ECONOMICS

(OF NOBEL LAUREATES)

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ECONOMICS
(Of Nobel Laureates)

By

Prof. V.T.Naidu

ECONOMICS
(Of NOBEL LAUREATES)

Dedicated To

My Children
Padma, Rama & Swamy

And their Spouses
Ramakrishna rao, Prasada Rao, Siva Sri

My Grand Children
Vidya Sagar, Santosh Kumar , Anusha & Dhanesh

By

Prof. V.T. Naidu

“Read not to contradict and confute,
nor to believe and take for granted,
nor to find talk and discourses,
but to weigh and consider.”

Francis Bacon: Essays, ‘Of Studies’

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PREFACE

Though my book on Economics is one among many, it is different from others, in emphasizing the contributions of Nobel Economists.

I hope my book serves as a supplement to the prescribed text books of Economics for P.G students of Business, commerce and Economics. Further this book might be of some interest to general readers also. If some students are induced to read some of the excellent text books and the original works of Nobel Economists, my effort would have been amply rewarded.

As usual with book writers, I have borrowed ideas and material from many books and I take this opportunity to thank all the authors and the publishers of the books.

I owe a deep debt of gratitude to my teachers,specially to Dr.D.N.Rao, Prof.B.S.Rao, Dr.Bhate, Prof.D.L.Narayana and Prof.Marvin Schars. I have been fortunate in having affectionate and friendly colleagues and well behaved students. My thanks to all of them.

I wish to express my homage to my parents Late.V.Appala Naidu Garu and Late Mrs. Kurmamma to whom I owe everything. I recall to memory the affection shown to me by my adoptive father V.Swamy Naidu and two other uncles V.Satyam Naidu and V.Venkata Naidu.The affectionate encouragement of my brothers Sri V.L.Naidu, V.Seetha Ram Naidu and sister Parvatamma has been a source of encouragement to me in the early stages of my life. Finally all my efforts received the silent approval of my wife Sarojini.

Chapter I

ECONOMICS AND NOBEL ECONOMISTS

Adam Smith, the founder of Economics, wrote his Classic book, Wealth of Nations in 1776. The sub-title of his book, "An Enquiry into Nature and Causes of The Wealth of Nations" may be taken as Smith's definition of Economics.

Lionel Robbins provided in 1935 an analytical definition of Economics. According to him, "Economics is the science which studies human behavior as a relationship between ends and scarce means which have alternative uses". Samuelson in his widely read textbook Economics (first published in 1948 and 17th edition, co-authored with William Nordhus in 2001) defines Economics in terms of choice. According to him, "Economics is the study of how societies use scarce resources to produce valuable commodities and distribute them among different people". Robert Mundell says that whenever alternatives exist, life takes on an economic aspect. Whenever decisions are made, the law of the economy is called into play. In short, Economics is the science of choice.

Douglas North approves of the choice definition, but he contends that the discipline neglects to explore the context within which choice occurs. North opines that we must understand the sources of human decision making and he advocates a new institutional Economics.

Friedman and others would like to restrict the scope of economics to Positive Economics, dealing with the issues of the functioning of the economic system while A.K.Sen and others want the scope of economics to be extended to Normative and ethical issues as well. Lucas and others want economics to be theory oriented while others like Akerloff want it to be more pragmatic. It is difficult to give a generally agreed definition of Economics which accommodates the divergent opinion among economists and which encapsulates the ever widening fields and sub-fields of Economics.

Economics has become eclectic. Economics is now defined neither by its subject matter nor by its method. The Economist, a prestigious weekly, defines Economics as follows: "Economics is what Economists do – the best of them, anyway". The Nobel Economists, by and large, are the best among economists. This explains our writing of this book, Economics, using the contributions of Nobel Economists and their equals.

Nobel prizes have been given annually for Physics, Chemistry, Medicine, Literature and Peace, for more than one hundred years. The Nobel Economics Prize was instituted in 1969 by the Central Bank of Sweden. Since then, the Swedish Academy has been awarding the economics prize along with other prizes. The stated reason for institution of Economics Prize is to commemorate the tri- Centennial year of The Bank of Sweden. The real reason behind might be that the Bank of Sweden had realized the significance of Economics.

The wider significance of Economics especially of its practical application is recognized by the Nobel committee by awarding Nobel Peace Prize to Norman E. Borlaug in 1970 and the 2006 Nobel Peace Prize to Muhammad Yunus and to the Grameen Bank of Bangladesh. Borlaug helped to solve the world food problem and Muhammad Yunus helped the world's poor through Grameena Bank Credit to them. The 2009 Noble Peace Prize is awarded to Barrack

Obama for creating a new climate of peace in International Politics. He justly deserves the prize for another reason. By his bold fiscal stimulus policies, he averted the U.S. Economic disaster and helped indirectly to solve the world economic crisis of 2008. By helping to solve the pressing economic problems of the world, these individuals have promoted lasting peace in the world.

Keynes recognized the significance of Economics much earlier. In his book, General Theory of Employment, Keynes states thus: “The Ideas of Economists and Political Philosophers, both when they are right and when they are wrong, are powerful than is commonly understood. Indeed, the world is ruled by little else.”

Economics, like all Sciences, need facts and theory. Economists collect facts and draw conclusions from them. If some needed facts or figures are not available, they are estimated by statistical (Econometric) methods. Economic theory is needed to prepare questions which we want to ask of the facts. Facts are collected on the basis of theoretical guidelines. After the collection of facts, they are arranged and analyzed so as to find answers to the questions raised’. Thus, Economics uses the deductive methods of Logic and Geometry in formulating Theory and inductive methods of statistical and empirical inference in Economic applications which includes Economic History.

Economics is discussed in this book under broad groups. They are: Economic Framework, Approaches to Economics, Methods and Tools of Economics, and Branches of Economics. The topics under each group are listed in the Contents. The topics are explained in one chapter each using the contributions of Nobel Economists. Names of Nobel Economists who have made significant contributions to the topic, figure in the chapter concerned.

The Nobel Economists have made important contributions not only to the areas listed in our classification, but also to other areas, such as Agricultural Economics, Demography, Energy, Ecology and Labor Economics. They have made forays into other disciplines such as Sociology, Psychology, Geography, Political Science, Ethics, Law and Philosophy. As the contributions of Noble Economists are vast, we are constrained to focus on one of their significant contributions only. It is not that their contribution is less in other areas but the one’s used are relevant to the topics discussed.

Many other eminent Economists (other than Nobel Economists) have made notable contributions to the areas classified and to other areas. The scope of Economics is vast and is expanding. There is Economics of war and Economics of Peace. There is Economics of poverty and there is Economics of Affluence. There is a Freakonomics too. StevenDLewitt collaroborated withStephenJ Dubner in writing the books Freakonomics and Super FreakonomicsThese books deal with everyday issues of modern world such as cheating corruption crime prostitution global warming-all hidden side of everthing As rightly noted by Robert Mundell “Economics seems to apply to every nook and cranny of human experience”.

It is said that Economics is not as precise as physics. A high degree precision is a characteristic feature of Physics. Earnest Rutherford, a noble prize winner in Physics, claimed that Science is Physics; everything else is not. Sciences differ in their degree of precision among them. To deny the label Science to others such as Economics is to falsify truth. Though Economic variables are difficult to measure, efforts have been made to measure them with adequate precision Economists have begun using systematically the experimental

method in their investigations. In 2002 Nobel Prize is awarded to the pioneers in 'Experimental Economics', Danial Kahneman and Vernon Smith. Widespread use of Econometric methods is another step in the direction of making Economics a scientific one.

