT WAYNE CLOWER

Life Sketch

Born in Pullman, Washington (USA) in 1926, Robert Wayne Clower took his Bacherlor's degree in 1948 and his Master's degree in 1949 from Washington State University. He obtained his Doctorate from the University of Oxford in 1978. He taught at the Universities of North-Western, California and Los Angeles. He too taught at the various reputed Universities of the World -

Australia, Canada and Italy.

His Works

Clower's main works include : Introduction to Mathematical Economics (1957), Growth Without Development (1966), Monetary Theory (1969), Microeconomics (1972).

His Contribution

Orthodox View

Recently, one of the most important papers published in Microeconomics is Robert Wayne Clower's essay - The Keynesian Counter Revolution. There is unemployment in Labour markets, but he is successful to provide the first convincing Microeconomics explanation of how equilibrium is achieved in Keynesian model. It is a well-known fact that orthodox economics provided a general theory of equilibrium state - that is, an adequate account of the factors determining equilibrium prices and equilibrium transaction plan in a market economy. Moreover, the same analysis may be said to provide the beginning of a theory of disequilibrium prices and disequilibrium transaction plan. Clearly, however, orthodox analysis does not provide a general theory of disequilibrium state. First, because it yields no direct information about the magnitude of realized transactions as distinct from planned transactions under disequilibrium conditions. Second, it tacitly assumes that the forces tending at any instant to change prevailing market prices are independent of realised transactions

at the same moment. Before detailed discussion of the area, let us first define the two terms 'equilibrium' and 'disequilibrium' in Robert Clower's own language.

Equilibrium and Disequilibrium

The word 'equilibrium' in its usual sense means an 'absence of motion'. A market is in equilibrium if and only if market price and quantity traded are stationary over time.[2] The economy may be said to be in a state of disequilibrium if prevailing prices are such that demand differs from supply in any market. This means that individual trading plans, taken as a whole, are mutually inconsistent which in turn, means that at least some individual plans cannot be carried into effect at prevailing market prices. In these circumstances, it is plausible to suppose that prevailing prices tend to vary over time - rising in market where demand exceeds supply, falling in market where supply exceeds demand.[3]

Notional and Effective Demand

Robert Clower introduced two types of demand namely 'Notional Demand and 'Effective Demand'. The former is the demand of households at full employment equilibrium prices. Some households will reduce their consumption expenditure if the economic system does not reach full employment equilibrium. It is due to the fact that their actual incomes have fallen below the notional incomes. The latter functions are those which take into account the constraints.

When there is considerable unemployment, the excess supply of labour

at the going real wage rate is not marched by an equivalent excess effective demand for goods and services because some 'notional' excess demand has been eliminated by the reallocation of expenditure reflecting the constraint of reduced incomes. Those deviations from full employment equilibrium are spread throughout all markets via the multiplier process. Producers now will receive the wrong price signals, which will not necessarily induce the adjustment that leads to full employment equilibrium. The labour market would be cleared if money wages were reduced but such wage reductions are not communicated to employers as an increase in effective demand for output. In consequences, labour markets are cleared by adjusting employment to unchanged wages instead of wages being adjusted to unchanged employment level.[4]

In a nutshell, economic adjustments depend more on income instead of relative prices. It is due to the fact that all exchange is regarded as disequilibrium exchange at 'false prices'. According to pre-Keynesian concept there is automatic adjustment of prices to clear markets. If we eliminate this automatic mechanism from price behaviour there will be either shortages or surpluses in all markets and less than full employment.

It can be concluded that Clower gives a new terminology to Keynes' 'Unemployment Equilibrium' by introducing the concept of the 'dual-decision hypothesis'. But many economists do not accept Clower's view. Whatever the reality may be on this question, we find a lot of changes in the field of macroeconomics since the publication of his essay. But some of the contem-

porary economists like Leijonhufvud and Okun have adopted the notion of 'dual decision hypothesis' as the micro-foundations of a Keynesian type of macro-economics. Clower's contribution is largely theoretical in nature.

AXEL LEIJONHUFVUD

Life Sketch

Axel Leijonhufvud was born in Stockholm (Sweden) in 1933. He earned his first Doctorate degree in 1960 from the University of Lund and he received his second Ph.D. degree from North-Eastern University in 1967. He became Professor of Economics in 1971 at the University of Los Angeles.

His Works

Leijonhufvud best known books are : On Keynesian Economics and the Economics of Keynes (1968) and Information and Coordination : Essays in Macroeconomic Theory (1981).

His Contribution

Leijonhufvud claimed that Keynes' economics is a 'disequilibrium' economics. Keynes assumed a world which is less than perfect information. Further, Keynes did not assume that money wages are inflexible but rather that all prices including wages change only slowly. The basic cause of unemployment in Keynes' opinion is that 'relative prices' are wrong. To generate full

employment, long term bond prices are too low and interest rates are too high.

Keynes' Theory of Interest

Keynes' theory of interest is a theory of short-run interest movement. The theoretical problems with which he was concerned were problems of the short-run, i.e. disequilibrium. Keynes' model was static but his theory was dynamic. The tools of equilibrium analysis must be handled with much circumspection when what is being analysed is not an equilibrium state but an equilibrium process, i.e. a succession of disequilibrium state.[5]

According to Axel Leijonhufvud, Keynes deal with a 'Comparative Statics' period analysis. His employment of a static apparatus has frequently been criticised, but the critique has often suffered from a confusion of the method and substance of the General Theory. The subject of his work is not "Unemployment Equilibrium" but the nature of the macroeconomic process of adjustment to a disequilibrating disturbance. The method attempts to analyse this continuous process with the tools of static equilibrium theory. The device which makes such a method possible involves the conceptual partitioning of the continuous adjustment process into discrete stages or periods. This device was not Keynes' invention. Marshall had made much use of it, and in this aspect of his method, as in many aspects, Keynes was very Marshallian. But Keynes differed substantively from Marshall as well as from other price theorists in the use he made of his device.

Prices

Leijonhufvud argued that in general equilibrium flow models, prices are only endogenous variables. It is these variables which enter into the demand and supply functions of individual households. Tastes and initial resource endowments are parametric. Similarly, if prices are not "perfectly flexible" - that is, if they do not adjust instantly and fully before any trade takes place - transactions will be concluded at disequilibrium prices. In Keynesia disquilibrium generally households are to some extent constrained by their inability to sell what they want at the prices of the moment. Firms like households are not always dependent solely on current revenues in order to finance current purchases. A firm's willingness and ability to utilise other sources of funds at a particular position. Since these are variables, the short-run reaction functions of producers will usually shift over time.

Information Costs

Further, the analysis of individual trader in a disequilibrium situation can be advanced by bringing in information costs explicitly. It is sometimes maintained that the competitive firm's information problem is simpler than that of the monopolist. The competitive seller needs to know only his cost function and the market price of his product in order to maximise profits.The monopolist, it is argued, needs information on his entire demand function. This argument can be examined with the help of disequilibrium situation. In disequilibrium, it is hard to see how it can be argued that sellers in 'atomistic markets'

have simpler information problems than the monopolist. Since the monopolist makes the market, the actual outcomes of all trading constitute information automatically available to him. He does not need to find out what a multitude of other sellers are doing, if there are multiple prices in the market at any time, it is because he, the monopolist, is discriminating; he does not have to devote resources to finding out where and by whom what price is paid. When the atomistic market is in disequilibrium, the individual seller can no longer regard price as "parametric" he must attempt to form an estimate of how 'industry demand' is developing in order to formulate a rational pricing policy. Changes in his own rate of sales give the atomistic seller less accurate indications of the relevant 'demand changes' than in the monopolist's case, since multiple price will be changed in the market at any one time. The information which he would need for an optimal pricing policy includes a lot of data, freely available to the monopolist but which he can only acquire at formidable cost.

In the end, it may be said that Leijonhufvud's contribution can be easily included in the new branch of economics - economics of disequilibrium. As a contribution to disequilibrium economics, Leijonhufvud's contribution was great and disequilibrium analysis has ever since become a part and parcel of modern economic theories.

GEORGE SHACKLE

Life Sketch

Born in Cambridge in 1903 and educated at the University of London, George Shackle became Professor of Economics in 1951 at the University of Liverpool, where he remained until his retirement in 1969.

His Works

Shackle's best known publications are : Expectations, Investment and Income (1938); Expectation in Economics (1949); Decision, Order and Time in Human Affairs (1961); The Years of High Theory : Invention and Tradition in Economic Thought, 1926-1939 (1967); and Epistemics and Economics : A Critique of Economic Doctrines (1972).

His Contribution

George Shackle's reputation mainly rests on his writing about 'Uncertainty' 'Expectation', 'Unpredictable Future'. His entire career has been devoted in preaching the doctrine that economic activity is ruled by expectations of future events. He argued that "The General Theory" is highly paradoxical. The book in fact uses a partial equilibrium method for a whole system of equilibrium purpose. There is partial equilibrium since something is held constant for the sake of argument which cannot be constant in life. But we would deal only with his two theories of 1) Surprise Function and 2) Investment, Rate of Interest

and Invention for which we have sufficient materials.

Surprise Function

Shackle offered a 'theory of surprise function' as a way out of the dilemma of foresight in the presence of uncertainty. Economic agents do have definite expectations about future events, at least, in the negative sense of being 'surprised' by certain improbable outcomes including the surprise of a totally unexpected event. The surprise function is a special sort of non-probabilistic function of the expected values of future outcomes. Shackle was able to formulate some general propositions about the shape of these surprise functions. However, Shackle's theory of surprise functions was not well received by the rest of the economics profession. Keynes had argued that investment is a volatile and unpredictable variable, precisely because of the unstable expectations of private investors, and this much was generally accepted by macroeconomists.[6]

Investment, Rate of Interest and Inventions

Shackle, in his book Expectations, Investment and Income discussed in detail investment, rate of interest and inventions. Investment is a flow. It is of dimension $\frac{\text{money value}}{\text{Time}}$. The time rate of aggregate investment depends on businessmen's expectations and on the rate of interest. Investment thus defined is the aggregate value of the additions made in a short interval of the immediate past to the separately owned sub-systems making up the economy's general complex of equipment. Each of these additions is what is left after

substracting, from the whole value of items which have newly come into possession of an enterprise by production or purchase during the short interval which has just elapsed, the value of those destroyed by acts of production or parted with by sale during this interval, both these valuations being made by the owner of the enterprise in the light of any new knowledge which may have come to him during the interval.[7]

It can now be concluded that Shackle has criticised the contribution of other economists on the ground that they have neglected the problem of uncertainty in their writings. His idea is perhaps correct as anything can happen tomorrow in any economy. Recently, in many economic systems of the world particularly communist blocks consisting of East Germany, Romania, U.S.S.R. and even China, the people are prepared for a change into democratic freedom with multi-party system of government. But it is difficult to accept his argument that the whole of economic literature which does not include the component of 'uncertainty' is invalid in modern world. However, his elements of 'uncertainty' and 'expectation' can be included as an additional variable for understanding and solving modern economic theory.

JANOS KORNAI

Life Sketch

Born in 1928 in Budapest, Hungary, Janos Kornai entered the Hungarian Academy of Science and received his first degree in Science in 1956. He

switched over to Economics, took his Doctorate degree from Karl Marx University in 1961. In the year 1966, he acquired another Doctorate degree in Science from the Hungarian Academy of Science.

His Works

Kornai's publications include : Over-Centralization of Economics (1959); Mathematical Planning of Structural Decisions (1967); Anti-Equilibrium (1975); The Economics of Shortage (1980) and Growth, Shortage and Efficiency (1982).

His Contribution

General Equilibrium Theory

According to Kornai, upto the present, Economics has produced only a single theory describing the operation of the economy from a system of theoretical point of view. This conceptual framework, typically expounded in formal mathematical models, is called 'General Equilibrium theory' and derived from the teaching of Walras. In order to avoid misunderstanding among readers, Kornai always refers to the Walras School. He does not refer to the theories dealing with problems of budgetary equilibrium or balance of payments equilibrium.

The 'General Equilibrium' theory claims to offer an explanation of reality. But it does not insist on verification. The theory is unrealistic because in order to regard a 'theory', it should possess a dual definition : 1) In the logical mathematical sciences, a theory is a theorem or body of theorems logically

deducible from a set of mutually consistent axiom; 2) In the real sciences, a theory is a systematic description of the essential interrelations between the variables of reality. That is, only those theorems and propositions (deduced from the assumptions not in conflict with reality) which describes the real world more or less accurately may be considered acceptable.[8]

Walras's Assumptions

Walras's Theory of General Equilibrium is based on twelve assumptions: 1) It assumes a number of elements in the model to be constant; 2) The economic system consists of a definite number of organisations, their number and set remain unchanged over time; 3) It is based on two types of organisations - producers and consumers; 4) It rests on a finite number of products - their number and set is unchanged over time; 5) The economy operates without either material or monetary inventories and reserves; 6) The set of feasible production is convex. The producer maximizes the difference between total revenue and total expenditure, i.e. his profit; 8) Maximization of consumer utility; 9) The Constancy of production and consumption sets and of preference ordering; 10) Exclusively of price information flows; 11) Anonymity of market relations and 12) Lack of uncertainty.

Kornai assumes that General Equilibrium School has become a brake on the development of economic thought. However, this school has suggested two important and realistic ideas : i) scarce resources should be used economically; ii) production should be adopted to provide greatest satisfaction to

the consumer. As a matter of fact, there is a train of thoughts that these conclusions are derived from the unrealistic vision of the world. In reality, there are mammoth corporations and the role of the government is great. General Equilibrium theory assumed atomized markets and perfect competition. These exists sharp conflicts of interest. But the theory sees peaceful harmony in the market. The latter disregards increasing returns to scale, one of the most significant aspect of technical progress as well as concentration. In addition the information structure is highly intricate and complex. But General Equilibrium describes that the whole system is governed by only one mechanism, i.e. by prices.

The General Equilibrium School is diverting our attention regarding the most important task of economic science, namely, the realistic description, explanation and formal modelling of the actual operation of the socialist and capitalist economic systems of the present era.

Price Information

General Equilibrium theory assumes a uniform price and information structure of the price system in the economy as a whole. But Kornai elucidates six characters of price formation : 1) Actual price, 2) Contract price, 3) Price offer; 4) Price prognosis, 5) Prescribed price and 6) Price Report source.

Let us explain the concepts of each of them in brief :

1) Actual Price : this is the price at which the actual transaction between

buyer and seller, as well as the accompanying money flow takes place.

2) Contract Price : Proceeding backwards in time, this price preceeds the actual price. Sometimes the actual price deviates from the contracted one.

3) Price Offer : This proceeds the contracted price. Offers can be made both by the seller to the buyer and vice-versa and these may undergo several modifications in the course of preparing the contract.

4) Price Prognosis : This may be prepared either by the buyer or seller or by another organisation. Even if it is prepared by the party concerned, the prognosis may differ from the subsequent offer.

5) Prescribed Price : This is an instrument issue (generally in socilaist systems) by the government price authority or (the capitalist system) by a multi-firm cartel to the contracting parties.