Economics, as discussed above uses many methods, several approaches, covers many areas and as integral links with many disciplines. Economics is an unique social science and indeed the queen of social sciences. Economics need not be as precise has physics. Prof. A.K. Sen rightly says that what Aristotle said of Political science applies equally well to Economics. Aristotle said that "the account of this science will be adequate if it achieves such clarity as the subject matter allows; for the same precision is not to be expected in all sciences".

Economics too has become highly mathematical during the last half-century. There is a need to explain the advances made in economic theories and models to all – to non-mathematical professional economists, like this author, to students, lay readers and specially to policy makers – in an easy and lucid prose and in an engaging style.

Only a few policy makers like Dr. Manmohan Singh, Prime Minister of India can understand the esoteric language of the Economists. He belongs to the two cultures of top economists and top policy makers. Bridging the wide gap in communication between Economists and policy makers is a must. Otherwise, the rich contribution of Economists to knowledge become unused and remain in a limbo.

Chapter – 2

NATIONAL INCOME AND EMPLOYMENT

(Peter Diamond, Dale Mortenstern & Christopher Pissarides)

Richard Stone has done extensive work on National Income and Accounts. Along with James Meade, Stone wrote a book titled National Income and Expenditure which appeared first in 1944 and revised many times later on. In place of a fifth edition of the above book, Richard Stone (with Giovanna Stone) wrote a short book titled National Income and Expenditure. (1960) In their book, the authors define National Income as "the income which accrues to the inhabitants, or normal residents of Country from their participation in World production". All such income is included, whether it is received by individuals in the form of wages, dividends interest, etc., or is retained in private businesses, or accrues to Government bodies as a consequence of their business activities. No other income is included, therefore, gifts, grants and benefits, which are not received for participation in production, are excluded and so is consumer's debt interest. Income may come from production taking place within the Country concerned or from abroad. The income arising from the productive activity that takes place within the territorial boundaries of a Country is called Domestic income.

Hicks, in his book, The Social Framework, notes the relationship between Social (National) product and Social (National) Income.

Net Social product = Wages + Profits = Social Income

Social Income = Consumption + Saving = Consumption + Investment = Net Social Product

So National income can be computed by using production method (Value added method) or by Income method or by Expenditure Method

National Income Analysis:- National Income Accounting, classified meaningfully provides the basis for Macro-Economic analysis. The division of output into factor payments (wages, etc.) on the production side provides a framework for studying aggregate supply. The division of income into Consumption and Investment on the demand side provides the framework for studying aggregate demand. Keynes is the leading architect of Macro-Economics and his book, General Theory of Employment, Interest and Money has revolutionized Macro-Economic thinking. Samuelson had described Keynes as the patron-saint of Macro-Economics.

We shall describe below the classical theory, Keynes theory, contributions made to Keynes theory by Samuelson and Hicks, and give a pre-view of the ideas of Monetarists and new classical economists, which are discussed in detail in Chapter Eleven.

J.B. Say, a French economist said that supply creates its own demand. Savings will get automatically invested. There cannot be any general over production. Classical economists starting from Adam Smith to Marshall and Pigou have subscribed to J.B. Say's view. The classical economists assumed that prices and wages are flexible. If there is excess supply of goods over demand, prices fall resulting in increased demand for goods ultimately leading to more production and more employment. Equilibrium will be restored in both product and labor

market. Due to the operation of the market forces, full employment will prevail. In their view, business cycles are temporary and self correcting.

We shall now describe Keynes theory of business cycles, using the concept of multiplier. The multiplier concept is first introduced by Khan, a contemporary of Keynes. The multiplier is the number by which the addition to investment must be multiplied in order to determine the resulting change in output. When aggregate income increases, consumption of house holds also will increase but not as much as real income. There must be an amount of current investment sufficient to absorb the excess of total output over what the consumers choose to consume. The equilibrium income (hear after income and output are used inter-changeably) is given by the equality of investment with that of savings. The multiplier is determined by the marginal propensity to consume (m.p.c.) and it is computed using the formula, 1/1-m.p.c. The denominator in the formula is the marginal propensity to save (m.p.s.). Let us calculate the multiplier, using simple examples. Suppose, the m.p.c. is 0.5. Then the m.p.s. is also 0.5. Using the multiplier formula, the multiplier is 2. Now, let us increase the m.p.c. (spending) to 0.8. The, the m.p.s. (saving) decreases to 0.2. The multiplier increases to 5. Thus, the multiplier increases, when spending increases and when saving decreases. The multiplier decreases when m.p.s. (saving) increases. Savings are considered as a leakage from the circular flow of income.

In Keynes theory, it is the investment that gives rise to increased income through the multiplier and income, in turn, determines savings. At the equilibrium level of output, the receipts of the investors are equal to the required receipts by them to invest sufficiently to produce equilibrium output. According to Keynes, investment depends on the rate of interest and the marginal efficiency of capital (expected rate of return). Output fluctuates due to volatility of investment. If the investment level is insufficient, the level of income falls. Consequently, savings fall such that they equal investment at a low level of income (output). The equilibrium level of output occurs at full employment (potential output), only by coincidence or design. There is no general rule that the equilibrium level will be at full employment level.

At the time when Keynes wrote his book, The General Theory, the great depression occurred. The competitive markets were caught in an under-employment equilibrium.

Keynes argued for enlargement of functions of Government to involve it in the task of adjusting to one another, the propensity to consume and the inducement to invest. While the classical economists want to leave everything to market forces, Keynes wants the Government's intervention to save capitalism.

Samuelson introduced the concept of accelerator, which says that a change in the rate of output induces a change in demand for investment in the same direction. The process of multiplier accelerator interaction results in continuous expansion of output until the economy reaches its full capacity level and then the growth rate of the economy slows down. The slower growth in turn, reduces investment and the process works in reverse direction. Thus, the multiplier-accelerator interaction results in business cycles.

In addition to the saving investment balance approach (also known as Keynesian multiplier model) discussed above, there is a second way of showing how output is determined. The method is called the consumption-plus-investment (or C + I) approach or aggregate spending

approach. We can visualize a graph where total spending (C + I measured vertically) is graphed against total output (measured horizontally).

Draw a 45 degree line though the origin to help to identify the equilibrium output. The total spending (or C + I) shows the level of desired expenditure by consumers, and businesses. The economy is in equilibrium at the point where the C + I curve crosses the 45 degree line. Aggregate demand is equal to national income. If the aggregate demand, comprising of desired consumption and autonomous investment is less than the equilibrium output, producers will cut back production. If the aggregate demand (AD) is more than aggregate supply (AS), it will lead to more production as long as unused resources are there. Thus, output adjusts itself to changes in aggregate demand. The total output cannot increase beyond full employment level. Any increase in AD beyond full-employment level of output result in inflation. This approach to Keynes theory is also known as 'Cross Approach' as the AD curve crosses AS curve at the equilibrium point. The equilibrium indicates a balance between aggregate spending and actual output. The actual output may be different from the potential output.

Synthesis:

Hicks well known article on Mr. Keynes and classics (1937) presents the gist of Keynes theory, compares it with the classical theory and synthesizes Keynes theory. Hicks condensed Keynes theory into three equations and derived the IS-LL curves. Later on, Hicks IS-LL curves came to be known as IS-LM curves. In many text books on economics, interest is presented on the vertical axis and income on the horizontal axis.

The IS curve presents a relation between income and interest. The marginal efficiency of capital schedule determines the value of investment at any given rate of interest and the multiplier tells us what level of income will be necessary to make savings equal to the value of investment. The curve IS shows the relation between income and interest that must be maintained in order to make saving equal to investment. With increased income saving will increase and that implies investment should increase and investment increases only at lower interest rate. As interest rates and income vary in opposite directions, the IS curve slopes downward.

The LM curve represents equality of money supply to demand for money. As income increases, the transactions demand for money increases. As money supply is fixed, the residual money supply for speculative purposes decreases. To make money supply equal to demand, the demand for investment (speculative purpose) should also decrease. It implies higher interest rates. Money market equilibrium implies that interest rates and levels of income vary together in the same direction. As such LM curve slopes upward.