6) Price Report : This can be submitted to many kinds of addresses, the price authority, statistical officer, tax-office, economic research institute etc. This too may differ from the actual price, either through inadvertent inaccuracy or through deliberate distortion.[9]

Control Sub-Systems of Information

Kornai explains five control sub-systems of information, viz.:

1) The market : the sub-system directly regulating sales, purchases and transactions involving products;

2) The monetary and credit sub-system;

3) The sub-system of national economic planning;

4) The sub-system of information about technical progress and science, and

5) The sub-system of labour allocation.

Out of the five sub-systems of information, only one type of information is present in the General Equilibrium model, i.e. market. The rest are neglected. As a result of this negligence, General Equilibrium Theory is unacceptable in the real world.

Modern mathematical equilibrium theory never advanced beyond the phenomena of the mid-nineteenth century. The world of Walras is a strictly single level economic system. The second basic assumption of the General Equilibrium School states that the economic system consists exclusively of real organisations; producers and consumers. This assumption hinders any further study of the multi-level phenomenon. It is only in recent years that mathematical models have appeared which represent multi-level economic system even if only partially and mainly in connection with planning. Originally these models owed their existence to technical computing, considerations; in order to facilitate the solution of large-scale linear programming problems, so called 'decomposition methods' were worked out. The widely employed decomposition method was developed by Dantizig and Wolfe.

It will be useful to determine whether or not the multi-level planning

models can be further developed into models describing multi-level control of economic systems, involving uncertainty as well as the formalisation of the multiplication of information. This is one of the important problems of research on the economic system theory in the future.

Arthur Okun argues that so far as underdeveloped economics are concerned, growth occurring in a state of disequilibrium is more advantageous as compared to equilibrium growth. Further, Hirschman, Streeten, and Manson believed that continuous 'suction' (shortage) and the appearance of bottlenecks may give an impetus to the country's economic development.

To conclude, we cannot completely reject the General Equilibirum theory as it was stated by Kornai. We do not have sufficient answer about the empirical validity of the theory. While some studies have refuted the theory, others have supported the theory. Let us assume that a day will come when a supercharged economist with supersonic calculating equipment (computer) backed by saturated foundation will perform this onerous task. However, modernisation of the General Equilibrium theory has already taken place and is associated with the names of Arrow, Debreu, Gale, Koopmans, Mackezie, Uzawa, Wald and others.

NICHOLAS GEORGESCU-ROEGEN

Life Sketch

Nicholas Georgescu-Roegen was born in Romani in 1906. In 1930 he

took his Doctorate degree in Statistics from the University of Paris. For one year, he studied with Karl Pearson in London. He started teaching at the University of Bucharest and became a Professor in the Department of Statistics in the year 1932. His ideas had a strong impact on American economists when he was a Visiting Fellow at Harvard in 1930's. He became a Professor in 1949 at Vanderbilt University. He remained there till his retirement in 1976.

His Works

Georgescu-Roegen's main publications are Analytical Economics (1966), The Entropy Law and Economic Process (1971), Energy and Economic Myths (1976).

His Contribution

Bioeconomics

Georgescu-Roegen introduced a new concept of Bioeconomics. In the words of Professor Mark Blaug, "Bioeconomics is the notion that production, involving as it does the transformation of what is for all practical purposes a constant stock of matters and energy, must conform to the same 'Law of Entropy' that governs all closed systems; entropy or unavailable matter and energy tends constantly to increase, while available matter and energy tends constantly to decrease."[10] Georgescu-Roegen concept of Bioeconomics is a new style of dialectical economic thinking. With mechanical mode of reasoning, it replaces more or less the whole of present day economics. The author argues

that the economic process is not a mechanical equations, and cannot be reduced to mechanical equations. It cannot be understood without the concepts of purposive activity and enjoyment of life. The study of this process cannot be built on what he calls "arithmomorphic" concepts, i.e. discretely distinct propositions holding true in all times and places. Instead it depends on "dialectical concepts" not in the Hegelian sense but in the sense of being surrounded by pnumbras and overlapping with their opposites. But he insists that correct reasoning with dialectical concepts is not impossible. Indeed no science can completely avoid them. Arithmomorphic models are absolutely essential in any science including Economics. They seldom represent accurate blue-prints. Instead, they are analytical similies by which we can test or illustrate our dialectical reasoning. As Georgescu-Roegen puts it "there is a limit to what we can do with numbers as there is a limit to what we can do without them."

Theoretical Science

He maintains the argument that Economics is not a "theoretical science" if by theoretical science, we mean "logically ordered description". He maintains that a social scientist seeking counsel and inspriation for his own activity from the modern philosophy of science is apt to be greatly disappointed, perhaps also confused. Most of this philosophy has come to be essentially a praise of theoretical science and nothing more. Since of all sciences professed today only some chapters of physics fit the concept of theoretical science, it is natural that almost every modern treatise of critical philosophy should avoid any refe-

rence to fields other than theoretical physics.

Entropy Law

Economists' vision has reacted to the discovery of the first law of the thermodynamics, i.e. the principle of conservation of matter and energy. Marshall in his Principles of Economics states that man can neither create matter nor energy. In physics as well as philosophy of science, we find Entropy Law.But economists have failed to pay attention to this law, the most economic of all physical law. "Entropy" means latent energy/absolute temperature. The literature on economic development proves doubtlessly that most economists profess a belief tantamount to thinking that even entropy, bottlogging is unnecessary; the economic process can go on, even grow, without being continuously fed 'low entropy'. Economic process is not circular but undirectional. As far as this facet is concerned, the economic process consists of a continuous transformation of low entropy into high entropy, the irrevocable waste.

Georgescu-Roegen elucidates that mathematical economists like Walras and Jevons have introduced mathematical models in order to explain consumer's behaviour but they were criticised by economists concerning the legitimacy of forcing human nature into the rigid frame of a mathematical structure. Owing to further improvement of the theory of choice, the controversy over the justification of consumers behaviour, at least for the purpose of static theory, slowly faded away. In the meantime, modern mathematical economists carried the theory of choice to such a level that apparently very little could still be added

to refine it further. The theory of consumer choice is even applicable to choice in general. Thus it could provide an adequate background for a theory of entrepreneurial decisions under multiple criteria some of which, nothing as a purley economic implication, ought to be classified as social factors.

Law of Demand

The law of demand is the relationship between prices and quantities is an economic law. An increase in price will bring about a decrease in the quantity. But according Georgescu-Roegen, this statement is not a quantitative law in the usual sense of the word. It does not imply a reversible relationship between prices and quantities. But it is simply a common feature of all demand laws either reversible or irreversible. From this to the representation of the demand law by a curve relating prices and quantities is a very long way. Yet, the step is commonly taken in connection with all similar truths in which economic theory abounds.

Cardinal Argument

He explains that the carinalist argument rests upon two unwarranted assumptions: In the first place the oversimplified patter of human behaviour ignores the irreducibility of wants. It is this assumption which leaked also into the ordinalist argument and which made it possible to use the real number system for ordering all non-equivalent alternatives. In the second place, credibility is ignored with the consequence that the background for unpredictable results is reduced to probability. This implies that man has almost 'demiurgie' know-

ledge.[11] These are sufficient reasons to explain that though the cardinalist doctrine is analytically true but it cannot be believed in actual practice.

Factor of Production

Georgescu-Roegen gives two different definitions of a factor of production which are different in comparison to the general definitions which are often formulated by theoretical economist. The first definition states that 'a factor of production' is limitational if an increase in its inputs is a necessary but not a sufficient condition for an increase in output. According to the second definition 'a factor of production is limitative if an increase in inputs is both necessary and sufficient condition for an increase in output'.

Opportunity Cost

Georgescu-Roegen also discussed the concept of 'opportunity cost'. Opportunity cost in economics can be defined as that cost in term of the value of the alternatives or other opportunities which have to be foregone in order to achieve a particular thing. But he explains that the opportunity cost curves usually found in economic literature are not established on the assumption of maximum utilization of labour. Indeed the opportunity cost curves can be constructed either by assuring that the entire labour must be used; also it can be used only up to the point where labour's marginal productivity is sufficient to provide the working class with the minimum economic standard.

Georgescu-Roegen criticises the economic theories on the ground that

they are impracticable in real world. His definition of a 'theory is in the first and last phase a logical file of our factual knowledge pertaining to a certain phenomena logical domain.[12] According to his view point, an economic theory to be operative at all, i.e. to be capable of serving as a guide for policy, it must concern itself with a specific type of economy not with several types at the same time.

Professor Paul A. Samuelson described Nicholars Georgescu-Roegen as "a scholar's scholar, an economist's economist".

In conclusion we may say that his contribution to economics can be placed in a high order and it is related to other branches of knowledge like Biology and Physics. As a theoretician, his work is indispensable to undertsand and analyse the problem of modern economic literature as a whole.

In the preceding pages we have dealt with the contribution of five economists, namely, Robert Wayne Clower, Axel Leijonhufvud, George Shackle, Janos Kornai and Georgescu-Roegen in the context of Economics of Disequilibrium. Hence, it is because of them that Economics of Disequilibrium emerges as a vital topic in contemporary economic theory. They provide us with the rethinking and reinterpretation of economic theories of Walras, pre-Keynesian and post-Keynesian approaches and methodology.

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Chapter IV

ADVANCES OF THE ECONOMICS OF EQUILIBRIUM

In this chapter, we will discuss the advances in the economics of equilibrium as could be found in the contribution of six contemporary economists, namely, Kenneth J. Arrow, J.R. Hicks, Gerard Debreu, Lawrence L. Klein, Robert Solow and Paul Anthony Samuelson. All these economists believe that economic system is not 'static' or 'stationary' as it was contended by the classical economists. The economic variables viz. prices, output, investment, consumption, etc. change from one period to another. They change because of higher economic growth, increase in consumption pattern, tastes and preferences of the individuals. An economic system is said to be in dynamic equilibrium if its total stock, including both things and people, changes at a constant rate (per cent per annum), and if the rates of production and consumption of all items of the stock increase at the same rate. We may now analyse the contribution of each of these economists in the following paragraphs :

KENNETH J. ARROW

Life Sketch

Arrow was born in New York City in 1921. He received his Graduation from City College, New York in 1940. He took his Ph.D. degree in 1951. He became a Professor at Stanford University in 1953. He has served in many American Universities such as Chicago, Cambridge and Stanford. He has been appointed the President of the Econometric Society in 1956, Winner of John Bates Clark medal of the American Economic Association in 1957.

He was honoured with the Nobel Prize in Economics along with John

R. Hicks in 1972 for their pioneering work in the highly abstract field of equilibrium theory. One of the members of the Nobel Prize Committee, Professor Bertil Ohlin quoted that "the general equilibrium theory is the basis for most of the direct application of economic theory such as localisation of industrial plant, resource allocation, financial and employment theory and foreign trade, all these being used to increase the welfare of the people."

His Works

Arrow has written numerous papers, articles, and is the author of Social Choice and Individual Values (1951), Studies in Linear and Non-Linear Programming (1958), Mathematical Methods in Social Sciences (1959), Studies in Applied Probability and Managment Science (1962), Essays in the Theory of Risk Bearing (1971). He is the co-author with Scitovsky of Readings in Welfare Economics (1969).

His Contribution

Arrow's theory of General Equilibrium is based on the foundation of neo-classical economic analysis. There are two notions of general equilibrium:

1) The economic system must form a system sufficiently complete to determine the values of its variables, and

2) Each relation represents a balance of force.

Concept of Equilibrium

According to Arrow, the concept of 'equilibrium' exists in mechanics

long before the appearance of Smith's Wealth of Nations (1776). But there is no concrete evidence to prove that Smith had borrowed the concept from mechanics. Whatever may be the source from which this notion has been derived, this concept has provided the most important contribution in the economic thought, in order to understand the social processes. Smith was regarded as a creator of equilibrium theory. His 'invisible hand' is a poetic expression of the most fundamental of economic balance relations, the equalisation of rates of return, as enforced by the tendency of factors to move from low to high returns. Smith's logical gaps were filled to some extent by the classical economists like Ricardo and J.S. Mill.

However, the classicial authors found that prices appeared to be determined by a system of relations not involving quantities, derived from the zero-profit condition. This is clear enough with fixed production coefficients and a single primary factor, labour, as in Smith's famous exchange of deer and beaver, and it was the great accomplishment of Malthus and Ricardo to show that land could be brought into the system.

We also find that application of partial equilibrium analysis of a single market by Cournot (1838), Jenkin (1870) and other neo-classical economists. The full credit to popularise the general equilibrium concept can be attributed to Walras (1874-1877). In Walrasian analysis, economic system consists of 1) households and 2) firms. Each household owns a set of resources, commodities, useful either in production or consumption, including different kinds of labour.

For any given set of prices, a household has an income from the sale of its resources, and with this income it can choose among all alternative bundles of consumer's goods whose cost, at the given prices, does not exceed its income.

According to Walras, the demand by an households for any consumers' good as a function of the prices of both consumers' goods and resources. An equilibrium set of prices was a set such that supply and demand were equated on each market, assuming fixed coefficients of production. It was argued that there existed an equilibrium set of prices on the ground that the equality of the number of prices to be determined with the number of equations expressing the equality of supply and demand on various markets. In this counting, Walras recognised that there were two offsetting complications - 1) only relative prices affected the behaviour of households and firms, 2) there is budgetary balance of each household between income and the value of consumption and the zero-point condition for firm.

Walras assumes a set of prices fixed abitrarily; then supply may exceed demand on some markets and fall below on others. Let us assume that in the first market, prices are adjusted to make equality between demand and supply, given all other prices. This will normally require raising the price if demand initially exceeded the supply, decreasing in the opposite case. Of course, the change in the first price will change supply and demand on all other markets. Let us repeat the process with the second and subsequent markets. At the end of the one round, the last market will be in equilibrium, but none of the .

others need be, since the adjustments on subsequent markets will destroy the equilibrium on any one. However, Walras, argues the supply and demand functions for any given commodity will be affected more by the changes in its own price than by the changes in its own prices. Hence, after one round the markets should be more nearly in equilibrium than they were to begin with, and with successive rounds the supplies and demands on all markets will tend to equality. The equilibrium analysis was further developed by a number of outstanding economists like W. Stanley Jevons, Carl Menger, J.B. Clark, Wicksteed, Cassel, Neisser, etc.

According to Wald, there are two alternatives which are sufficient conditions for the uniqueness of competitive equilibrium 1) that the weak axiom of revealed preference holds the market demand functions; 2) that all commodities be gross substitutes. His theory provides further incentives for research.

Theory of Games

Von Neumann used the the 'theory of games' for the first time in his celebrated paper on 'balanced economic growth' (1937). The historical relation between game theory and economic equilibrium theory is paradoxical. In principle, game theory is a very general concept of equilibrium which should either replace the principle of competitive equilibrium or include it as a special case. In fact, while game theory has turned out to be extraordinarily stimulating to equilibrium theory, it has been through the use of mathematical tools developed in the former and used in the latter with entirely different interpretations.

In this model there is only the application of production function, demand function being excluded.

Games theory of Von Neumann in a simplified form was presented by Katutani, Shirzuo, George B. Dantzig, Albert W. Tucker, Harold W. Kuhn, Tjanlling, C. Koopmans, etc. Arrow explains that a competitive equilibrium is a designation of non-negative prices for all commodities, of a bundle for consumption for each household, and of a production bundle for each firm satisfying the following conditions :

(a) for each household, the designated bundle maximises utility among all available bundles.

(b) for each firm, the designated bundle maximises profit among all technically possible bundles.

(b) for each commodity, the total consumed by all households does not exceed the total initially available plus the net total produced by all firms.

(d) for those commodities for which total consumed is strictly less than total initially available plus total products, the prize is zero.

The following assumptions are sufficient to ensure the existence of competitive equilibrium :

1) The preference ordering of each household is continuous, admits no saturation and is convex.

2) The set of possible production bundles for each firm is convex and closed.

3) No production bundle possible to society as a whole can contain outputs but no inputs. There is at least one bundle possible for society that contains a positive net output of all commodities not possessed initially by any households.

4) The economy is irreducible.[1]

There are two theorems of competitive equilibrium and allocations. They are enumerated as follows :

1) Any competitive equilibrium is necessary optimal.

2) Given any optimal allocation, there is some assignment of society's initial assets among individuals such that the optimal allocation is a competitive equilibrium corresponding to that distribution, provided that the assumptions of the previous section which ensure the existence of equilibrium hold.

The concept of optimality can be defined without a price system or any prescribed set of markets. The optimal theorem states that there will be an identity between optima and competitive equilibrium without introducing prices into the definition of optimality.

Walras clearly explained the firm in the general equilibrium theory. He assumed fixed coefficient and passive nature of the firm. In the last quarter of the nineteenth century J.B. Clark, Wicksteed and Barone recognised the possibility of alternative production activities in the form of production function. the firm have the responsibility of minimising costs at given output levels. A number of economists were interested in analysing the theory of the firm.

These economists include Cournot (1838), Wickshell, Pareto, Robertson, Sraffa, Shove, Viner, etc..

According to Cournot firms may be either monopolists or competitors and in such circumstances profit maximisation is compatible with increasing Returns to Scale. In modern terminology, the production possibility set of typical firms displays an initial tendency towards Increasing Returns followed at higher scales by Decreasing Returns. The first part is explained by indivisibilities and the second by the decreasing ability of the entrepreneur to control the firm.

According to Arrow the set of firms is regarded as fixed. He also assumed that sometimes firms might find it most profitable to produce nothing. The production possibility sets of the firms are assumed to be convex. This assumption excludes the possibility of an initial phase of increasing returns. It is compatible with either Constant or Diminishing Returns to Scale. His model creates a category of pure profits which are distributed to the owners of the firm. But the model does not explain that the owners are necessarily the entrepreneurs or managers. Since profit maximization is assumed, conflict of interest between the organisation or its management, on the one hand, is assumed always to be resolved in favour of the owners. The model is sufficiently flexible because it includes managers as owners of the firm.

It can be concluded that in spite of the advances, some of the problems of general equilibrium are still unsolved. There is no sufficient empirical evidence

in the general equilibrium in order to prove that the system of equation had a solution at all. Secondly, there cannot be a unique profit-maximizing position for any set of prices. If there is no inputs and outputs, profit will be naturally zero. Though Arrow was unable to solve some of the problems of the general equilibrium, nevertheless, he gave a practical analysis to this type of problem. By the application of mathematical tools, Arrow discovered that the existence of multi-market equilibrium under conditions of perfect competition requires forward markets in all goods and services. That is, the markets in which we can pay today to obtain delivery tomorrow or accept today for the promise of payment tomorrow. This finding throws doubts on the practical significance of general equilibrium theory and much of Arrow's contribution was concerned to demonstrate that general equilibrium theory is still relevant to those economic with missing forward markets.

JOHN R. HICKS

Life Sketch

John R. Hicks was born in Leamington Spa, England in 1929. In 1925 he took his Graduation from Oxford University. In 1935 he became Professor at Manchester University, he retired from his Professorhip in 1965 from the same institution.

Hicks and Kenneth J. Arrow were jointly winner of Nobel Prize in Economics in 1972 for their pioneering contributions to the General Equilibrium

and Welfare Theory.

His Works

The important works of Hicks are Theory of Wages (1932), Value and Capital (1939), Taxation of War Wealth (1941), The Social Framework : An Introduction to Economics (1942), Standard of Local Expenditure (1943), Incidence of Local Rates (1945), A Contribution to the Theory of Trade Cycle (1950), Essays in World Economics (1959), A Revision of Demand Theory (1965), Capital and Growth (1965), Critical Essays in Monetary Theory (1967), A Theory of Economic History (1969), Capital and Time : A New Austrian Theory (1973), The Crisis in Keynesian Economics (1974), Causality in Economics (1979), Framework of Indian Economy : An Introduction to Economics by J.R. Hicks, M. Mukherji and Symamal K. Ghose (1984).

His publications record run to twenty books over fifty articles, most of which, are reprinted in three volumes of his book, Collected Essays on Economic Theory (1981).

His Contribution

Exchange Equilibrium

Hicks regards Walras as the creator of the theory of 'exchange

equilibrium' according to which solution there must be equality between the number of equations and that of unknowns. Excluding the speculative market, the theory can be explained this way : once a particular set of prices is given, it is not difficult to determine the most preferred position of any individual. This gives us the quantities he will demand of those commodities he does not possess, and the quantities he will be willing to supply in exchange for them of those commodities he does. By simple addition, we can determine the demand and supply for each commodity. If the price system is such as demands and supplies equal, the relative position will be that of the general equilibrium of exchange.

While expectations are generally precise, Hicks finds that there is always an element of uncertainty for which allowance should be made. Under conditions of perfect competition, prices can be taken as a parameter; and with the help of relevant data regarding production and the prices of the inputs, the firm can easily estimate its profit. A key concept introduced by him is the transformation of a group of commodities into a single one so long as their prices move in the same direction or change in the same proportion. In this way a number of variables are reduced to one only, thus attaining generality.

Hicks, however, fears that the introduction of monopoly conditions might have disastrous consequences for his theory. He states that "under monopoly the stability conditions become indeterminate : and the basis on which economic

laws can be constructed is, therefore, shorn away. Not only is falling average cost consistent with monopoly; falling marginal cost is consistent with monopoly too. There must indeed be something to stop the indefinite expansion of the firm, but it can just as well be stopped by the limitation of the market as by rising marginal costs, though of course, both may be in operation simultaneously.

General Equilibrium

Hicks claims that the 'general equilibrium' of production is of much wider applicability as compared to the general equilibrium of exchange. It is indeed a fairly well-developed system, and includes so much of the economic problem that many of the systems of thought employed by economists during the last century fall within it, and have to be reckoned among its simplified forms. It is applicable to long period problems such as distribution and international trade. He assumes a system which consists of two individuals 1) private individuals and 2) entrepreneurs. The demarcation is made in this way. Every individual possesses supplies of one or both of two sorts of resources - (1) factors of production which can be disposed of on the market, 2) entrepreneurial resources which cannot be disposed of in that way, but which can be used, in combination with the other sorts of factors, to produce disposable products.

A person who possesses entrepreneurial resources given a set of markets

prices for factors and products, will be in a postion to determine whether the utilization of those resources in the production will yield a positive surplus. If he will do so, he becomes an entrepreneur. As entrepreneur, he will be in a position to arrange production in such a way that he will be able to maximise his surplus. At given prices, the most profitable arrangement is determined by the state of technique and by the extent of his entrepreneurial resources. Consequently, his demand for factors and supply of factors as well as his surplus is determined. This surplus now become part of his income on private account - that part of his account where his decisions become similar to those of the private individual.

The private individual unwilling to use his entrepreneurial resources, has to decide (i) how much of his supply of factors he shall dispose of, (ii) how much of the income so secured he will spend on each kind of commodity. These decisions must be made in one way by assuming a given system of prices and scale of preferences. Therefore, Hicks assumes that it is possible to determine private individual's demand for commodities and supply of factors.

The entrepreneur who possesses both entrepreneurial resources and disposable factors has to make similar decisions on his private account. At given prices, his income is derived from his surplus and supply of factors. Hence, his demand for commodities can be easily calculated since his income is determined.

The income of entrepreneur who possesses two kinds of resources -

entrepreneurial and disposable - is derived from his surplus and the supply of factors. Hicks distinguishes between four kinds of markets : (1) the markets for products, where demand comes from private account and supply comes from the business accounts of entrepreneurs; 2) markets for factors, where demand comes from firms, supply from private accounts; 3) markets for direct services, where supply and demand both come from private account; 4) markets for intermediate products which are products for one firm and factors for another. In this case both supply and demand come from the firm. In all kinds of markets, however, supply and demand are determined once the price system is given. It is of interest to note that Hicks has mentioned three drawbacks from which this system suffers. First, it pays no attention to monopoly and imperfect competition. Secondly, it abstracts from the economic activity of the state. Last but not the least, it abstracts from capital, interest, saving, investment and speculation.

Temporary Equilibrium

Hicks also discusses the temporary equilibrium of the whole system. Temporary equilibrium implies that current demands and supplies have been rendered equal. They consist of equations of supply and demand for goods and services of every sort, for securities and for money. We will analyse what happens when there are disturbances in some of the variables (datas) of temporary equilibrium like given tastes, resources and expectations. The theory of temporary equilibrium does not include the ultimate dynamic problems, but it is not therefore devoid of direct practical application. The prac-

tical problems which have to be considered under the heading of temporary equilibrium are controversial issues as the effects of savings and investment on the rate of interest, and the effects of general changes in money wages. Temporary equilibrium system is simply an extended system of multiple exchange. The following conditions are necessary for a system of mulitiple exchange to be perfectly stable. A rise in the price of any commodity must make the supply of that commodity exceed the demand (a) if all other prices are given, (b) if some other prices are adjusted so as to preserve equality between demand ans supply in their respective markets, (c) if all other prices are so adjusted. If the last of these conditions is not satisfied the system is not stable at all, but will break down at the slightest disturbance. If some of the stability conditions are not satisfied, though other conditions are, then the system will be imperfectly stable. It is stable in the end, so it does not break down.[2]

Trade Cycles

A Contribution to the Theory of the Trade Cycle marked Hicks' first attempt at equilibrium dynamics, building on the Harrod-Domar growth model and Samuelson's interaction of the multiplier and accelerator. Acoording to Hicks, there are four phases of a trade cycle viz., (1) Recovery, (2) Full Boom, (3) Downswing and (4) Depression. He has pointed out that "the theory of the multiplier and the thoery of the accelerator are the two sides of the theory of fluctuations, just as the theory of demand and the theory of supply are

the two sides of the theory of value."[3] He distinguishes between two types of investment - 'induced investment' and 'autonomous investment'. Induced investment in fixed capital can generally be thought of as depending upon changes in actual output; for the output which can be produced from a given equipment is capable of some variation within the Marshallian short period. For the induced investment in working capital comes before the actual rate of output change, it occurs in response to a change in demand, and is part of the process whereby supply adjusts itself to demand. Public investment which occurs in direct response to inventions, and much of the long-range investment which is only expected to pay for itself over a long period, all of these can be regarded as autonomous investment. So far as the limits of cyclical fluctuations are concerned, the upswing is the result of the combined action of the multiplier and accelerator, the downswing is largely a product of the multiplier alone. However, there are certain limitations of his trade cycle viz., a) He assumed fixed value of multiplier in different phases of cycles and (b) He does not explain the psychological forces arising from the future uncertainty and expectations which play an important part in a dynamic capitalist economy.

In the monumental work of Hicks Capital and Growth, he developed well-known contrast between fix price and flex price markets and stocks and flows equilibrium concepts : when prices are constant, quantities of goods and services can be added by adding their money values; money values become volume indexes. It is called 'fix prices method'. This method has an inherent

tendency to 'go macro'; a tendency which there is now much experience to confirm.[4] The temporal equilibrium method is generally known as 'flex-price method'. The products of manufacturing industry have a greater durability is referred to as flex price. Stock equilibrium is an equilibrium at a point of time; in accounting terms, it is an equilibrium of the balance-sheet. If a unit is in stock equilibrium at the beginning of the period, and is still in stock equilibrium at the end, it is then in flow equilibrium during the period. Flow conditions include that production should just cover consumption demand plus the required investment.

To conclude, Hicks discusses three types of equilibrium namely, exchange equilibrium, general equilibrium and temporary equilibrium. He gives credit to Walras as the creator of the Theory of Exchange Equilibrium. In his opinion general equilibrium of production is more applicable than his equilibrium of exchange. He too introduces four kinds of markets viz. markets for products, factors, direct services and intermediate products. In these markets, if the prices are given, the demand and supply is easily calculable. Hence, he can be placed reasonably in the first rank of modern theorists.

GERARD DEBREU

Life Sketch

Gerard Debreu was born in 1921 in France. He took his Graduation from the University of Paris in 1946. He became Professor of Economics

and Mathematics at the University of California, Berkeley. He was the President of the Econometric Society from 1969 to 1971, a Fellow since 1970 of the American Association of the Advancement of Science. He received honorary degrees from a number of Universities, viz. Universities of Bonn (1977) and Lausanne (1980). The Royal Swedish Academy of Sciences announced Nobel Prize for him in 1973 for his three decades of distinguished service. While announcing Nobel Prize for him, the Chairman of the five-member Nobel Committee, Asar Lindbeck commented, "we have never before awarded the Prize of contributions of such pure basic research".

His Work

In 1959, he published his masterpiece, Theory of Value : An Axiomatic Analysis of Economic Equilibrium. The book contains 102 pages with mathematical formulae, i.e. application of set theory and topology. The contribution of this book consists in a rigorous, axiomatic, and formal analysis of producer behaviour, consumer behaviour, general equilibrium, and the optimality of the market mechanism for resource allocation.

His Contribution

Debreu has created a model of a theoretical market place and has provided an analytical framework for some of the most tenents of classical economics. Adam Smith published his masterpiece, Wealth of Nations in 1776. Since then economists believed that the conflicting interests of the producers

and consumers can be easily reconciled through the price mechanism. There will be equilibrium between demand and supply. The best explanation which Smith could offer was that individual economic agents were guided by the idea of common good. In this connection, we can quote him, "They are led by an invisible hand to make nearly the same distribution of the necessaries of life which would have been made had the Earth been divided into equal portions among all its inhabitants, and thus without intending it, without knowing it, advance the interest of the society, and afford means to the implication of the species".[5]

Equilibrium

Debreu's chief contribution was to make invisible hand somewhat more discernible. In his classic Theory of Value he showed that an economy is defined by m consumers (characterised by their consumption sets and their preferences), n producers (characterised by their production sets), and the total resources. A state of the economy is specification of the action of each agent, and a state is said to be attainable if the action of each agent is possible for him and if their (m + n) actions are compatible with the total resources.[6] He called this state of the economy as a general equilibrium in which supply equals demand in every market and where there is neither shortages nor surplus of any product. Debreu and Kenneth Arrow co-authored an epoch-making paper 'Existence of an Equilibrium for a Competitive Economy' (1954), in which they provided a definitive mathematical proof of the existence

of general equilibrium, using topological methods hitherto unknown in economics. They assume that in their model the producers, distributors and consumers each attempts to maximise their own economic welfare by manipulating prices and other factors of production such as land, labour and capital. Debreu believed that in the theoretical world equilibrium can be attainable. He was confirmed to the internal logical consistency of the classical view of markets.