The IS curve represents equilibrium in the goods market and LM curve in the money market. The points of intersection between IS and LM curves determine the equilibrium interest rate and equilibrium output.

There is another way of illustrating Keynes theory. The aggregate demand AD and aggregate supply (AS) curves may be depicted on a graph measuring price on the vertical axis output on the horizontal axis. The AS curve slopes upward and AD curve slopes downward. The pointer intersection of AS and AD curves determine the equilibrium price and output.

One important source of business fluctuations according to Keynes, is shocks to aggregate demand. These shocks occur when consumers, businesses and the Government change the total spending relative to productive capacity. If there is no change in supply of goods any adverse shock to aggregate demand shifts the AD curve to the left, causing prices and output to decline. Thus the adverse shocks results in a recession.

Differences in the Classical and Keynesian views arise from their assumptions about the Aggregate Supply Curve (A S). The Classicists assumed that there is always full employment of labor. According to them AS curve is vertical at the full employment level of work and changes in output take place in the long-run due to growth factors such as technological progress. Keynes assumed horizontal Aggregate Supply curve (AS), indicating that firms will supply whatever amount of goods demanded at the existing price level. They will be able to do so because of existing unemployment of labor. If prices are measured on vertical axis and output Y on horizontal axis, then AS curve is horizontal at the existing price level. Given a perfectly elastic supply, a fiscal expansion leads to shifting Aggregate Demand (AD) to the right causing output to increase but leave the equilibrium price level unchanged. According to Keynes, in the short run, output is determined by Aggregate Demand alone. If AD is above AS, then output expands and vice-versa.

For simplifying our analysis, we have used a two-sector model, consisting of consumers and business persons and their expenditure on consumption and investment respectively. In the simple model, there is no government sector and the rest of the world sector. Actually, the components of aggregate demand (AD) comprises of expenditures of four sectors. The expanded version can be broken down as follows:

$Y = C + I + G + X$

Where C is consumption, I is investment, G is government expenditure and X is net exports. Treating each variable as an endogenous one, others constant, we can calculate multipliers for the endogenous variable.

For the graphic presentation of the above AD – AS curves, I.S. – LM curves, BP (Balance payments curve discussed in Chapter 13) and such others, one may consult any relevant text book referred in the Appendix.

Samuelson, Galbraith, Hansen and Harris in U.S.A. and Hicks, Joan Robinson & Kaldor in U.K., have welcomed Keynes ideas. They are called neo-classical synthesizers or neo-keynesians (some call them early Keynesians.) The early Keynesian theory is called New Economics and the Keynesian policies to stabilize the economies held sway up to the middle of 1970's.

The monetarists and new-classical economists like Lucas, have challenged Keynes ideas. Lucas argued that Keynesian policies of demand management are ineffective. The ideas of monetarists and the new-classical economists are discussed in Chapter 11. Based on the Lucas model (1977), the Dynamic Stochastic General Equilibrium (D.S.G.E.) models have been used in Macro economics. The D.S.G.E. models are predicated on the assumption of perfect markets and rational expectations.

The later day Keynesians, termed new Keynesians, such as Krugman, Stigltz, and Akerloff have been focusing on market imperfections and less on price and wage rigidities emphasized

by early Keynesians.

Commenting on the crisis facing the world in 2008-09, Krugman observes that we are in a liquidity trap situation and monetary policy cannot be effective. He argues for fiscal stimulus policies. In his book, The Return of Depression Economics, (2010), Krugman opines that 'Keynes is more relevant than ever'.

Amartya Sen is also a keynegian. Amartya Sen says that austerity is not an effective way to reduce public debt. Austerity is essentially anti-growth (as Keynes noted). We need economic growth and not austerity which created joblessness. (www.theStatesmancom.politics the economic consequences of austerity).

In a commemorative lecture delivered on 20th December, 2008 at the Institute of Social Sciences at Delhi, Stiglitz observed that the world economic crisis of 2008 has been precipitated by a failure of the American financial sector. America needs to do something to save the world from the worst economic crisis. In that context, stiglitz, observes that "We are all Keynesians Now". In his latest book titled Free Fall (2010, Stiglitz commented that economic downturn, the free fall has discredited the many policy prescriptions of main stream economists and their belief in perfect markets and market efficiency. He emphasized the need for government intervention. He says that economies need a balance between the role of markets and the role of government. Stiglitz declares that he is in the tradition of John Maynard Keynes'.

Wide adoption of Keynesian policies of fiscal stimulus and monetary easing policies by the governments have put the economies of the industrialized nations on the path of recovery from the Recession. Though the great recession ended technically by the end of 2009, there is still high unemployment.

There is significant empirical evidence that macro-economic fluctuations are dominated by shocks with permanent effects. Since aggregate demand shocks do not have permanent effects, some argue that aggregate demand fluctuations are less important than aggregate supply fluctuations. Aggregate supply fluctuations are caused by shocks to technology. An alternative view is that there are occasional periods of large permanent aggregate supply shocks, but between these periods, aggregate demand shocks, such as changes in money supply and tax policies predominate. It is observed that temporary shocks move output around a stochastic trend, that itself contributes to movements in Gross National Product (G.N.P).

The general Auto-Regressive Moving Average (A.R.I.M.A) is found to be useful in studying business cycles. Econometricians are interested in the effect of shocks and transfer mechanisms. Econometrics use lagged values of explanatory variables among Regressors and their effect on the dependent variable (say output), distributed over time are estimated. It is observed that the Time-series methods and Econometric methods complement each other in the analysis of business cycles.

Production requires inputs such as labor, land and capital. Since employment of labor need some clarification of concepts, we shall examine some of the concepts of employment of labor and its empirical relation to production.

We have discussed above the theories of business cycles. Unemployment usually moves in tandem with output over a business crisis. Cyclical unemployment is pretty high during a period of recession. As aggregate demand (AD) falls output falls, unemployment rises every where.

According to the traditional business cycle approach, the trend level of output corresponds to the output producible by workers at full employment level, which s termed potential output. Fluctuations of output around trend level are called business cycles. The gap between the actual output and the potential output is termed output gap.

Okun codified an empirical relation between unemployment and output, and it is named after him, Okun's law states that every 2 percent that the gross domestic product (GDP) falls relative to potential GDP the unemployment rate rises about 1 percentage point. Okun's law provides the vital link between the output market and the labor market in the short run. One percent more of employment will produce 2 percent more of GDP.

There are other kinds of unemployment, such as frictional unemployment and structural unemployment. Frictional unemployment results from increasing mobility of people between regions and jobs or through different stages of the life cycle. Because frictionally unemployed workers are often moving between jobs, or looking for better jobs, they are treated as voluntarily unemployed.

Structural unemployment signifies a mismatch between the supply and demand for workers among different sectors. We often see structural unbalances across occupations or regions as certain sectors grow while others decline.

The Nobel Prize for 2010 is awarded jointly to three labor Economists – Professors Peter A. Diamond, Dale T. Mortensen and Christopher A. Pissarides. According to them (let us term their work as DMP model) labor markets do not function smoothly as assumed by traditional theory. According to traditional theory, job seekers find available jobs and labors market ensures matching between the two. The three Nobel Laureates have contributed significantly to the search theory and matching theory which facilitates the analysis of job search and job matching issues. The typical job seeker keeps in touch with employers who might offer a suitable jobs and waits until one opens up. The employer considers applicants quickly and makes a hire. Job seekers remain unemployed until they win suitable jobs. The optimal strategies that workers should follow in seeking employment is known as search theory. One of the basic assumptions in search theory is that wages and working conditions vary across jobs. A job seeker would not accept readily the first job that is offered. Instead, a job seeker compares the benefit of accepting the first job right away against the benefit of taking a better job that comes along later net of cost of waiting and takes a decision in favour of the larger benefit. Christopher Pissarides deals with the optimal search problems in his book, Equilibrium Unemployment Theory, (Basil Blackwell 1990). Peter Diamond discusses labor markets issues in his books on Social Security Reform (O.U.P. 2002) and Pension Reforms. Mortensen analyzes wages in his book Wage Dispersion (M.I.T Press 2004).