To attain the results, Debreu had to assume an ideal world of flexible prices and unfetted competition. He stated that an optimum is "an attainable state such that within the limitations imposed by the consumption sets, the production sets, and the total resources of the economy, one cannot satisfy better the preferences of any consumer without satisfying less well those of another".[7] If an attainable state of an economy is an optimum, there is a price system relative to which the state is an equilibrium. "When an attainable state is not an optimum, it is possible, by suitable changes in productions and consumptions, to satisfy better the preferences of at least one consumer without satisfying less well those of any other".[8]

According to Karl Goran Maler, a member of the Royal Academy both the World Bank and International Monetary Fund use models that are based on Debreu's work, and the economic political planning in many nations is also, to a great extent built directly on Debreu's efforts. Even the Nobel Laureates like James Tobin and George Stigler have been influenced by his contribution. His equilibrium theory is used by private forecasters and government planners

to predict such things as the impact of a tax change on various industries.

General equilibrium theories are applicable in all branches of modern economics. If a general equilibrium model possessed a solution, one can confidently employ general equilibrium analysis. The proofs of the existence of a general equilibrium solution based on certain restrictive conditions, and these conditions may throw light on the way in which multi-markets equilibrium is actually attained in the real world. Of course, the contribution of Arrow-Debreu illuminates some aspects of real world competition. Debreu also wrote a large number of technical papers on 'existence theorems', seeking to relax the stringent assumptions required to prove the existence of general equilibrium under competitive conditions. He also addressed the quite separate question of the speed of which actual economics converge on a general equilibrium solution.

In conclusion, it may be stated that Debreu has tried to modify Adam Smith's invisible hand according to which the conflicting interests of producers and consumers are reconciled through the price mechanism. But Debreu proved this concept in a different way. In his model of topology, producers, distributors and consumers maximize their welfare by manipulating prices and other factors of production like land, labour and capital. Debreu's works include a number of major innovations with practicable application.

LAWRENCE L. KLEIN

Life Sketch

Klein was born in Omaha, Nebraska in 1920. He graduated from the University of California, Berkeley in 1942 and received his Ph.D. from the Massachusetts Institute of Technology in 1944. His Doctoral thesis 'The Keynesian Revolution' is an early study of the process whereby Keynes had moved from the arid formulas of his Treatise (1930) to the more promising line of advance in his General Theory (1936). Klein did Post-doctoral research at the University of Chicago, then joined the University of Michigan. Klein was associated with the Brookings Econometric Model Project, the largest econometric model that has ever been constructed for any economy. He was awarded the Nobel Prize in Economics in 1980 for his pioneering contribution of econometric models and their application to the analysis of economic fluctuations and economic policies. The American Economic Association award him the John Bates Clark Medal in 1959. He was President of the Econometric Society (1960), the Environmental Economics Association (1975) and the American Economic Association (1977). He is popularly known as the "Father of Econometrics".

His Works

His works include The Keynesian Revolution (1947), Economic Fluctuations in the United States, 1921-1941 (1950), Textbook of Econometrics (1953),

Econometric Model of the United States, 1929-52 (1955), An Introduction to Econometrics (1962), The Brookings Model (1975) and The Economics of Demand and Supply (1983).

His Contribution

Lawrence R. Klein states that Keynes accepted the classical theory for the case of equilibrium in his Treatise, Keynes wrote that in equilibrium, i.e. when the factors of productions are fully employed, when the public is neither bullish nor bearish of securities and is maintaining in the form of savings - deposits neither more nor less than the normal proportion of its total wealth, and when the volume of savings is equal both to the cost and to the value of new investment, there is a unique relationship between the quantity of money and the price levels of consumption goods and of outputs as a whole, of such a character that if the quantity of money were double the price levels would be double also.[9]

Classical economists were mainly concerned with long run equilibrium analysis whereas Keynes dealt with the problem of economy with short-run equilibrium analysis. He remarked "in the long-run we are all dead". In the same way, classical economists assumed wage flexibility in order to attain full employment. But Keynes did not believe that full employment is automatically assured; within the framework of Keynesian economics wage flexibility does not correct unemployment and leads to merely to hyper-deflation,

if carried to its logical conclusion. But in the real world one observes neither hyper-inflation nor full employment. The explanation is that wages are sticky; they are not flexible. The solution to the Keynesian system which gives a value of employment not on the supply schedule persists when wage cut do not occur. Because workers do not bid against one another, we do not experience the 'hopeless' downward spiral.

Keynes did not invent anything new but said something quite different from what his contemporary economists used to explain. Keynes' The General theory of Employment, Interest and Money, was based on three components, viz. 1) the propensity of consume (save), 2) marginal efficiency of capital and 3) liquidity preference. His contemporary economists had not used these three components.

According to Klein, the primary contentions of Keynesian theory as set down in his book The Keynesian Revolution can be summarised in a form that gives us scientific agreement in terms of reference. The Keynesian system is :

1) A theory of the determination of total income (output or employement),
2) A theoretical explanation of the possibility of under-employment equilibrium.
3) A group of doctrines in public policy about how to control the economy at desirable levels of economic activity.
4) A long-run view on the historical trend of capitalism.[10]

General Theory

General theory deal with a static model. The world is dynamic and no static model will give a widely applicable representation of it. After the Second World War, when the Keynesian model was naively applied to the events of the period, it was usually found that there were major factors not accounted for in the simple model that had determined the course of the economy. The model needs substantial amplication for reaching the whole truth. At present, it can be classed as containing "causal empiricis". The Keynesian idea of the existence of a basic psychological law establishing a relationship between aggregate consumption and aggregate income, with slope less than unity, needs obvious extension to account for taxes, transfer payments, income distribution, lags, relative prices and possibly wealth.

Investment

Keynes paid little attention to two types of investment which play a important role in recent economic fluctuations. They are residential construction and inventory investment. Resident construction merits separate treatment in disaggregation because it is strongly influenced by its own demographic factors and may received special form of public support. Inventory investment may follow familiar lines of stock-adjustment theories, but its adjustment parameters imply a very different lag, one that gives rise to short business cycles of less than four years' duration. Speculative variables of price-level change and interest rate change may also be peculiar to inventory

investment. These, then, are compelling reasons for some disaggregation of investment beyond that originally given by Keynes. Followers of Keynes were quick to investigate these specific type of investment, but it must be recognised that the theory needs extension to include these in a consistent and fully determined manner.[11]

Keynes attributed passive role to consumption function because of the decline of marginal efficiency of capital in the long run. Marginal efficiency of capital has been defined by Keynes as "being equal to the rate of discount which would make the present value of the series of annuities given by the returns expected from the capital asset during its life just equal to its supply price.[12] The pessimistic outlook for investment cannot be justified by recent events, either in the industrialised economics of the United States and Western Europe or in the newly developing countries. New discoveries will not be stopped in dynamic world. As a result of new discoveries, there will be new investment opportunities and hence it is not necessary that marginal efficiency of capital will decline in the long run.

Liquidity Preference Theory

The doctrine of liquidity preference theory may be defined as the preference or desire to hold money in liquid form or in cash. Keynes mention four motives which provide an incentive to liquidity viz., 1) income motive, 2) business motive, 3) precautionary motive, and 4) speculative motive.According

to Klein, this theory is not application to a complicated money market. There are three lines of development, Klein said, that need to be followed to make this theory workable :

1) More assets or debts instruments must be considered - bills, bonds, equities, cash, savings accounts, and goods.

2) More classes of holders must be considered - private households, non-financial companies, private banks, non-bank financial institutions, foreigners, central bank and public treasury, and

3) A supply theory of money must be developed.

Keynesian economics is sometimes referred to as the economics of depression situation, Keynes published his General Theory (1936) after the Great Depression of 1930's and it is wrong to assume that he was in support of either inflation or deflation. We can quote him in this regard, "Inflation is unjust and deflation is inexpedient". Klein argued that Keynesian revolution need not be discarded on the simple pretext of depression economics, rather they must receive elaboration be extended to handle more complex situations. We must realise that Keynesian economics will admit full employment or over employment as legitimate solutions to the equations as well as infinite number of underemployment solution.

It may be pointed out in conclusion, that Klein found out both the merits and demerits of the Keynesian Theory of Employment, Interest and Money .

Keynes' 'Psychological Law of Consumption Function' did not take into account taxes, transfer payments, income distribution and relative prices. In order to make the 'Liquidity Preference Theory' workable in contemporary period, it is necessary to make some addition like more assets or debts, more classes of holders and a supply theory of money. Thus besides clarifying Keynesian economics Klein also analyses equilibrium in a dynamic model.

ROBERT M. SOLOW

Life Sketch

Born in New York City (1924), Robert M. Solow obtained his Graduation in 1947, received his M.A. in 1949 and took his Ph.D. degree at Harvard University in 1951.[13] He won the John Bates Clark Medal of the American Economic Association in 1961. He also became President of the Econometric Society in 1964 and the American Economic Association in 1979. He was awarded Nobel Prize in Economics in 1987.

His Works

His works consists of Capital Theory and the Rate of Return (1963), Growth Theory : An Exposition (1969), and Linear Programming and Economics Analysis (1958) co-author with Dorfman and Samuelson.

His Contribution

Stylized Facts

Solow states that in 1958 Nicholas Kaldor summed up six 'stylised facts' for a model :

1) Real output per man (or per man hour) grows at a more or less constant rate over fairly long periods of time. Of course, there are short-run fluctuations as well as even changes from one quarter to another,

2) The stock of real capital growing at a more or less constant rate, exceeds the rate of growth of labour input,

3) The ratio of capital to output shows no systematic trend since the rate of growth of real output and similarly the stock of capital goods remain the same,

4) The rate of profit on capital has a horizontal trend, of course, there will be occasional violent changes associated with sharp variations in effective demand,

5) The rate of growth of output per man can vary quite a lot from one country to another, and

6) Economics with a high share of profits in income tends to have a high ratio of investment to output. Solow admits that according to the third and fourth stylized facts, the share of profit in total income will be constant

in the process of economic growth. An economy growing in the lines of either three or four above rules in now-a-days termed 'steady state'. Its output, employment and capital stock grow exponentially and its capital-output ratio is constant. A steady state can be defined as that state in which output and employment be growing at some constant proportional rates and net saving and investment be a constant fraction of output. Steady state growth, constant saving rate, constant capital output ratio, accompanied by only limited fluctuations of the unemployment rate and the capacity utilisation rate, should be a rare state of affairs, except in planned economics.

The total output of an economy depends on the volume of employment, given the inherited stock of capital that is saved from the past outputs. Solow assumes that the economy's production possibilities are subject to constant returns to scale in its two homogeneous factors of production, labour and capital. The volume of employment will produce more output one year later than it would have done one year earlier. When employment is very low for a given stock of capital, the capital-output ratio is very high, perhaps infinitely high. When employment is very high for a given stock of capital, the capital-output ratio is very low. He also considers two alternative theories of saving. In the case of the first one he postulates fixed saving ratios from wage and profit income, a larger one from profits than from wages. The aggregate saving rate is thus a weighted average of the two elementary saving rates. Alternatively, the aggregate saving rate is equal to the saving rate from wages plus the extra saving from profits, which is the difference between

the two savings rates multiplied by the share of profits, the proportion of income subject to the extra saving. Now the share of profits in income is the rate of profit times the capital output ratio. It is adequate if we merely assume that profits increase (or do not decrease) with employment, given the stock of capital, so that in a free-scale economy, the rate of profit is higher (or no lower) the higher the ratio of employment to capital. Any theory of saving that deals with the saving rate and depending only on the variables of the model the capital-output ratio, the labour-capital ratio, the return on capital can be handled in the same way. If the stock of current wealth is larger, the current saving rate is lower. Employment growth will be less as compared to the growth of output and the capital stock.

In the preceding discussion, we have excluded two important factors in our model, i.e. technological progress and increasing returns to scale. Owing to the technological progress, capital and output both rise through time faster than employment. Continuous innovation could stave off the effects of diminishing returns, which otherwise bring any such process to a halt. Increasing returns to scale could do the same. The steady enlargement of the economy could offset diminishing returns and permits a continuous rise in capital and output per man. Under constant returns to scale, output has to grow at the same rate as both capital in natural units and capital in efficiency units. Progress is both labour and capital augmenting. If the economy maintains full employment with a constant fraction of output save and invested, the capital-output ratio will persistently rise and the rate of profit will persistently

fall. If the economy wishes to maintain a constant rate of profit and constant capital-output ratio, it must save and invest a persistently decreasing fraction of its output.

In a model without direct substitution, Solow describes that in a planned economy, maximisation of output is possible by fuller utilization of industrial capacity. The economy will try to employ its total working force by creating newest capacity. The economy also could increase output by shifting labour from the older to the newest capacity from a factory will lower output per man to a factory with higher output. A competitive profit-maximising economy with flexible real wages follow the same pattern. An old factory would be operated only if the real wages were less than or equal to its output per man. If the real wage exceeds its output per man, the factory will be closed down. Let us analyse the history of a single factory. When the factory is new, it earns profits which is equal to the difference between its productive capacity and its wage bill. But when the real wages increase because of technological progress and the competition of newer and more efficient factories, its wage bill rises and its profit will diminish. Eventually, the wage rises as high as the output per man in this factory and it has become the marginal no-rent factory. Sometimes a factory loses its efficiency during its life time regardless of the wage.

An economy with a capital market can be in equilibrium only if the existing supplies of money and real capital find a welcome place in the consoli-

dated balance sheet of the private economy. Solow assumes money market to be always in equilibrium, with a constant rate of inflation. Let us suppose that due to some unforseen reason, there is a decrease in the rate of inflation. Slower inflation implies a reduction in the opportunity cost of holding money. To maintain money-market equilibrium, there must be an increase in the ratio of money supply to value of output. The normal way for this to come about is that individuals attempt to increase their own holdings of money or government debt by selling off commodities. The economy as a whole can change neither its stock of money nor its stock of capital. But the excess demands for money can deflate the price level and restore money market equilibrium by reducing the money value of capital.

Solow published a number of papers, among them, the two papers are notable. These two papers are on 'A Contribution to the Theory of Growth' and 'Technical and Aggregate Production Function'.[14] His articles laid the basis for what was later to develop into "growth accounting". The articles established a mathematical relationship between production on the one hand and factors such as the introduction of new technology, labour and investment on the other.

It may be concluded that Solow demonstrated that only a small proportion of annual growth could be explained by an increase in labour and capital. The key factor was always technology. Solow's contribution is classified into the equilibrium economics because his output rests on dynamic analysis, i.e.

introduction of new technology in production system. Thus his contribution is indeed an advance in economics of equilibrium.

PAUL ANTHONY SAMUELSON

Life Sketch

Samuelson was born in 1915 in Gary, Indiana. He received his Doctorate degree from Harvard University at the age of twentysix. He was the President of the Econometric Society (1953) and the American Economic Association in 1961. He was the first American economist to receive the Nobel Prize (1970) in Economic for his influential and widely read works, which have raised the level of scientific analysis in economic theory.

His Works

His main works are Foundations of Economic Analysis (1947), Economics (1948), Linear Programming and Economic Activity (1958) coauthor with Robert Dorfman and Robert Solow.

His Contribution

His natural gift for economics was astonishing: most of his Foundations of Economic Analysis was written in 1937 when he was a 22-year old graduate student at Harvard. He has contributed to the field of microeconomics, macro-

economics, welfare economics, international monetary theory. He said that "turnpike theorems and osculating envelopes; non-substitutability relations in Minkowski-Ricardo-Leontief-Metzler matrices of Mosak-Hicks type; balance-budget multipliers under conditions of balanced uncertainty in locally impacted topolotical spaces and molar equivalences".[15] Samuelson regards economics not as a bourgeois science but as a science essentially of the bourgeoisie. "Economics" he says, "seems to decay under a nonbourgeois society". He notes that when two men whom he admired as creative and productive scholars, the economists Oskar Lange and Michal Kalecki, returned to communist Poland and Czecholovakia after the Second World War, neither did scientific work comparable to what each had done earlier as refugees in the capitalist West. And Samuelson is not impressed with the Soviet Economists he meets, "unless they are simply applied mathematicians, in which case they can be extremely good, as in probability theory".[16]

Comparative Statics and Equilibrium

Samuelson made the distinction between two concepts, i.e., comparative statics and equilibrium. The formner implies the investigation of changes in a system from one position of equilibrium to another without resort to the transitional process involved in the adjustment. The latter means only the values of variables determined by a set of conditions, and no normative connotation attaches to them. The general problem of comparative statics deals with how from a knowledge of the qualitative and quantitative properties

of equilibrium conditions, it is easy to deduce meaningful theorems concerning the direction and magnitude of changes in our variables which certain data change. Samuelson also state that Pareto laid basis for comparative statics. His contribution was not rich in definite theorems in this subject. Because he rarely concerned himself with the secondary inequalities relevant to maximum positions. On the few occassions when he did so, he came to grief in their statement. This concept was further developed by a number of notable economists viz. W.E. Johnson, Slutsky, Hicks and Allen, Georgescu-Roegen, Hotelling, etc. The usefulness of the notion of equilibrium conditions from which emerges our solution lies in the fact that by so doing we often gain knowledge concerning possible and necessary responses of our variables to changes in data. Without such restrictions, our theories would be meaningless. The method of comparative statics consists of the study of the responses of our equilibrium unknown to designated changes in parameters.

Samuelson also discussed that according to general method involved the equilibrium of our variables can be regarded as the solutions of an extremum (maximum or minimum) problem, it is often possible regardless of the number of variables involved to be determined unambiguously the qualitative behaviour of our solution values in respect to change of parameters. If the equilibrium of a system is determined by extremum conditions where all unknown are independently, variable, the addition of auxillary constraints (satisfied by the equilibrium position) will leave the equilibrium unchanged.

The comparative statics show the determination of the equilibrium values of given variables (unknown) under postulated conditions (functional relationship) with various data (parameters) being specified.[17] Sometimes it is stated that an equilibrium is stable if a displacement from equilibrium is followed by a return to equilibrium. A displacement is equivalent to an arbitrary change in the initial conditions and is possible only if some of our functional equations are momentarily relaxed or if our system is enlarged to include impressed forces or shocks.

In his contribution, Samuelson discussed about Hicks concept of equilibrium. According to Hicks, for a single market, equilibrium is stable if an increase in demand raises prices. For multiple markets, equilibrium is imperfectly stable if an increase in demand for a single good raises its price after all other prices have adjusted themselves; the equilibrium is perfectly stable if an increased demand for a good raises its price even when any subset of other prices is arbitrarily held constant.

A system is dynamical if its behaviour over time is determined by functional equations in which "variables at different point of time" are involved in an essential way. Samuelson borrowed this concept from Professor Ragnar Frisch. Comparative dynamics included (i) a change in initial conditions, (ii) a change in some force actions in the system, i.e. autonomous investments vary (iii) there may be a change in some internal parameters of the system.

Samuelson also contributed numerous papers, articles of international repute. He remarked on January 2, 1932, that he was "born as an economist".

It may be concluded that Professor Samuelson beautifully explains the concepts of 'comparative statics' and 'equilibrium'. His analyses are mainly based on equilibrium economics. He can be placed in the rank of modern theorists.

In the end of our analysis of the contribution of the six economists to the advances of the economics of equilibrium, it may be said that they all believe that in the modern world the economic system is purely dynamic. Nothing is constant. Labour, capital, techniques of production, organisation, tastes and preferences of consumers vary from one period to another and from one region to another. Hence, Economics should be studied with dynamic equilibrium concept.

While the disequilibrium economists have diverted our attention to the importance of disequilibrium in economic theory as discussed in the last chapter, the six economists cling to the importance of equilibrium analysis. Thus there is a need to strike a balance between the two opposing stands.

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Chapter V

DEVELOPMENT OF RADICAL ECONOMICS

The main pioneers in the development of radical economics are Joan Robinson, Maurice Dobb, Paul Baran, Piero Sraffa, Paul Sweezy, Samuel Bowles, Michio Morishima, Albert O. Hirshman, Samir Amin and others. However, owing to lack of sufficient materials, we propose to discuss the contribution of only two radical economists namely Robinson and Morishima. But before we proceed to discuss the contribution of the above two economists, we feel it relevant to define the nomenclature 'Radical Economics'.

The term "radical" has acquired a new dimension in economic thought. The Dictionary meaning of the word radical is that 'affecting the foundation, essential or fundamental or forming the basis'. The International Encyclopaedia of Social Sciences has this to say :

"The term 'radicalism' always points to some analytical or revisionist function. It implies a concentration of the focus of relevance on a particular principle, at the expense of the traditional sanction regard for the complexities of context. The element thus abstracted becomes the salient on which inference and action are based. Radical tends to comprehensive; no matter where it starts, it tends to assimilate all aspects of life to the initial principle".[1]

Thus it is not surprising that the nomenclature "Radical economics" should have attained such a status as to form a new branch of economics dealing with a comprehensive doctrine not based on logical deduction. It is a unified and internally consistent projection of a completely new version of human life. It always sticks to reality. It rejects orthodox theories which

are absolutely inapplicable and suggests revision wherever necessary. In this context, it is thought important to discuss in this chapter the contribution of the two radical economists.

JOAN ROBINSON

Mrs. Robinson is included in the group of radical economists because initially she was Marshallian but later on she became a supporter of Keynesian economics. In addition, she studied Marxian economics in detail. Many English economists once regarded her as a Marxist. But she was neither pure Keynesian nor a Marxist. She argued that there are many similarities between Marx and Keynes but this argument was paid less attention by economists. In order to understand different economic systems of the world, it is necessary and essential to study both Marxian and non-Marxian economics. She supported the view that economics is a dynamic subject and revision and reinterpretation of economic theories are always essential to reach the reality.

Life Sketch

Joan Robinson was born in Surrey in 1903 and educated at St. Paul's Girls' School, London and Girton College, Cambridge. She joined the Cambridge faculty as an assistant Lecturer in Economics. She became a University Lecturer in 1937, Reader in 1949 and finally a Professor in 1965, and retired in 1971. At first Mrs. Robinson was influenced by the Marshallian thought but later on she switched over to Keynesianism. Her own contribution to

the study of imperfect competition helped shatter the Marshallian inheritance.

Her Works

Robinson's publications include Economics of Impefect Competition (1933), Essays in the Theory of Employment (1937), Essay on Marxian Economics (1942), Collected Economic Papers, Vol.I (1951), Vol.II (1960) and Vol.III (1965), The Accumulation of Capital (1965), Essays in the Theory of Economic Growth (1963), and articles in Economic Journals. Her latest publications are Economics : An Awkward Corner (1966) and Freedom and Necessity : An Introduction to the Study of Society (1970). Mrs. Joan Robinson contribution are mainly found in four main fields : Imperfect Competition, Marxian Economics, Theory of Employment and Accumulation of Capital.

Her Contribution

Robinson in her contribution discussed that Cournot was the first economist who showed a clear grasp of imperfect competition in his Researches into the Mathematical Principles of the Theory of Wealth (1838). Cournot took the example of the owner of a spring well who being a monopolist, would fix the price of water at a level which would give him the maximum revenue. Similarly, he took the example of duopoly, i.e. two proprietors of such springs competing with each other in the same market. But credit should be given to the Italian economist, Pierro Sraffa, for presenting a general outline of the theory of imperfect competition. He published an article under the caption

'The Laws of Return under Competitive Conditions' in the 'Economic Journal' of December, 1926. In that article, he elucidated that the theory of value could be discussed from two standpoints viz., monopoly and perfect competition. This new approach with two alternative analysis to the situation of reality shook the very foundation of the classical theory.

Recently two names are associated for the theory of imperfect competition namely Edward Chamberlain and Mrs. Joan Robinson. The former had written a book, The Theory of Monopolistic Competition, the latter, The Economics of Imperfect Competition. These two masterpieces appeared almost at the same time. Dr. Chamberlain claimed that he should be regarded a pioneer in the field of imperfect competition since he had put the same idea in his Ph.D. thesis presented in 1927. Mrs. Joan Robinson, however, wrote in the foreword to her book that Professor Chamberlain's Theory of Monopolistic Competition provides a plentiful group of coincidences. She further said, "it appeared too late for me to notice them in detail".[2]

Mrs. Robinson introduced two notions in her theory of imperfect competition, namely 'marginal cost' and 'marginal revenue'. The former implies the net addition to the total cost and latter indicates the net addition to the total revenue earned by the additional unit. According to her, if rival producers are seen producing distinctive articles, it is certain that the competitive theory will be put aside. A monopoly may be said to exist when consumers are ready to pay higher prices for the product of a producer than for the competing goods (product differentiation of similar quantity). She lays emphasis on the

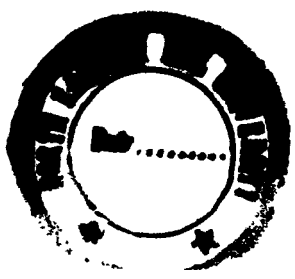
basic proposition - the demand curve of the individual firm will slope downward.

It is explicitly necessary to note that under imperfect competition, every producer is a kind of monopolist subject only the possibility of consumers substituting rival products for the one produced by him. The demand curve, under such conditions, is affected by the degree of elasticity because if the latter is less than unity at the point of estimated output the marginal revenue would be either zero or less. If this is the case, it would advisable for the producer to contract the market operations. If the demand for the commodity varies, elasticity and marginal cost will also be affected, and with a change in the marginal cost, the direction of price movements must change, it will depend upon the elasticity of the new demand curve. The factors that underline these formal changes (greater income of buyers, increase in their number, higher costs of possible substitutes and elimination of rivals from the market) will affect total demand; and their impact will be different for different producers.

We can easily admit without any hesitation that consumers take into account not only the price factor but also the quality of the product, cost of transportation, service, location and credit facilities on the basis of which, they distinguish between sellers. Mrs. Robinson did not mention the problem of product differentiation, but it is clear that it permeated her analysis. Extending her analysis to input factors she lays emphasis on the fact that the expansion under the conditions of limited supply will increase their prices, and if the producer can have choice between the relatively scarce and relatively

plentiful factors, he would possibly substitute one for the other. Even then, the economics enjoyed by large scale production can counter balance any increase that accrues from the use of scarce factors. She also discussed buyer's monopoly, i.e. monopsony. She pointed out that where labour is the input factor, two things are useful - the organization of trade unions and the enactment of minimum wage legislation impose the conditions of equality of two marginal measures - marginal total value and marginal physical product, and foster a better utilization of economic resources of the country. She believed that exploitation takes place on account of the absence of perfect elasticity in the supply of labour, which can be enforced effectively by trade unions.

Mrs. Joan Robinson explained Keynesian economics in an analytical manner with a critical discussion. She elucidated that the traditional theory of money "ceased to be the Theory of Money, and become the Analysis of Output".[3] The orthodox economists had used the tools of demand and supply to explain the purchasing power of money in their theories of money. She argued that the changes in the price level has a severe repercussion in the working of an economy because it affects the volume of output, employment, and wealth of the community as a whole. But till now no economist takes pain to study these variables in their quantity theories of money. Robinson pointed out that the Fisherian Equation and Cambridge Equation of the Quantity Theory of Money are similar in their analysis but different in their approach. This can be illustrated as follows :



Cambridge Equation

$$\Pi = \frac{KR}{M}$$

where Π represents purchasing power of money

R = the real National Income

K = the proportion of real Income held in the form of money i.e., cash and bank balances.

M = Quantity of money

KR = demand for money in terms of real wealth.

Fisherian Equation

$$MV = PT$$

$$P = \frac{MV}{T}$$

where P represents price level

M = total quantity of money

V = its velocity of circulation

T = volume of transaction

MV = total quantity of money in circulation

PT = total volume of transaction.

But the exponents of the two equations were in a paradoxical position because they were not satisfied with their own apparatus. In the case of Fisherian Equation, Robinson wrote "a theory of money which does not mention

the rate of interest is not a theory of money at all".[4]

Mrs. Robinson explained that when Keynes, wrote his Treatise on Money, he failed to realize the fact that the subject with which he was dealing was the analysis of output. Keynes discussed the relationship of the quantity of investment to the quantity of saving in his Treatise. Further, he also pointed out that "savings exceeds investment, consumption goods can only be sold at a loss. Their output will consequently decline until the real incomes of the population is reduced to such a low level that savings are perforce to equality with investment."[5]

Mrs. Joan Robinson in her paper 'Kalecki and Keynes' discussed that both these two economists came from different political and intellectual background but reached the same conclusion. Keynes The General Theory of Employment, Interest and Money was published in 1936 whereas Kalecki's book Essays in the Theory of Business Cycles was published in Polish in 1933. Both of them used the concept of effective demand in their analysis. Kalecki viewed that the problem of unemployment could be reduced by investment in the economy. His analysis avoided the concept that there is equality of saving and investment. He did not study the theory of unemployment through Kaln multiplier. Kalecki never learned orthodox economics whereas Keynes did. Kalecki studied the economics of Marx but Keynes was unable to understand Marx. Kalecki was even successful to elaborate the concept of marginal efficiency of capital of Keynes in a clear manner. Both of these two economists claim the credit for the Keynesian revolution. Keynesian economics

cannot be understood without taking into consideration both of them. It is absolutely difficult to say that Kalecki was first and Keynes was second or Keynes was first and Kalecki was second. We need a critical research in these context.

There was a belief in Britain and Austria (1929) that both private and public expenditure did not increase employment in the economy. But Keynes repudiated this concept and formulated a theoretical model in this context. According to Keynes, in a market economy if there is unemployment of workers and of productivity capacity, it is necessary to increase expenditure in terms of money (from private sector from the general public) to increase output and employment in the economy. Britain and America accepted the notion that 'a high and stable level of employment' to give solution to the problem of unemployment in the contemporary world. Keynes' theoretical models are not sufficient to analyse the complex problem of the world that was prevailing after 1960s, i.e. unemployment, low productivity, problem of balance of payments and inflation. She wrote, "The Keynesian still remains to be made, both in teaching economic theory and in forming economic policy".