Chapter – 3

ECONOMETRICS
(Frisch, Tinbergen, Klein, Stone, Havelmo, Heckman, Mcfadden, Engle, Granger and Sims)

Samuelson, Koopmans and Stone, in a report about the Journal, Econometrica, have said: “Econometrics may be defined as the Quantitative analysis of actual economic phenomena based on the concurrent development of theory and observation, related by appropriate methods of inference”. In his well-known Text- Book, An Introduction to Econometrics, Klein observed, “Econometrics is a branch of Economics in which measurement of the relationships discussed in apriory Economic analysis is studied”. Econometric theory mainly deals with establishing statistical properties of estimators and the development of tests, while applied econometrics uses statistical methods to test and evaluate economic theories, and to forecast future values of the variables. When the Nobel Prize in Economics was first introduced in 1969, it was awarded to the pioneers in Econometrics, Ragnar Frisch and Jan Tinbergen.

Ragnar Frisch

Frisch first coined the term Econometrics and he had made rich contributions to Multi-Colliniarity problems in Econometrics. The term Multi-colliniarity is used by Frisch in his book on Statistical Confluence Analysis. The term refers to the existence of perfect or an exact linear relationship among some or all-explanatory variables in a Regression model. Today the term Multi-Colliniarity is used in a broad sense to include the case of perfect Multi-Colliniarity as well as the case where the explanatory variables are inter-correlated but not perfectly.

It refers to the tendency of many economic series to move together overtime. Economic theory of Demand tells us that relative prices and income are the explanatory variables in Demand function. However, the Statistician will not be able to isolate their separate contributions if they move together in a Time-series sample.

If there is Multi-Colliniarity among explanatory variables, the standard errors of the estimated parameters will be large. Frisch devised his Confluence Analysis to tackle such problems.

Tinbergen

Tinbergen’s significant contributions relate to the analysis of Business Cycles. His Statistical Testing of Business Cycle Theories is a landmark in that area of Research. Tinbergen formulated the first macro econometric model, Business Cycles in the United States of America, 1919-32. Another notable contribution of Tinbergen relates to designing Development Policy for National economy. For evaluating Government’s policies, Tinbergen has suggested instrument target approach. According to Tinbergen, there are four main economic variables, which a policy maker has to take into account. They are the targets, or objectives of economic policy, instruments available to achieve the targets, non-controllable variables and irrelevant or neutral variables. He advocates that the Government should use policy instruments in such a way as to achieve the desired levels of the Target variables as closely as possible despite the fact that the time paths of the Target variables are strongly influenced by factors which are, for the policy maker, non-controllable.

Klein

Like Tinbergen, who wrote an excellent introductory book on Econometrics, Klein too wrote one elementary but excellent book on Introduction to Econometrics. Besides, Klein wrote earlier an advanced book titled, Text Book of Econometrics. Both the books of Klein are well received and read by Students of Econometrics all over the world. Also, Klein is well known for his Doctoral Dissertation on Keynesian Revolution. The thesis, with some additions, is published.

Klein is a Macro-Econometric model builder. An econometrician first specifies the Economic model. Then, the next task of the econometrician is to obtain estimates of the parameters of the model for the data. If the predictions of the model are consistent with empirical evidence, he accepts the theory; otherwise, he reformulates the theory or proposes new one. Klein built a Model for the American economy.

Richard Stone

Stone's work relates to Statistical Demand analysis. He estimated Elascities of demand for a wide variety of products in U.K.Price Elasticity of demand (own price) is measured by percentage change in quantity demanded divided by percentage change in the price of the same commodity. Cross Elasticity of demand refers to the percentage change in quantity demanded of a commodity in response to the percent age change in the price of another related commodity. Percentage change in quantity demanded of the commodity divided by percentage in Income is known as Income-Elasticity of demand.

Havelmo

Havelmo, who worked earlier as Research Assistant with Ragnar Frisch, won the Nobel Prize in 1989 for his valuable contributions to Probability approach in Econometrics. Another area in which Havelmo did valuable Research relates to a system of Simultaneous equations. In the Simultaneous equations approach the particular equation being studied is considered as a part of a relationships describing the simultaneous interactions of the relevant variables. Havelmo devised a statistical method of reduced form equations to estimate the parameters of the system of Simultaneous equations.

Heckman and McFadden

James Heckman and Daniel McFadden were awarded the Nobel prize in Economics in 2000. While giving that prize, the Swedish Academy said: "The micro econometric methods developed by Heckman and McFadden are now part of the standard too-kit, not only of economists but also of other Social Scientists".

Social Scientists make generalizations about the whole Populations on the basis of Samples. If the samples are selected randomly, the generalizations made are likely to be close to truth. However, Heckman argues that often these Samples are not random, people self-select themselves into these Samples and this leads to bias in results. For instance, in the case of man-=power training programs, Heckman's Research shows that often those employees who are keen on improving their performance will join the Training program; others will not. Even without training, these who have joined the programme would have performed better than

those who did not. This leads to bias in conclusion. Heckman tackled such selection bias problems.

McFadden also conducted Research on micro-units and their decisions. McFadden worked on problems of discrete decisions and developed Statistical methods for discrete choice analysis. This method is known as “conditional Logit method, which is applied for making many discrete policy choices. This method can help to calculate how probable it is that a person of certain age, income and education would choose to travel by bus, Sub-way or car, taking into account costs and journey time. His method is used widely in tackling, urban transport problems and Telephone services.

Engle and Granger.

Engle and Granger shared the Nobel prize in 2003 for their statistical contributions to economic Time Series. Engle contributions are in areas such as Auto-Regressive Conditional Heteroscedasticity (ARCH), co-integration and band-spectrum regression. Granger’s contributions are mainly to spectral Analysis of Time-Series.

Granger’s researches are contained in his book, Forecasting Economic Time Series. (Academic Press, New York)

SIMS

Sims developed Vector Auto-Regression (VAR) method. He popularized the Granger-Sims casuality tests to analyse time-series data. The tests are often used to describe the joint behavior of a variable X will Granger cause variable Y, if the set of correlations between the current innovations in Y and lagged innovations in X is significant. (Sims 1972 AER-62).

Since suggested alternative style of identification of equations and models to that of existing large scale models of the economy prevalent during 1970-80’s. In a path breaking article on macro economics and reality (1977), since discussed the simultaneous equation identification problem and issues involved in constructing macro economic models of an economy for both descriptive and forecasting purposes. His article can be downloaded from the internet. (Discussion paper No: 77-91, Dec 1977 University of Minnesota).

Chapter - 4

ECONOMIC HISTORY
(Fozel and North)

Economic history, in the words of Hicks, is just the applied economics of earlier ages. Any discussion of Economic history is incomplete with out mentioning the works of Karl Marx and W.W. Rostow. Karl Marx is a house- hold word in many Nations and his book Das Kapital revolutionized the thinking of men and influenced working classes everywhere. Marx analysis is an unique materialistic interpretation of history. Marx's applied Hegel's dialectic method to economics. The core of the dialectic lies in the conception of the process by which change takes place. The conception embraces the celebrated triad of thesis, anti-thesis and synthesis. The dialectic pattern is best exemplified by Marx view of class struggle in capitalistic society as the mechanism through which a thesis and anti-thesis interact to form a synthesis in the form of communism. What generates the contradiction is the thesis, what represents the contradiction is the anti-thesis and the synthesis represents the negation of negation or the reconstruction of aspects of the thesis with aspects of the anti-thesis into a higher composite.

The gist of Marx's arguments are:

The nature of individuals depends on their material conditions of production

The mode of production in material life determines the general character of the social, political and spiritual process of life.

At a certain stage of their development, the material forces of production in society come in conflict with the existing forces of production viz, with the property relations within which they had been at war before. From forms of development of the forces of production, those relations turn into fetters. Then comes the period of social revolution. The history of all societies has up to now been the history of class struggles. The burgeoise (capitalists) replaced the feudal nobility.

Capitalist industrial societies would create the conditions for their destruction because of inherent contradictions. Capitalists in their pursuit of profits introduce more and more labor saving machinery; thereby create vast army of unemployed unskilled labor. Increased competition among capitalists leads to concentration of capital and increasing of a labor. Workers receive subsistence wages, the rate of profits decline. There is shortage of demand for the supply of goods produced. The conditions of capitalist society become fetters to the productive forces of capitalism; there results a conflict between the Capitalists and the working classes. The fall of capitalism and the victory of the proletariat are equally inevitable.

Thus Marx suggested several stages in the evolution of societies:

1. Primitive Communism, 2. The ancient slave state, 3. Feudalism,

4. Socialism and finally 5. Communism.

In the early 60's of last Century, W.W. Rostow wrote a book titled the Stages of Economic Growth (A non-Communist manifesto). He identifies all societies, in their economic dimensions

as lying within one of five categories or stages of Growth. They are: 1. the traditional society 2. The Pre-conditions for Take-Off 3. The Take-Off 4. The drive to Maturity and 5. The Age of high mass consumption.

As against the above broad approaches to the study of the evolution of societies, the new economic history some times called 'clio-metrics' uses econometric techniques to the historical issues. Robert W.Fozel and Douglas C North made valuable contributions to new-history. They were awarded the Nobel Prize in 1993 for having renewed research in economic history by applying economic theory and quantitative methods in order to explain economic and institutional change.

Fozel's researches centered round two themes. The first was to measure the impact of key scientific and technological innovations, key Governmental policies and important environmental and institutional changes on the course of economic growth. The second was to promote wider use of mathematical models and statistical methods of economics in studying the complex, long-term processes that were the focus of economic historians.

Fozel's approach to Historical research is exemplified in his works, Rail Roads and American Growth, the Escape from Hunger and Premature death, 1700-2100 and others.

Douglas C North is another founder member of the new economic history, called clio-metrics. He made a comprehensive study of economic growth of U.S. (1790-1860), the gist of the argument is that the timing and pace of an economy's development has been determined by: the success of its export sector and the characteristics of the export industry and the disposition of the income received from export sector.

North realized that a theory of economic history is needed. The existing Neo-Classical theory was concerned with the operation of markets and assumed the existence of the underlying condition needed for the efficient operation of markets. It had nothing to say about how markets evolved. The strong points in favour of Neo Classical economics are: its use of individual as the unit of analysis and its areas of analysis are competitive situations. Marxism was explicitly concerned with institutions, asked good questions, and had an explanation of long-run change but there were many flaws in the Marxian model. Making classes as a unit of analysis and failing to incorporate population change as a key source of change, were major short comings.

Douglas North's initial effort to incorporate institutions into historical economic analysis resulted in two books (one with L. Davis) Institutional Change and American Economic Growth and other (with Robert Thomas) The Rise of Western World. In Structure and Change in Economic History, Douglas North abandoned the notion that institutions were efficient and attempted to explain why inefficient rules would tend to exist and be perpetuated. He stressed the need for a political economic framework to explore long-run institutional change and that led to the publication of Institutions, Institutional Change and Economic performance. He attempted to evolve a theory of institutional change.

The first step in the evolution of a theory was to separate institutions from organizations. The former are rules of the game, and the latter are players. In the world of scarcity and competition, the organizations are in competition to survive. That competition will lead them to try to modify the institutional framework to improve their competitive position. The direction of change of institutions, however, will reflect the perception of the actors. North tries to blend

cognitive science with institutional approach to history in his recent book, understanding the process of Economic Change. When humans understand their environment as reflected in their beliefs and construct an institutional framework that enables them to implement their desired objectives, then there is consistency between the objectives of those players in a position to shape their destiny and the desired outcomes. North feels that such consistency is not automatic and further it is an evolving process over a long period. Because of human failure lack of consistency occurs.

The rise and fall of the Soviet Union between 1988 to 1991 is best explained by its process of change: its beliefs – institutions – organizations – policies – and finally outcomes. While admitting that he is no expert on Soviet Union, he gives highlights of the Soviet Union, drawing on the expertise of others.

Gorbachev introduced Perestroika (Reorganization) which gave enterprise directors greater autonomy. Glasnot or openness was introduced with the aim to undermine the power of the party leaders. The decline and destruction of the stable party structure has led to disorder. Government officials lost confidence in Soviet institutions. Soviet institutions were pulled apart by the Government officials. The catalysts of State collapse were the agents of State itself. Soviet institutions did not have adaptive efficiency.

Chapter - 5

EXPERIMENTAL ECONOMICS
(M.Allais, Kahneman, V. Smith)

Maurice Allais

Maurice Allais, a Ph.D. in Engineering and a Prof. of Mechanics at Lyons turned to Economics. Maurice Allais's contributions to pure Theory and his first book Inquest of Economic discipline are in French and many do not know the contents. Allais formally reports of experiments in economics in his article in Econometrica as early as 1953 but the article is also in French. What is better known is his work on decision theory, and in particular the so called Allais Parodox

Allais's Parodox

Utility measurement passed through several phases-cardinal utility, Ordinal Utility, Behaviouristic ordinalism and to neo-Classical utility under risk. Nuemann and Morgenstern (N-M) have devised a method of measuring utility under condition of Risk, According to N-M method, individuals do not maximize expected money but expected Utility. By way of criticizing N-M method, Allais raised a paradoxical decision situation.

Suppose a person is asked to choose between the following alternatives: Lottery L_1 which offers Rs.2 crores for certain and another Lottery L_2 which offers a 10% chance of winning Rs.10 crores and 89% chance of winning Rs.2 crores and 1% chance of getting nothing. In this case, anyone will choose L_1. Now consider another choice situation. Lottery L_3 offers 11% chance of winning Rs.2 crores and 89% chance of earning nothing. Another Lottery L_4 offers 10% chance of earning Rs.10 crores and 90% chance of earning nothing. Let us choose between L_3 and L_4. Many others will choose similarly like us. The preference is for L_4 over L_3.

Our choices are not consistent with excepted Utility given by probability multiplied by utility. If the expected Utility from L_1 is greater than L_2, then, the expected Utility from L_3 must be greater than L_4 Denote the Utility values of the outcomes U_{10}, U_{02} and U_0 (the subscripts indicate the amount of winnings). Expected utility of L_1 is presented on the left side and L_2 on the right side of Eqn.(1).

Then the choice of L_1 to L_2 is represented by greater than symbol.

$$U_{02} > (0.10)\, U_{10} + (0.89)\, U_{02} + (0.01) U_0 \qquad \text{Eqn.(1).}$$

Adding $(0.89)\, U_0 - (0.89)\, U_{02}$ to both sides, we get

$$(0.11) U_{02} + (0.89)\, U_0 > (0.10)\, U_{10} + (0.90)\, U_0 \quad \text{Eqn.(2).}$$

The expected utility of L_3 is given on the left side and that of L_4 on the right side of Eqn.(2).

As per Eqn.(2) L_3 must be preferred to L_4 (and not L_4 to L_3 as indicated by our choice)

Thus Allais has shown that certain kinds of risky choice could not be squared with expected utility theory. This and many other anomalies in choice behaviour have been thoroughly explored by both Psychologists and Economists.