Marxian Economics

Robinson attempted to analyse Marxian economics with a comparison of Marx and Marshall, and Marx and Keynes. Marx's explanation was based on labour-value of money as the cost of account. There is no cost of production. Labour only produces value. Marxian tool of analysis is based on three

ratios (i) the rate of exploitation, (ii) the rate of profit on capital and (iii) organic composition of capital. He divided the total gross annual output of the industry into three components, viz., (i) constant capital is raw material entering into final output, wear and tear of plant. It can be represented by the symbol 'C'; (ii) variable capital 'V', i.e. annual wage bill and (iii) surplus 'S', i.e. interest, rent and profits. Marx wrote $\frac{S}{V}$ to denote the rate of exploitation and $\frac{S}{(C+V)}$, the rate of profit on capital. Marshall's familiar economic axiom that a man purchases labour and commodities with that portion of his income which he saves just as much as that which is said to spend. Let us make another comparison between Marx and Keynes. Marx regarded that capitalist system itself contains the germs of its own destruction. Keynes wrote that capitalist system as a permanent almost a logical, necessity. According to the latter, the interest obtained by owing capital as the reward of abstinence or waiting, and profit as the reward of enterprise. Marx treats interest, profit as the reward of enterprise. Marx treats interest, profit and rent as unpaid labour or surplus value. Keynes wrote : "It is preferable to regard labour ... as the sole factor of production, operating in a given environment of technique, natural resources, capital equipment and effective demand.[6]

The essence of Keynes theory can be enumerated in the following manner. The demand for goods falls short of the productive capacity of industry because of an unequal distribution of income. The market is unprofitable due to the fact that consumers do not have the purchasing power. The people who possess wealth are not genuine consumers but they are saver. If there is sufficient demand for new capital investment especially in houses, industrial equipment,

means of transport, growing stocks of goods etc. and if and only if savings are utilised then the system functions adequately. Savings do not provide guarantee for capital accumulation. On the contrary, saving limits the demand for consumption goods and so limits the demand for capital to produce them. Profitable outlets for investment creates booms.

In the nineteenth century when there were large opportunities for profitable investment in exploiting new inventions and developing new continents, there was long period of prosperity. In war time pseudo-prosperity occurs because war created unlimited demand. For a highly-developed capitalist system, prosperity is not the normal state. Increased wealth and saving makes prosperity harder to attain. Keynesian theory is inapplicable to analysis post-war inflation. But still it revolutionized the theory of International Trade. Marxian theory and Keynesian theory are similar in may respect but still less attention is paid to their comparative study by English academic economists. Mrs. Joan Robinson pointed out two serious defects of Marxian apparatus and she wanted to remedy them, so that Marxian economics can be easily applied to solve the problem of capitalist economy of present day.

In Marxian terminology constant capital, i.e. 'C' represents productive equipment (factories, machinery etc.) and raw material; variable capital 'V' implies the wage bill and surplus 'S' include rent, interest, and profit. So, C+V+S represent the flow of production say per year, then 'C' is not the stock of capital invested, but the annual-wear-and tear and amortization of capital $\frac{S}{(C+V)}$ is the share of profits in turnover, and not the value of profit on capital

invested. The rate of profit which (for Marx as in orthodox systems) tends to equality in differnt lines of production and the rate of profit which tends to fall as capital accumulates is not $\frac{S}{(C+V)}$, but the rate of profit on capital invested. Marx himself was well aware of this point, but his habitual use of the expression $\frac{S}{(C+V)}$ for the rate of profit on capital is excessively confusing.[7] Academic economists are much concerned without output and other concepts such as 'real national income' the level of real wages'. But Marx methods of analysis in terms of value do not take into consideration these aspects as a whole. The difference between Marx and pre-Keynesian economics is on the question of the total supply of capital and the rate of profit on capital as a whole.

International Economics

So far as International Economics is concerned, Mrs. Robinson argued that every industrial nation is anxiously looking for prospects of sales. The International Market has not increased in such a manner as to absorb the sales of all countries of the world as a whole. As a consequence, each government feels it a worthy and commendable aim to increase its own share in world activity for the benefits of its own people. This phenomenon is called 'New Mercantilism' by Joan Robinson. The main characteristic of new mercantilism is that every nation wants to earn a surplus at the cost of other nations.

Some economists regard Mrs. Robinson a Marxist. But she was not a Marxist though she studied in detail Marx's capital. In this context we can

quote her, 'capitalism, if it is managed with intelligence and good-will, may continue to flourish in economics that are already developed".[8]

In conclusion, it can be said that Mrs. Robinson is indeed a radical economist. She has attempted to reconcile different branches of economics, namely, Classical, Keynesian, Marxian, etc. Her contribution has opened new fields of investigation in economic thought and doctrine.

MICHIO MORISHIMA

Like Mrs. Robinson, Michio Morishima is regarded a radical economist. Academicians or orthodox economists have regarded Walras as the pioneer in the general equilibrium theory. But in reality it is incomplete. Evern Marx should get credit for equilibrium analysis. Morishima has mathematically proved equilibrium economics. He opined that there should be revision of Keynesian, Marxian and Walrasian models in order to assimilate all aspects of human life.

Life Sketch

Professor Morishima, the Japanese mathematical economist, was born in 1923 in Osaka. He took his B.A. degree in 1946 from the University of Kyoto. He taught at the University of Kyoto in 1950 and moved to the University of Osaka in 1951. He spent two years at the University of Oxford in England and Yale University in America from 1956-58. Finally, he emigrated

to Britain in 1968, became first a Professor of Economics at the University of Essex (1968-70). Then he became a Professor of Economics and Chairman of the International Centre for Economics and Related Disciplines at the London School of Economics.

His Works

Morishima's main publications are Theory of Economic Growth (1969), Marx's Economics : A Dual Theory of Value and Growth (1973), Economic Theory of Modern Society (1975), Walras' Economics (1977), Value, Exploitation and Growth (1978).

His Contribution

Morishima says that it is a regrettable fact that economists have for a long time been divided between the 'orthodox' and the Marxian camps as a result of cliquishness; each school has lost touch with the other and has become inbred. In his view, Marx and Walras should really be honoured together as the progenitors of the modern dynamic theory of general economic equilibrium. Marx was the first economist to obtain a vigorously scientific macro-dynamic model and his work is still highly relevant for contemporary economics. His main contributions are reviewed below :

Labour Theory of Value

The labour theory of value has two functions in Marxian terminology

namely (i) to explain the equilibrium prices (or the exchange values) of commodities, around which actual prices fluctuate over time, and (ii) to provide aggregators, or weights of aggregation, in terms of which a large number of industries (or primitive sectors) are aggregated into a small number of 'departments'. Marx explicitly explained the first part in his Capital and was unaware of the second part. The followers as well as the antagonists of Marx explained only the first part of the labour theory of value. But Morishima believes that the second aspect is more important as compared to the first aspect. Marx formulated two definitions of value. According to the first definition, "all that these things now tell us is, that human labour-power has been expended in their production, that human labour is embodied in them. When looked at as crystals of this social substenance, common to them all, they are values."[9]

According to the second definition of Marx, "we see then that that which determines the magnitude of the value of any article is the amount of labour socially necessary, or the labour-time socially necessary for its production."[10] Marx actually regarded these two definitions as synonymous but Morishima argued that only with rigorous proof their equivalence can be provided, The latter also pointed out that there are hidden assumptions in the Marxian theory of value. He believed that the most basic assumption of Marx must be that the technology has already been developed to such a level that production processes which are 'productive' are available to the capital goods industries of the society. Morishima stated that "Marx took a particular commodity (say, capital good 1) as the standard commodity (or 'value numeraire')

in terms of which the value of every other commodity was expressed. The ratio of the value of commodity 'i' to the value of the standard commodity, λ_i/λ_1, which Marx called 'Relative value' expresses a definite quantity of the standard commodity, 'q', which is equivalent, in 'value', to one unit of commodity 'i'; that is to say, $\lambda_i = q\lambda_1$, which means that the same quantity of value substance (congealed labour) is embodied in one unit of commodity 'i' and 'q' units of the standard commodity".[11] We can quote from Marx capital Vol.I that "the two commodities (of these quantities) have each cost the amount of labour or the same quantity of labour-time".

As far the society of simple commodity production is concerned Marx worte "the labourers themselves are in possession of their respective means of production and exchange their commodities with one another". He explained his theory of value by characterizing commodities as something two fold, both 'objects of utility' and at the same time, 'depositories of value'. In many respects Marx theory of value is similar to that of the Marginal Utility Theory of Consumers Demands.

Marxian Economics

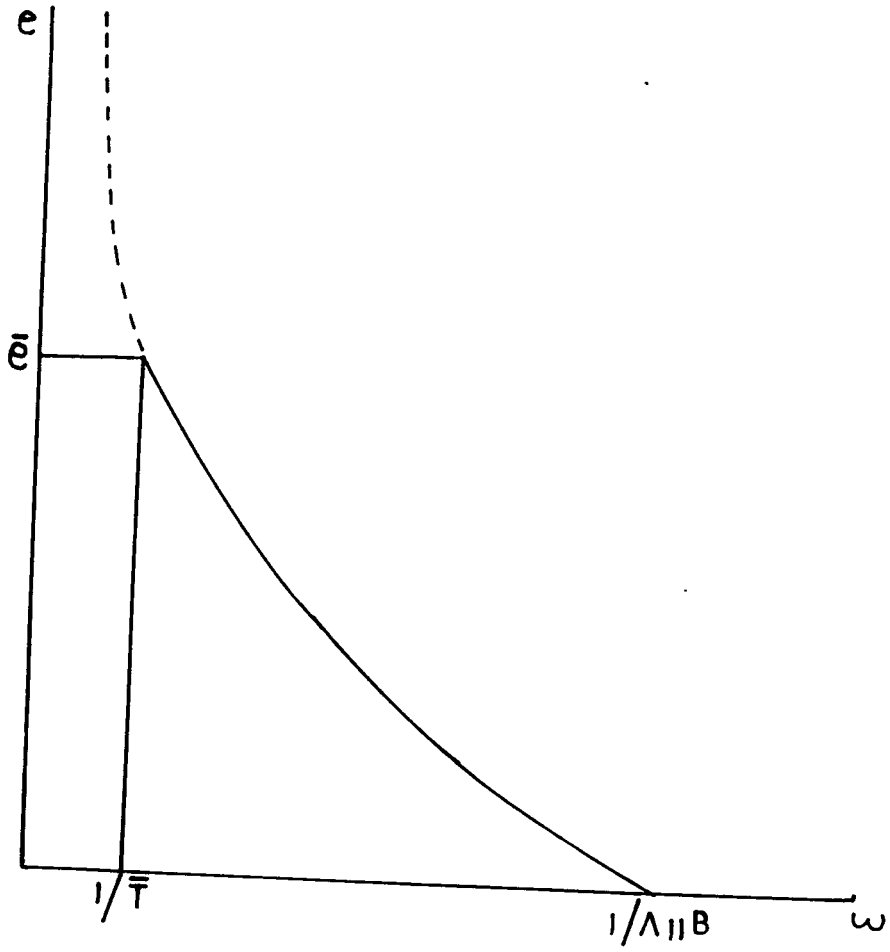
Morishima is of the opinion that Marxian system has dual accounting systems : one system in terms of value while the other in terms of price. But many notable economists, viz. Sweezy, Joan Robinson and Samuelson were confused regarding this point because they often treated values and prices as synonymous. He also explained the theory of exploitation of Marx with

the help of a graph. Morishima assumed that technology is developed in such an extent that capital goods or means of production are productive. The techniques adopted by industries are so productive that the value of wage goods $\Lambda\omega$ are low enough to make the total value of the means of subsistence $\Lambda\omega\beta$ less than the maximum length of the working day $\bar{T}$. Thirdly, the actual working day T is long than the necessary labour time $\Lambda\omega\beta$. In other words, the 'real-wage rate' ω is less than the maximum rate, $1/(\Lambda\omega\beta)$. Under these conditions the formulae

$$e = \frac{\text{Surplus labour}}{\text{Necessary labour}}$$

('e' denotes the rate of exploitation) enables us to draw the exploitation rate curve in the e,w plane. In the diagram it traces out a downward sloping curve, starting from $\omega = 1/\bar{T}$ and ending at $\omega = 1/(\Lambda\omega\beta)$. Marx wrote 'the working day (hence, the reciporcal of the working day, ω) is thus not a constant, but a variable quantity'. So the problem of determining the rate of exploitation is reduced to the problem of determining the length of the working day. When the worker's position is very weak, the working day will be prolonged as much as possible and the rate of exploitation will be maximised at e, the rate corresponding to $w = 1/\bar{T}$".[12]

Morishima assumed equilibrium prices and equilibrium rate of profit in the economy. He examined the relationship between the equilibrium rate of profits and the rate of surplus value. Let us first discuss Marxian view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of profit. He stated that "the capitalist does not produce a commodity for its own sake, not for the sake of its use-value, or for his personal consumption" but is interested in "excess value of the product over the value of the capital consumed by it". The surplus value is a surplus over the advanced total capital.

Marx represents the proportion of this surplus to the total capital by the fraction S/C, in which C stands for total capital. The rate of profit, i.e. S/C = S/(C+V), as distinct from the rate of surplus value S/V. On the other hand, 'the ratio of this surplus value to the advanced variable capital, or S/V, is called the rate of surplus-value and designated S'. Therefore, S/V = S' and consequently S = S'V. Now, substituting for s its equivalent S'V, we find P' = S'V/C = S'V(C+V), which equation may also be expressed by the proportion, P' : S' = V:C, where P' represents the rate of profit. It follows from this proposition that the rate of profit, P' is always smaller than S', the rate of surplus-value, because V, the variable capital is always smaller than C, the sum of V+C, or the variable plus the constant capital. Marx made the application of the above mentioned equations of the rate of profit, P' = S'V/C, to the various possible cases.

Marx obtained the results that the rate of profits of two different capitals or one and the same capital in two successive different conditions are equal only if the percentage composition of the capitals is the same if their rates of surplus value are identical. He also argued that they are unequal if the rates of surplus-value are the same and the percent composition is unequal. Marx arrived at the point regarding the 'falling rate of profit' on

the assumption that surplus value is created by variable 'capital only and that there is a tendency for the proportion of the variable capital to that capital to decline in the long run. Morishima argued that Marx derived these formulas and results under the assumptions that the profits and surplus values of individual industries are proportional to each other so that profits may be normalized at the level such that they are numerically equal to the corresponding surplus value. He assumes that Π_i and S_i stand for profits and the surplus value of industry i; and let C_iP and V_iP be constant and variable capitals in terms of prices. If we, further, assume $\Pi_i = S_i$ for each industry i (as Marx did in Part I of the volume III), then we have $C_iP + V_iP = C_i + V_i$ for each i. Hence

$$\Pi_i = S_i' \quad \frac{V_i}{C_i + V_i} \quad (i = 1, \ldots, m) \tag{1}$$

where Π_i and S_i' are the rate of profit and the rate of surplus value respectively. We may then ask under what conditions we have $\Pi_i = S_i$ and $C_iP + V_iP = C_i + V_i$ for all i, and we shall find that we may equate profits and surplus value, and prices and values, if and only if all industries have the same value-composition of capital. Therefore the equation (1) imply that

$$\frac{C_1}{V_1} = \frac{C_2}{V_2} = \ldots = \frac{C_m}{V_m} \tag{2}$$

So that it follows from (i) that

$$\Pi_i = \ldots = \Pi_m \text{ if } S_i = \ldots = S'_m$$

Hence we cannot derive Marx's proposition (ii) quoted from the formula (i), whilst in his proposition (i) the condition that 'the percent composition of the capital is the same is redundant".[13]

Marx's Transformation

According to Morishima, Marx's transformation problem consists of two sub-problems : (i) conversions the rate of surplus value into the rate of profit and (ii) conversion the values of commodities into their production prices. Before detailed discussion of the transformation problem in Marxian analysis, it is evidently necessary to draw at least three conclusions of Marx from his Capital, Vol.III. First, he assumed that "the sum of the prices of production of all commodities produced in a society - the totality of all branches of production is equal to the sum of their values". Secondly, he also stated that "the cost-price of commodity is always smaller than its values". Thirdly, he explained that "surplus value and profits are identical from the standpoint of their mass". Fourthly, he elucidated that "aside from possible differences in the periods of turnover, the price of production of the commodities would then equal their value only in sphere in which the composition (of capital) would happen to be (the same)". Last but not the least, he further, stated that "the value of the commodities produced by capital (of higher value composition) would, therefore, be smaller than their price of production of the commodities (produced by capital of lower composition) smaller than their value".