Daniel Kahneman

Daniel Khaneman, a Professor of Psychology at Princeton University, have used insights from Psychology to study human behaviour and to conduct experiments in individual decision making under uncertainty. He argued that in complex decision situations under uncertainty, individuals do not make rational calculations, as assumed by traditional theory. Instead, individuals rely on heuristic short - cuts or rules of thumb. Khaneman (and Tversky) have developed the 'Prospect theory' of decision making under un-certainty. In this theory, individuals are assumed to be sensitive to the way an outcome deviates from statusquo than to the absolute level of outcome. And individuals are more averse to losses relative to the statusquo than they are partial to gains of the same size.

Suppose, you have invested in a start-up company, which is making profits (Company P). You have a 90% chance of winning Rs. 100 lakhs and a 10% chance of receiving nothing. If some one offers to buy the asset from you, for Rs. 85 lakhs, most likely you would accept the offer because the latter option has less risk. You would be exhibiting risk averse behaviour.

Now consider another situation involving huge losses. Suppose you had invested in a start-up company, which is incurring losses (Company L). There is a 90% chance of losing Rs. 100 lakhs but 10% chance of losing nothing (nil losses). Another investor offers to take-over the company if you pay him Rs. 85 lakhs (resulting in a certain loss of Rs. 85 lakhs). You would most likely reject the offer and choose to retain the loss making company.

The loss making unit case is exactly similar to the earlier profit making case. But, in the profit making case, you exhibit risk averse behaviour and in the loss making case, you don't exhibit risk averse behaviour. This is called 'a framing effect'.

This Prospect theory can explain why people take out expensive small scale insurance, why people buy expensive service contract for appliances that would be cheap to replace and such other individual (irrational) decisions.

Vernon L. Smith

Smith established laboratory experiments as a tool in empirical analysis, especially in the study of alternative market mechanisms. Smith (and Knez) tested a 'strong market hypothesis', which states that markets equilibrate as if agents were Utility maximisers even if the agents do not themselves behave as if they were Utility maximisers. They state this point of view as follows:

"The efficiency and social significance of markets does not depend on the validity of any particular theory of individual demand…. The empirical validity or falsity of efficient markets theory is a proposition that is entirely distinct from the empirical validity or falsity of theories of individual demand in markets".

Smith (and Knez) conducted experiments to test the market hypothesis and the results confirm their hypothesis. The behaviour of some individuals might be irrational but the market

behaviour of all is rational and efficient. Smith's book Bargaining and Market Behaviour contains his experimental findings.

Smith's latest interest is in Neuro-Economics. He uses brain scanning of experimental subjects playing economic games. The exponents of Neuro-Economics believe that by brain scanning of experimental subjects, they will be able to peer directly into the brain to predict behaviour.

The three Nobel Economists discussed in this chapter are pioneers and key figures in the experimental economics. Nowadays experimental work in economics is done in many areas such as investigating two-person bargaining problems; the free rider problem in the provision of public goods: and in examining auction markets and in privatization of public monopolies.

The study of human behavour based on human psychology and experiments falls into the category of a newly flourishing field of Behavioral Economics. The new field is again discussed in the Chapter on Markets.

Chapter - 6

THEORY OF GENERAL EQUILIBRIUM
(Debreau & W. Leontief)

Debreau

Debreau, won the Nobel Prize earlier than his inspirer Allais. Debreau has made a significant contribution to General Equilibrium theory, which is discussed in his short and highly mathematical book, Theory of Value. The seeds of General Equilibrium theory can be traced to Adam Smith's formulation of the laws of Markets, where "The private interests and passions of men are led by an invisible hand in the direction which is most agreeable to the interest of the whole society".

Smith's idea that everything depends on all other things was not followed in United Kingdom. In Marshall's time, markets were analyzed mostly on-at-a-time – a partial equilibrium analysis. The inter connections among markets were not explored.

The theory of General Equilibrium is developed thoroughly in 1874 by the French mathematician and economist, Leon Walras and Villfred Pareto. They have explained how millions of individual market decisions can achieve overall equilibrium of the system. Debreau's research in General Equilibrium Theory (Done jointly with Arrow) throws light on a set of conditions required under which Perfect Market could exist. The Arrow -Debreau results show that, given some pre-conditions, the results of market mechanism is Paretooptimal.

From the works of Arrow – Debreau on General Equilibrium, we learn that a particular economic change will have remote repercussions that may be a more significant than the initial change. After their work the market mechanism became the panacea for all the ills of the economies. In fact, their assumptions were very restrictive. If perfect markets were not there markets would be inefficient.

The proof of existence of general equilibrium in a competitive model by Arrow – Debreau is highly mathematical, requiring knowledge of set theory.

Wassily Leontief

Wassily Leontief's work, Input-Output Analysis is a major effort towards empirical quantification of General equilibrium theory. It studies general equilibrium phenomena in the empirical analysis of production. Input output model seeks to take account of the interdependent nature of the production plans and activities of many industries which constitute an economy. The interdependence arises out of the fact that each industry employs the outputs of other industries as its inputs and supplies its outputs to other industries as raw material for their products. The residual output is available for final consumption.

Input-output analysis is a useful tool and served as base for planning in many countries.

Input-Output analysis is explained-below using an example. (General readers may skip the illustration below). Suppose, there are two sectors Agriculture (A) and manufacturing (M) and

they use Primary inputs like Labor. Also there is Final Consumption of goods given exogenously. (C) Details of Input-Output Table are given below.

Table 1, Input-Output Table

Input	**Output**			
Sector	A	M	C	X
Agriculture (A)	200	100	150	450
Manufactures (M)	180	120	100	400
Value added (Primary input)	70	180	-	-
Gross Income	450	400	-	850

In the above Table Rows represent output flows of each Sector and Columns show the input use of each Sector. The gross National Income (Output) is Rs.850 crores.

Leontief assumed that all Factor proportions are technologically fixed. Ratio of each input divided by output gives the Technical Coefficient. for eg. In the first column (and first Row) 200/450 gives a Technical Co-efficient of 0.444, and so on for others.

The Technology Co-efficient Matrix is presented below. (Matrix A)

Technology Matrix

	a	m
Agriculture (a)	0.444	0.25
Manufacture (m)	0.4	0.3

Suppose, a Planner or Policy maker wants that consumption of Agricultural goods should be increased to Rs.200 and Manufactured goods to Rs.150. using the Technical Co-efficient and the change consumption requirements, we write the equations and solve for outputs.

$0.444Xa + 0.25Xm + Ca - Xa = 0$

$0.4Xa + 0.3Xm + Cm - Xm = 0$

We can solve the above simultaneous equations by conventional methods in algebra.

Solving, we get $Xa = 618$ and $Xm = 567$

Agricultural sector has to produce output of 618 and Manufacturing sector has to produce output of 567 in order to meet the changed consumption.

Those familiar with Matrix methods, they may use the following procedure to solve the equations.

1. Deduct technology Matrix from Identity matrix. We get Leontief Matrix.
2. Calculate the Inverse for Leontif Matrix
3. We can find the output vector by post multiplying the Inverse of Leontief Matrix by consumption Vector.

Of late, the general equilibrium method is used in macro-economic dynamics. Such models are known as Dynamic Stochastic General Equilibrium Models (D.S.G.E. models). In their construction advanced mathematical methods are used, such as stochastic difference and differential equations.