In the first three statements Marx often confused on account in terms of values with the corresponding account in terms of price. Inspite of the fact that price and value are two different concepts. The former is measurable in terms of money while the latter is measurable in terms of labout time. According to the last two statements, it is evident that Marx was aware that under a capitalist system of production, 'the law of value' was not in force in its pure and simple form and that prices of commodities would deviate from their values. Therefore, transformation problem is possible if and only if the prices are normalized in such a way that they are dimensionally identical with values. The question of normalization is not a difficult task. If prices are measured in terms of labour they can be compared with values. Morishima believed that the transformation problem in Marxian economics can be found correct only if there will be some revision of Marx's proposition under additional assumptions. His view is not totally correct in this context since Marx transformation problem still has its own validity.

Samuelson wrote : "This mathematical fact (that prices of commodities will not be proportional to their values when there is exploitation) willl not be of comfort to one looking for a labour theory of value as a base point for a theory of labour exploitation, the propositionality of market price to labour content applies validity only when surplus value is zero and not worth talking about".

In the transformation problem, Marx was not interested to establish

a proportionality between values and prices. But on the other way round he shows that individual exploitation and individual profits are disproportional unless some restrictive conditions are imposed. Marx also wrote that the rate of profit is from the very outset distinct from the rate of surplus value. He, further, states that the rate of profit may rise or fall but the rate of surplus value remains the same. Because capitalists are mainly concerned with the rate of profit. The transformation of values into (different) prices of production serves to obscure the basis for determining value itself. Marx wrote : "The individual capitalist (or all the capitalists in each individual sphere of production), whose outlook is limited, rightly believes that his profits is not derived solely from the labour employed by him or in his line of production. This is quite true, as far as his average profit is concerned. To what extent this profit is due to the aggregate exploitation of labour on the part of the total social capital, i.e., by all his capitalist colleagues - this interrelation is a complete mystery to the individual capitalist; all the more so, since no bourgeois theoriests, the political economists, have so far revealed it."[14]

Aggregation Problem

So far as the aggregation problem is concerned, Marx dealt the simplest case of aggregate. He included all capital goods into one department and all wage and luxury good industries into another department. In volumes I and III, he discussed the Microeconomic analysis of value and prices. In Vol.II the Macroeconomics of reproduction and accumulation. Marxian aggregation

in terms of value is comparable to Keynesian aggregation in terms of wage units. Marx pointed out that relative market price fluctuate with time. As a consequence, they affect the coefficients of the macroeconomics model in terms of wage units, on the basis of which macro analysis are made in order to explain market prices and other things that happen in the market. Samuelson, stated that the transformation problem in Marx is a 'pointless' problem.

French economists were very much influenced by Quesnay's Tableau Economique and they were in search of a theory of general equilibrium. Marx, too, was profoundly influenced by Quesnay and formulated his models of general equilibrium as early as Walras. Marx's model of simple reproduction is similar in many respect to that of Walras static general equilibrium system of production. But Marx analysis was wide than Walras because in his theory of reproduction he was concerned not only with the usual problem of reproduction of commodities, but also with the reproduction of the capitalist class and the working class, and thus the reproduction of the capitalist character of the entire process of production. Marx's models consists of sub-systems which are not only 'duals' of each other but alo in addition to a price - determining sub-system which is a dual of the output determining sub-system, a value determining sub-system which is also a dual of the output sub-system, so that they have dual duties.

Nevertheless, the duality between the value and output sub-systems enabled Marx to aggregate his models in terms of values into two departments

by assuming, as a first approximation to reality, that the value structure of the industry is similar which each of the two major departments. Let us first analyse Marx's static model. It is assumed in the simple reproduction model that both capitalists as well as workers do not save. Their whole income is entirely devoted to consumption of wage goods to the extent that they are necessities of life and luxury goods. The consumption of the capitalist class in terms of values equals the total surplus value acquired by exploiting workers in terms of prices, it equals the total amount of profit earned.

Marx constructed the model of simple reproduction not for its own sake, but as an introduction to the dynamic model of 'reproduction in an extended scale' of which it is a special case, with the steady rate of growing being zero. Reproduction on an extended scale is not posible in a society where it is technically and biologically infeasible to exploit workers so as to yield a total surplus value greater than the value of the necessities of life which the capitalist require. Marx assumed that the portion of the newly created money capital capable of being converted into variable capital will always, find at hand the labour-power into which it is to transform itself. Marx's assumption is similar to that of Von Neumann did, that the labour force could be expanded at a rate which was higher than in the maximum rate of growth of capital or at least that the supply of labour could adjust itself quickly and smoothly to demand.

Marx introduced a peculiar investment function according to which (1) capitalists of department I devoted a constant proportion of their surplus

value to accumulation, (2) it was reinvested in department I so that it was converted into constant and variable capital, (3) capitalists of department II adjusted their investment in order to maintain equality between demand and supply for capital goods.

According to Morishima in Marxian economics, with the advance of accumulation the proportion of constant to variable capital changes with the growth of total capital, its variable constituent or the labour incorporated in it also increases by a constantly diminishing rate. Technological improvements in production reduce the demand for labour force "the labouring population produces along with the accumulation of capital produced by it, the means by which itself is made relatively superfluous in turned into a relative surplus population. It forms the industrial reserve army which is a condition of existence of the capitalist mode of production and a mass of human material always ready for exploitation.

According to Marx, the constant or periodical increase of the reserve army will grow, "the mass of misery, oppression, slavery, degradation, exploitation, but with this too grows the revolt of the working class, a class always increasing in number and disciplined, united, organized by the very mechanism of the process of capital production itself. The monopoly of capital becomes a fetter upon the mode of production,which was sprung up and flourished along with under its centralization of the means of production and socialization of labour at last reach a point where they become incompatible with their capitalist integument. The knell of capitalist private property sounds. The

expropriators and expropriated" (I,P,863).

Marx believed that an increase in the reserve army induces a decrease in the real wages, so that the capitalists are more fortunate to exploit workers at a greater rate. He, also, further elucidated that the rate of profit falls as the process of economic development advances. In his own terminology "the gradual growth of constant capital in relation to variable capital must necessarily lead to a gradual fall of the general rates of profit so long as the rate of surplus value or the intensity of exploitation of labour by capital remain the same".

Morishima in his masterpiece, Theory of Economic Growth said 'only by treating capital goods at different stages of wear and tear as qualitatively different goods, so that each capital good newly defined can serve only for one period, can we adequately deal with the structure of capital stock'. Marx almost came up with this 'golden rule' way of treating depreciation of capital goods which was later developed by Von Neumann, but he did not follow through with it.

Marx in his Capital, Vol.I wrote: "nothing can have value without being an object of utility. If the thing is useless, so is the labour contained in it; the labour does not count as labour, and therefore creates no value." This implies that if a good is useless even though it contains a positive amount of labour, its value has to be set at zero. The actual values are generally different from the optimum values. But Marx was mainly concerned with

the former and not with the latter. Marx labour theory of value is difficult at first sight. But on a closer examination enables us to see that it is in conflict with his theory of exploitation, unless the conversion ratios are determined to be proportional to the wage rates of the various kinds of labour. We can emphasise the point that Marxian economists should be able to reinterpret the labour theory of value. If it has to determine the accounts of labour with the techniques of production actually adopted in a capitalist economy, require directly and indirectly, in order to produce commodities, it is not a satisfactory theory at all.

Walras' Economics

Morishima's analysis of Walrasian economics is another masterpiece of his. Walrasian theory of general equilibrium is misunderstood by many students as well as his followers. Two economists namely Schumpeter and William Jaffe praised the contribution of Walras. Schumpeter states that his inherent logic, inevitability and power impress us as a natural event.He convinces us that economic theory could be treated mathemtically. He is concerned in the method and not in any specific problems. William Jaffe explained that Walras expounded his philosophy of social reform based on mathematical ideas of Victor Cousin and Etienne Vancherot calls for a conciliation of interest.

Ideological as his position was, he resisted the efforts of his Saint-Simonian friends to enrol him among their number because their socialism

was unscientific. Schumpeter and Jaffe appreciate part II, VI of the Elements of Pure Economics. Saying that they are richest and most important part of all Walras' three main volumes on pure economics, applied economics and social economics. Walras formulated four models of general equilibrium in these parts, they are (1) of exchange (of two and then more than two commodities) (2) of production, (3) of capital accumulation or economic growth and (4) of money and circultion. From the single principle of maximum utility, he derived demands for commodities, aggregate savings and the desired cash balance as functions of prices and the rate of interest.

Walras was influenced by his father's theory of social wealth and Cournot's theory of arbitrage. The originality in his study was free competition. He was successful to introduce mathematics in social sciences. In this context he said "the twentieth century which is not far off, will feel the need .... of entrusting the social sciences of men of general culture, who are accustomed to thinking both inductively and deductively and who are familiar with reason as well as experience. The mathematical sciences of astronomy and mechanics .... and on that day justice will be done to our work." Walras explained the phenomena of an exchange economy where all individuals are price takers. Let P be a price vector, $P = (P_1, P_2 \ldots, P_n)$ each individual is provided with certain quantities of n commodities $X, X_2, \ldots X_n$, before trade, and wishes to convert them into $X_1, X_2 \ldots X_n$ through exchange so as to maximise his utility function:

$$U = U(X_1, X_2 \ldots, X_n) \tag{1}$$

He will maximise it, subject to his budget equation :

$$\sum P_i X_i = \sum P_i \bar{X}_i \tag{2}$$

In addition, the stock of commodities he holds after trade should be non-negative

$$X_i \geqslant 0 \quad (i=1, \ldots,n) \tag{3}$$

In the case of an economy with two commodities, Walras wrote : "Given two commodities in a market, each holder attains maximum satisfaction of wants, or maximum effective utility, when the ratio of the intensities of the last want satisfied, or the ratio of their raretes (i.e., marginal utilities) is equal to the price." Of course, it is possible that a party to the exchange may find it to his advantage to offer the entire amount of whichever one of the two commodities he possesses to start with (i.e. to have $X_{i=0}$ for commodity i with $X_i > 0$) or to demand none at all of the other commodity (i.e. to have $X_{i=0}$ for i with $X_{i=0}$). For the latter case he concluded "the quantity demanded of one of the two commodities by a holder of the other commodities becomes zero. Whenever the price of the commodity demanded is equal to or greater than the ratio of the intensity of his maximum want for it to be intensity of the last want which can be satisfied by the quantity possessed of the commodity offered (i.e. the ratio of their marginal utilities)". For

the former "the holder of one of the two commodities will offer all he possesses of that commodity demanded in exchange is equal to or less than the ratio of the intensity of the last want which can be satisfied by the commodity whenever the price of the commodity demanded in exchange in equal to or less than the ratio of the intensity of the last want which can be satisfied by the commodity demanded to the intensity of the maximum want satisfied by the commodity to be offered."

The above quotations doubtlessly proved that Walras accepted subjective equilibrium for the two commodity analysis. Walras obviously knew the fact that nothing will be changed when several commodities are exchanged. He also does not accept the British labour theory of value and French utility theory because none of them consider the elements of 'scarcity' in their analysis. According to him, "Surely, if labour has value and is exhcnageable, it is because it is both useful and limited in quantity, that is to say it is scarce. Value thus comes from scarcity. Things other than labour, provided they are scarce, have value and are exchangeable just like labour itself". So far as the utility theory is concerned, he wrote : "Utility is not sufficient to create value. Besides being useful, a thing must be scarce, i.e., it must not exist in unlimited quantities; the air we breathe, the wind that fills the sails at sea or turns wind mills on land, the sun that gives us light and heat and ripens our harvests, water and steam from heated water, these and many other forces of nature are not only useful, but indispensable. And yet they have no value. Why? Because they are unlimited in quantity and everyone can obtain all he

wants of them whenever they are present all, without giving up any thing or making any sacrifice in return." It is explicitly verified by Walras in his theory of exchange that all valuable and exchangeable things are useful and the same time limited in quantity and vice-versa.

To reach an equilibrium in the real world, Walras assumed that for each and every commodity there was a perfectly organised market. Walras minimised monopoly elements in his analysis and assumed that the exchange of several commodities for one another in the market is empirically solved by the mechanism of competition. He wrote "the markets which are best organised from the competitive standpoint are those in which purchases and sales are made by auction, through the instrumentality of stock-brokers, commercial brokers or cries acting as agents who centralize transactions in such a way that the terms of every exchange are openly announced and an opportunity is given to sellers to lower their prices and to buyers to raise their bids. This is the way business is done in the stock exchange, commercial markets, grain markets, fish markets, etc. Besides these markets, there are others, such as the fruit, vegetable and poultry markets, where competition, though not so well-organized, functions fairly effectively and satisfactorily. City streets with their stores and shops of all kinds - baker's, butcher's, grocer's, tailor's, shoemaker's, etc. - are markets where competition though poorly organized, nevertheless operates quite adequately. Unquestionably competition is also the primary force in setting the value of doctor's and lawyer's consultations, of the musician's and the singer's recitals, etc."[15]

Moreover, what is bought and sold in the stock exchange of a large investment centre like Paris or London are "titles of property in shares of very important kinds of social wealth, such as fractions of state and municipal loans or shares of railways, canals, metallurgical plants etc."[16] The prices generally do not deviate from equilibrium values because important commodities have their own well organized markets even less competitive commodities are able to find competitive equilibrium under the pressure of competition.

Walras was also concerned with the problem of formation of general equilibrium in an economy where production is simultaneous with exchange. In this economy both inputs and outputs must be determined. Let us assume that the available quantities of the factors of production are given. Walras did not make the distinction between producible and non-producible factors of production. He believed that all factors are owners of some factors of production. "The economy has only two groups of goods and services; commodities and factors of production. There are a number of industries or firms, each producing a single commodity by means of commodities and factors, while factors are not produced. There are consumers who buy commodities with the income from the factor they own. However, there are no banks nor government and no international trade. Long-run dynamic factors such as production periods and expectations, as well as investment, are all neglected."[17] Walras implicitly made the assumption in his model that the aggregate excess profit (or supernatural profit) which may accrue in a positive or negative amount in the process of establishing an equilibrium is not distri-

buted among individuals, so that the amount is saved or disaved by firms. Morishima argued that in order to correct Walras' Law, the excess profit should be distributed among individuals according to their ownership of capital goods. But it is not necessary that excess profit should be distributed to individuals according to their ownership of capital, it can be reinvested in the economy for further production and to achieve a high economic growth rate.