Chapter - 7

LINEAR PROGRAMMING
(Koopman and Kantarovich)

Koopman & Kantarovich are joint winners of the Nobel Prize in 1975.Kantarovich, a Russian mathematician, is one of the pioneers in the theory Linear Programming. His classic works include: Best use of Economic Resouces and Mathematical Methods of Organization and Planning. Koopman, is an economist and he used the Optimization tools for solving the problems of production processes or activities. Both Kantarovich and Koopman are responsible for the extensive literature on Linear Programming, Integrand Dynamic Programming techniques. These tools of optimization are very useful in programming and planning; in transportation problems; in product mix problems and resource allocation problems.

. These Optimization methods are considered as a branch of Mathematics, as a tool of Economics, or as a part of Operations Research, depending on the user.

As for the solution to these optimization problems, Simplex method is used for solving a Linear programming problem. For other programming problems also, there are methods of solution. All these programming problems can be solved in few minutes by the use of Computer Soft-ware.

Chapter - 8

John F. Nash

John F. Nash made significant contribution to the Bargaining problems in game theory and introduced the concept of Equilibrium known after him. He is less known outside the circles of Mathematicians and Economists but towards the end of the 20th Century he became popular and a cult figure.

Nash suffered from the killer disease of paranoid Schizophrenia. Through sheer will power and with the help of his devoted wife, he recovered well enough from his mental ailment to continue his work on Game theory at Princeton University. He is a living legend of a man's courage against heavy odds and his dogged persistence and perseverance in achieving life's goal.

Sylvia Naser wrote in 1998 an excellent Biography of John F. Nash titled, A Beautiful Mind. The blurb of the award winning Biography says that "it is a drama about the mystery of human mind, triumph over incredible adversity and healing power of love. Inspired by Nash's life story Glazier the famous Hollywood producer has produced a film titled 'A Beautiful Mind' and that film won the Best Film and Best Director awards at the 74 annual Oscar awards of 2001. Nash came to India in Jan-2003 to participate in a seminar on Game Theory in Mumbai

Chapter – 8

Game Theory
(Nash, Auman, Shelton, Schelling, Hasranyi & Shapely)

Game theory is first formulated by Von Nueman and Morgenstern. Later on John Nash, Richard Shelton and John Hasranyi further developed the game theory and they were awarded the Nobel Prize jointly 1994. The Nobel Prize was given again in 2005 to Schelling and Aumann for their analysis of "Conflict and Cooperation in Game Theory". One way of remembering the five Nobel Economists above is to use the name NASH as an acronym. The first letter 'N' stand for Nash, 'A' stands for Auman, 'S' for Shelten and Schelling and 'H' for Hasranyi.

Game theory considers situations, in which there are two or more Players, each of whose actions influence the outcome of certain event. Depending on which event actually occurs, the Players receive various payments (pay-offs).

A famous example cited in Game theory is the Prisoner's dilemma case. The story goes like this. Two individuals are known to be guilty together of a small theft case and a big Crime; there is evidence to convict them for a small theft but not for a big crime. They are kept in separate cells by the Police. A Public Prosecutor talks to them separately. He tells each individual separately the Rules. If one prisoner confesses and the other does not the person confessing will go free without any punishment. But the prisoner who does not confess get prison term for 6 years. If they both confess, they will be convicted for the Crime but in view of their good behaviour in confessing, the prisoners will get prison term for 3 years only instead for 6 years. If neither confess, then there will be no evidence to convict them for the crime. As such they get short prison time of 1 year each for the theft case.

We present below the punishment matrix (which is opposite to pay off). Least punishment means high payoff

		Prisoner - 2	
		Confess	Not-confess
Prisoner – 1	Confess	(3, 3)	(0, 6)
	Not-Confess	(6, 0)	(1, 1)

Considering Prisoner-1, confess strategy dominates not-confess strategy. Taking the first row and first number in the cells, 3 and 0 in the confess row and compare them with the 6 and 1 in not-confess strategy. $3 \leq 6$ and $0 \leq 1$. The prison terms are less in both cases (pay-offs are higher) in the confess category. As such prisoner-1 prefers to confess. Similarly for the second prisoner, taking the second numbers in the cells, column wise 3 and 0 in the confess category and compare them with 6 and 1 in not-confess category. Confess strategy

dominates the not-confess strategy. So prisoner-2 prefers to play confess strategy. So both the prisoners confess and get 3 year prison each. This type of dominant equilibrium is termed Nash equilibrium.

The prisoners' dilemma illustrates that self interest prevails over group interest and makes the prisoners confess. But it they cooperate with each other and both adopt the strategy of not-confessing, they reduce the prison term to one year each.

Nash Equilibrium is applied to Cournot Duopoly problem. Each firm chooses its best strategy to the other firm's best strategy. In the Cournot equilibrium, which is discussed in the chapter on Markets. Each Duopolist produces an amount that maximizes his profits given the output of its competitor. Neither Duopolist has any incentive to change its output. It is termed Cournot-Nash equilibrium. It is a non-cooperative game. Games involving joint action and are contractual are termed cooperative games.

Hasranyi made significant contribution to games of incomplete information and Shelton made contributions to Extensive Games. Shelling made significant contributions to Strategies of Conflict in game theory and Aumann made valuable contributions to randomized strategies and Correlated equilibrium in game theory. For detailed treatment of game theory, readers may consult the excellent books on game theory mentioned in the Appendix.

In the first para of this Chapter, we mention that the letter 'S' in Nash stands for Shelton and Shelling. Now the letter 'S' stands for Shapely too. Shapely's contribution are mostly in co-operative Game Theory. He used a value named after him as Shapely Value to the cost allocation problem in designing markets. We listed Shapely in this Chapter while his co-sharer of the 2012 Nobel prize, Alvin Roath is listed in Chapter 15 on Information Theory.

Chapter - 9

1. Hicks(1904 – 89)

Hicks was known to many students of Economics in India , through his works, especially value and capital. His works include. The theory of Wages , Value and Capital, Revision of Demand Theory, Trade Cycles, Critical Essays in Monetary Theory, Crises in Keynesean Economics, Capital And Growth and Wealth and Welfare. He visited India in 1960's and addressed students at the Delhi school of Economics and after the Nobel award , he again came to India in the 90's and addressed Indian students at interior places like Kavali in Andhra Pradesh

2. Samuelson (1915 – 2009)

Every student of Economics, in India knew Samuelson through his classic text book Economics. For more than 50 years his book has served as a standard text book in class rooms of India and abroad. He was an apostle of pure theory, which is testified by his doctoral dissertation Foundations of Economics and his papers. His papers are collected and edited by Joseph Stiglitz Robert Merton and Nagatani and published in several volumes. Samuelson trained many economists who received the Nobel Prize later on, and inspired many other eminent economists. His life was long and his contributions are long lasting.

Chapter - 9

DEMAND THEORY
(Hicks & Samuelson)

J.R.Hicks

The most widely used book of Hicks is Value and Capital. His book uses the General Equilibrium approach of Walras and Pareto and it continues their tradition. He re-discovers the indifference curve technique earlier used by Edgeworth and Pareto. He uses this tool of Indifference curve to explain the theory of Demand. Dispensing with the Cardinal Utility concept, Hicks uses the ordinal concept of Ranking based on Indifference curves.

Marshall assumed that a Consumer gets satisfaction from his consumption of goods and his satisfaction is measurable in terms of so many 'Utils' of satisfaction. This satisfaction is the feeling by the consumer and it is introspective. According to Marshall, a Consumer tries to maximize his utility and he spends his money in such a way so that every Rupee spent on commodity X and Y should yield equal extra satisfaction, when consumed. Then only his utility will be maximized. Any change from this position will result in less satisfaction, the gain in utility in buying, say, more of 'X' will be less than the loss of Utility in buying less of 'Y'. This follows from the principle of Diminishing marginal utility which states each successive units of consumption yields diminishing extra satisfaction. Marshall's argument leads to the conclusion that marginal utilities of commodities must be proportional to their prices. Marshall assumes that the marginal utility of money is constant. Therefore, the marginal utility of a commodity and its price is a constant ratio. If the price falls, the marginal utility must be reduced too. But by the law of diminishing marginal utility, this implies an increase in the amount demanded and consumed. A fall in Price therefore increases the amount demanded.