We shall make a comparison of Walrasian rules with the Keynesian ones with respect to the stability of equilibrium in production. In a number of ways, Keynesian economics is different from neo-classical theory of Walras. First, Walrasian process of grouping in production is based on dual adjustment rules; (i) the prices of commodity is raised or lowered whenever there is positive or negative excess demand for that commodity or (factor); and (ii) the output of a commodity is expanded or reduced whenever the excess of its price over its cost of production is positive or negative."[18] In Keynesian economics, prices and outputs are always adjusted according to the following rules (a) the price of a product is raised (or lowered) if its current price falls short of (or exceeds) its minimum cost of production (b) factor prices are rigid downwards; they remain unchanged in spite of an excess supply of factors, though they rise if there is excess demand, (c) where there is an excess demand for (or supply of) the product of an industry, it increases (or reduces) its output. Keynes distinguished the effective demands for commodities and factors arising from actual income from the notional demands assuming a state of full employment whereas in Walrasian model full employment of all factors was automa-

tically established. Walras accepted Say's law whereas Keynes did not accept it.

Let us analyse a neo-classical model of Walras. In this model m^{th} is the factor of production. Let us represent Walrasian rules in terms of differential equation in the following manner. The differentiation with respect to time is denoted by a dot above the relevant symbol in this model.

$$\dot{P}_i = \mu \xi_i \quad (i=1, \ldots, n) \tag{1}$$

$$\dot{V}_k = \mu n_k \quad (k=1, \ldots, m-1) \tag{2}$$

$$\dot{X}_{s_i} = \omega \xi_{s_i} \quad (S_i = 1_i, \ldots, K_i), \ (i=1, \ldots, n) \tag{3}$$

Where

$$\xi_i = \begin{cases} E_i & \text{if } P_i > 0 \\ \max (E_i, 0) & \text{if } P_i = 0 \end{cases} \tag{4}$$

$$n_k = \begin{cases} F_k & \text{if } V_k > 0 \\ \max (F_k, 0) & \text{if } V_k = 0 \\ & \text{if } \bar{\bar{X}}_{s_i} > X_{s_i} > 0, \end{cases} \tag{5}$$

$$\zeta_{s_i} = \begin{cases} G_{s_i} & \\ \min (G_{s_i}, 0) & \text{if } X_{s_i} = \bar{\bar{X}}_{s_i} \\ \max (G_{s_i}, 0) & \text{if } X_{s_i} = 0 \end{cases} \qquad (6)$$

In the above equations E_i represents the excess demand function for commodity i, F_k means the excess demand function for factor K; C_{s_i} the excess profit from process S_i (i.e. the S_i^{th} process of industry i); P_i and V_k the prices of commodity i and factor K, repectively; X_{s_i} the output produced by process S_i, $\bar{\bar{X}}_{s_i}$ an output of the same process which is so large but it is not producible, because it causes a shortage of some factors regardless of the production level of other processes; and $\mathcal{U}$ and W the coefficients of price and output flexibilities, respectively. Equation (2) do not include the equation for factor m, which is the numeraire, and V_m is always fixed at I. The qualifications (4) and (5) state that where excess demand for a commodity (or factor) becomes negative when its price is zero, the price is no longer diminished but stays at the zero level; otherwise the prices of goods and factor increases (or decreases) if there is an excess demand (or supply) in the corresponding market. The qualification (6) implies that industry i no longer wants to increase the quantity it plans to produce by process S_i when its production reaches the infeasible level 0, eventhough the process is still unprofitable i.e. $G_{s_i} < 0$ otherwise the quantity produced by the S_i^{th} process increases (or decreases) according as it yields a positive (or negative) excess profit."[19]

Morishima praised Walras more for his growth and money theories than his exchange and production theories. Walras' growth theory did not consider the assumption that the stocks of goods and services available for consumption and production are constant. It is not necessarily required in his growth theory that there should be identity between aggregate saving and aggregate investment in a particular market. Let us quote from the Elements of Pure Economics, "Consequently, it is not enough for the landed capital, personal capital and capital proper .... to produce new income, our three categories of capital must also produce new capital goods proper to replace the capital goods worn out in use and destroyed by accident, and even to increase, it possible, the existing quantity of capital proper. Here we have one of the indices of economic progress. Imagine that we arrest the process of production again after a certain interval of time .... as we did before, and imagine that we find an enlarged quantity of capital goods proper. That would be a sign of a progressive state. One of the characteristic traits of economic progress is an increase in the quantity of capital goods proper."[20]

According as "the excess of income over consumption in the aggregate is greater or less than the excess of consumption over income in the aggregate, an economy is either progressive or retrogressive ... New capital goods are exchanged against the excess of income over consumption; and the condition of equality between the value of the new capital goods and the value of the excess gives us the equation required for the determination of the rate of new income."[21] Walras defined savings as the excess income over consumption.

He assumes a pure credit economy in which individuals can only save in his model either in the form of bonds or by increasing the quantities of durable goods they hold. He believed that his general equilibrium theory of capital formation as the real growth theory. So far as the growth model of Walras is taken into consideration, he elucidates that the capitalist, landowners and workers save their incomes in the form of capital goods for production. The real capital which is saved by different classes in the economy are lent to entrepreneurs or firm for investment in the economy. In his growth he was confined himself to Say's world in order to avoid logical inconsistency. Walras growth model mainly deals with temporary equilibrium. It will be established in a particular period, provided that prices, outputs and investments are all perfectly flexible. He wrote "equilibrium will be established effectively by the reciprocal exchange between savings to be accumulated and new capital goods to be supplied with a given period of time, during which no change in the data is allowed". According to Morishima the economic growth of Walras is similar to Hicks' approach in his Value and Capital. Walras also elucidates that in order to achieve reality "we must drop the hypothesis of an annual market period and adopt in its place the hypothesis of a continuous market. We pass from the static to the dyanmic state".

Walras' fourth model of general equilibrium can give a comprehensive, analytical picture of the real world. It deals with an economy where goods and services are determined in terms of money. Trades are done in exchange of money. Both consumers and producers hold money for the future. In the

models of exchange, of production and of capital accumulation, the importance of money has been eliminated. Hence, he wrote: "the time has now come to introduce these elements in order to complete our general problem of economic equilibrium."[22] Morishima mentioned that money has three functions namely (i) as standard of value, (2) as an accepted means of exchange and (3) as a store of value. Walras rightly explained that the function of money as a store of value can be explained not by introducing it into the exchange (or production) model, but by monetarizing real growth theory. In the Walrasian concept, there is no demand for money in the system of pure exchange and that of simple reproduction, since there is no place for saving and investment in these systems.

Walras' economy consists of four classes of people, landowners, workers, capitalists and entrepreneur. According to him the entrepreneur is a distinct fourth person, 'whose role is to lease land from the landowner, hire personal faculties from the labourers and borrow capitalists', in order to combine the three productive services in agriculture, industry and trade. Morishima is of the opinion that Walras' model is incomplete because he was concerned with an economy where capital goods and inventories directly owned by capitalists are rented to firms or entrepreneurs, and decisions concerning investment are, therefore, made by capitalists (i.e. savers) themselves so that there is no inconsistency between investment and saving such as Keynes emphasized. In such an economy there is inconsistency between investment and saving. It is due to the fact that investment decisions are made by entrepreneurs

or executive of firms, but saving decisions are taken by capitalists. Walras stated that in the monetary economy, the only way people can acquire (or dispose of) money is by supplying (or demanding) commodities.

In Walrasian general equilibrium theory of interest, there is adjustment of the rate of interest and the absolute level of prices. Walras said that equality between the two sides of the equation, i.e. saving investment equation, is achieved through an increase or decrease in the price of new capital goods brought about by a fall or rise in the rate of interest, according as the demand (savings) is greater than the supply (investment). The price of the service of money or the absolute price level is established through its rise or fall accordingly as the desired cash balance is greater or less than the quantity of money.

In conclusion, it may be said that Morishima's view that Walrasian theory needs revision is very tenable. In his three models, Walras did not pay much attention to the role of money. We might agree with Clower that money is the principal means of transaction in the economy. Walras pointed out that value is determined by scarcity. Scarcity is not the only factor which can determine value. The forces of demand and supply are equally necessary to determine value. Walras' general equilibrium is not free from weakness but undoubtedly it is a classic so far as equilibrium analysis is concerned.

Radical economics emerges with new arguments with mathematical validity. Radical economists have refuted the orthodox economic theories

and their analyses are multi-dimensional. Both Joan Robinson and Michio Morishima did not completely ingore Marx's contribution, but they rather held it to be still valid in the present world. They too believe that both Marxian and non-Marxian economics require revision and reinterpretation to maximise human welfare.

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Chapter VI

CONCLUSION

Economics is not a static discipline but it is flexible and dynamic depending on the socio-political set up of different countries of the world. It is a younger discipline of knowledge as compared to other disciplines such as History, Political Science, Physics, Chemistry, Medicine, Astronomy, Anthropology, Botany, etc. So new branches of knowledge are sprouting to enlarge the scope of economics.

At the end of our attempt to record the contribution of sixteen contemporary economists, it is now time to summarize them and to give our conclusion.

II

Stigler, Buchanan and Simon have along with others contributed to a new branch of knowledge in the discipline of economics which may be termed as The Economics of Information and Non-Market Decision-Making. Stigler has propounded the concept of price distribution and advertising as important variables of market economy and price theory. This helps in avoiding the ignorance of knowledge of price variation to a large extent in the theory of market.

Buchanan is the founder of 'public choice thoery' based on democratic process. The theory helps the individuals as well as the authorities not to make wrong decisions on investments on public goods.

Herbert A. Simon is famous for his concept of administrative behaviour, administrative principles, rationality and communication. Public Administration being one of the non-economic infrastructure in economic development. Simon's

contribution is considered as important in the contemporary economic theory. His contribution are taken as a good set of variables require in the decision-making process.

These three economists together have strengthened this new branch of economics which is growing and which must draw the attention of students of economics.

III

Clower, Leijonhufvud, Shackle, Kornai and Georgescu-Roegen have together built up the theory of disequilibrium in contrast to earlier equilibrium analysis. Clower gives new terminology to Keynes' 'Unemployment equilibrium', by introducing the concept of "dual-decision-hypothesis".

Leijonhufvud dealt with Keynes' theory of interest and information costs. Shackle's contribution rests on his writing about 'uncertainty', 'expectation' and 'unpredictable' future. He is very critical about the neglect of the problem of uncertainty in the writings of many economists. His idea is perhaps correct as anything can happen in any economy.

Kornai dealt with the General Equilibrium Theory of the Walrasian School. He criticises their theory. Georgescu-Roegen's 'Bioeconomics' and 'Entropy Law' are contribution of high order. His work is indispensable to understand and analysis the problem of modern economic literature.

Many economists do not accept Clower's view that many other economists have adopted his notion 'dual-decision-hypothesis' as the micro-foundations of a Keynesian type of macro-economics. Clower's contribution is largely theoretical in nature.

So far as Shackle's contribution are concerned, Shackle is of the opinion that the whole of economic literature is irrelevant to the modern world if the concpt of 'uncertainty' is excluded from it. The concept of uncertainty taken with other concepts of expectations are important in the context of recent changes in the communist systems that rules USSR and its satellites countries.

We cannot completely reject the General Equilibrium Theory as Kornai suggested although the theory may be modernised as done by many economists.

The six economists together have greatly contributed to new branch of economics namely the Economics of Disequilibrium. Their contributions are great in the sense that disequilibrium analysis since become a part and parcel of modern economic theories. It is because of these five economists and their friends that Economics of Disequilibrium emerges as a vital topic in contemporary economic discussion. Their contributions further provide us with the basis for the reinterpretation of economic theories of Walrasian, pre-Keynesian and post-Keynesian approaches and methodology.

IV

The six economists Arrow, Hicks, Debreu, Klein, Solow, Samuelson have made great advances to the Economics of Equilibrium. By way of challenging Kornai's criticism of the General Equilibrium Theory as being as a brake on the development of economic thought. The six great economists and their friends have sought to modernize the theory instead.

Arrow was unable to solve some of the problems of General Equilibrium although he gave practical analysis to it. He discovered that the existence of multi-market equilibrium under conditions of Perfect Competition requires forward markets in all goods and services.

Hicks discusses different types of equilibrium after attributing credit to Walras as a creator of the theory of exchange equilibrium. His second type of equilibrium of production is more applicable than his equilibrium of exchange. He also introduces four kinds of markets namely the markets for products, the markets for factors of products, the markets for direct services and the markets for intermediate products.

Debreu has made an attempt to modify Adam Smith's "invisible hand" According to which, the conflict interest of producers and consumers are reconcile through price mechanism. His application of topology shows that the producers, distributors, consumers maximize their welfare by manipulating prices and factors of production.

Klein has discovered both merits and demerits of Keynesian theory of Employment, Interest and Money. Besides, clarifying Keynesian economics he analyses equilibrium in a dynamic way.

Solow contribution is also an advance in Economic of Equilibrium. Samuelson, on the other hand, explains a concept of comparative statics and equilibrium which are great advances in Equilibrium Economics.

Arrow's finding, however, throws some doubt on the practical significance of General Equilibrium Theory although he could demonstrate that the theory is still relevant to these economics with missing forward markets.

Debreu explained of Adam Smith's 'invisible hand' in a very different way which may lead one to think that his contribution is a innovation rather than the modification of Adam Smith concept.

The six economists have been able to preserve the importance of the equilibrium analysis by way of modernization the theory in contrast to the growth of Disequilibrium Economics.

V

The development of Radical Economics is a major development in the different branches of economics. There are a good number of radical economists but Joan Robinson and Michio Morishima have been considered in this work.

Mrs. Robinson is indeed a radical economist. Many writers regards her as a Marxist while others regard her as pure Keynesian. Initially she was even taken as being Marshallian. But she was neither pure Keynesian nor Marxist. She has rather attempted to reconcile different schools of economics - classical, Keynesian, Marxian. Her contribution has open new fields of investigation in economic though and doctrine.

Like Mrs. Robinson, Morishima has made radical treatment of economics. He has mathematically proved equilibrium economics. He is of the view that there should be revision of Keynesian, Marxian and Walrasian models forthe purpose of assimilating all aspects of human life.

Radical economists have put forward new arguments with mathematical validity. Besides, they have refuted the orthodox economic theories and their analyses are multi-dimensional. In particular, Joan Robinson and Michio Morishima did not completely reject Karl Marx's contribution. They rather helped Marxian economics to be still valid in the present world. They, however, believe that both Marxian and non-Marxian economics require reinterpretation to maximize human welfare. To that extent, it may be said that they are radical.

To end with, it is hoped our humble attempt has fulfilled the objectives of this dissertation.

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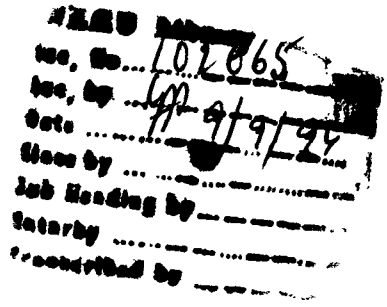

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