A fall in the Price of a commodity actually affects the demand for the commodity in two different ways. On the one hand, it makes the Consumer better off, it raises his real income and this may be termed the Income effect, on the other hand, it changes relative Prices, and therefore, apart from changes in real Income, there will be a tendency to substitute the commodity whose Price has fallen for other commodities. This is the substitution effect. The total effect on demand is the sum of these two tendencies. Marshall neglected the Income effect while Hicks considered them both in his Theory. The Income effect added to the Substitution effect gives the Price effect on Demand.

For explaining the Theory of Demand, Hicks uses Indifference Curves. Points on an Indifference Curve represent different combinations of two commodities giving the same level of satisfaction (not the absolute amount). The slope of an indifference curve represent the ratio of marginal utilities of the two commodities and it is the rate of substitution in Consumption. The slope of a Budget line indicates the ratio of Prices of the two commodities and it represents the rate of substitution in purchase. The tangency between the Price line and the Indifference curve is the expression in terms of Indifference curves, of the proportionality between marginal Utilities and Prices.

Using the tool of Indifference curves, Hicks shows the Price effect on Demand, consisting of the Income effect and the substitution effect.

In the case of Normal goods, the Income effect is positive. Only in the case of Inferior goods, Income effect is negative. Even if the income effect is negative, it may be small and substitution effect will out-weigh the Income effect. The demand curve for a commodity must slope down wards, more being consumed when price falls. The only exception to the Law of Demand is the famous Giffin Paradox where the Income effect is negative and large.

Samuelson

Samuelson was a great general economist who made significant contributions to many areas and fields of Economics such as Macro-economic theory, Public finance, Trade, Finance and Consumer behaviour.

We consider here, Samuelson's contributions relating to Demand theory. His fundamental Theorem of Consumption states that the demand for a commodity always changes in the same directions as that of a change in the income of consumer; positively sloped income curves always imply negatively inclined demand curves. He avoids any reference to cardinal utility and satisfaction, abandons Hicksian Indifference curves while stating his Law of demand. Based on consistence axioms of Consumer behaviour, Samuelson deduces the Law of Demand, using the Revealed Preference approach. His fundamental Theorem of Consumption states that "any good that is known always to increase in demand when money income alone rises, must definitely shrink in demand when its price alone rises". Samuelson argued that observed consumer spending reveals the consumers' preferences of goods. His theory of Revealed Preference to demand is termed as Behavioristic Ordinalism.

Chapter - 10

THEORY OF MARKETS
(Stigler, Simon, Oliver Williamson and Elinor Ostrom, Jean Tirol)

In the 1930's, the dominant Perfect Competition market structure did not fit the fact of reality. Joan Robinson and Chamberline have developed a new theory of market structure. Joan Robinson explained her theory in The Economics of imperfect Competition and Chamberline discussed his views in Monopolistic Competition. While Joan Robinson discusses the imperfection in the market structure, Chamberline tries to blend both Monopoly and Competition and develop a theory of Monopolistic Competition. According to Chamberline Firms do not start in most cases with Monopoly but they strive to create monopoly by differentiating their products.

Let us give a brief account of the main features of each type of Market structure and explain how prices are determined under each category. In a Monopoly, there is only one seller and the product is unique and he has a large degree of control in setting either the price or quantity sold. The Duopolist refers to two sellers and Oligopoly refers to more than two but few sellers, whose products are either differentiated or homogeneous. Monopolistic Competition is a market where there are many sellers (both large Groups and Small Groups) whose products are differentiated but only slightly and who have some degree of control over price or quantity sold. The conventional model of Perfect Competition refers to a large number of sellers selling identical products and no single seller has any control over price and his Demand Curve is horizontal.

Under Perfect competition there is a free entry and e Hixit of Firms and there is no scope for excess profits by any single Firm in the long run. Since P is given, it's P = M.R and it maximizes profit where P = M.R. =L.M.C =A.R=L.A.C. At the given price, the firm's M.R = A.R. is horizontal. The A.R. curve is tangent to long-run A.C. curve from belo!? Mi mi what up at the minimal point of A.C and M.C. curve cuts the A.C. curve from below at the minimal point of A.C. As there is free entry and exit of Firms, long-run equilibrium of the Firm under Perfect Competition is at point of minimum average cost. In the long-run, the equilibrium of the firm is given by P=M.R.=L.M.C.=L.A.C. There are no excess profits

A monopolist is a single seller and he is the Industry. The demand curve for his product is downward sloping and as such M.R is also downward sloping. The MC slopes upwards. The point of intersection of the downward sloping MR and upward sloping MC determines the equilibrium output. The demand determines his price. As compared to perfect competition, a Monopolist output is less and price is more. Under Monopolistic, competition, the demand curve for the product of a firm may be expected to have a negative slope, for customers will have different degrees of loyalty to the firms whose products are differentiated. In the short run, firms may earn excess profits. But in the long run Firms will enter and compete away the profits. Firms earn only normal profits.

Cournot model of Duopoly

Duopoly refers to a situation where there are only two sellers and oligopoly to more than two sellers (but few). Augustine Cournot, in his book titled Mathematical Principles of the Theory

of Wealth., proposed a Duopoly model, which is named after him. The model assumes: Two produces A and B produce identical products and have identical costs. For simplicity, Cost of Production is assumed to be zero and the total demand in the market they share is linear. Both Firms know exactly what the total demand is. Further both accept the market price and neither sets it and each Duopolist, in making his own plan of output assumes that his rival's reaction will be to maintain the same level of his output and each attempt to maximize profit the Duopolists act independently and do not collude.

We shall follow the explanation given by Stigler in discussing Cournot's model.

Suppose two Firms each own a mineral spring whose water is much valued by customers. There are no costs of Production. Cournot proceeds to analyse the problem, subject to the assumptions mentioned above. Let the demand curve be P=I00-Q, and retain the condition of no Cost. In the case of Monopoly he maximises the total revenue, PQ (cost are zero)

$TR = PQ = I00.Q - Q^2$

MR = I00 - 2Q (derivative of TR, wrt to Q)

Setting MR = MC, I00 - 2Q = O (MC = O),

2Q = I00, Q = 50 and P = I00 – 50 = 50

If there is only one producer, a Monopolist, his profit maximizing output is 50 and price is 50.

Using the same example, let us consider the case of Duopoly. I

Op loop hi guy op on I min

$P=I00 - (Q_A+Q_B)$

Step I. Let A set any output say, 40 which fetches a price of 60 (P = 100 – Q)

2). Then B will take A's output as given, and seek the output that maximizes his (B's) profits. The market for B will be the remaining part of the demand curve. In the case of a linear demand curve, the MR curve bisects the horizontal line drawn from the Price axis to the demand curve. Suppose a total demand curve (of both duopolists) is drawn and mark the A's out put on the X axis and draw a vertical line to cut the demand curve. From that point of intersection, if we draw, MR curve (of B) it will cut the remaining part of the horizontal axis in to half. As Mc = 0, it is equal to horizontal axis. The profit maximizing output for B will be exactly half of the Competitive output. Hence the output of B will be ½ (100 - 40) = 30. The price in the Market is

100-(40 + 30) = 30

3). Then A sets his output to maximize his profits, on the assumption that B's output will be 30. Then A will produce ½ (100-30)=35

4). It is now B's turn. It will produce ½ (100-35)=32.5

5). Then A will produce 33.75; then B will produce 33.125 and so on

This is an infinite series. The final solution will be for each Duopolist to produce is 331/3 units, with a market price of 33 1/3. Output supplied by the two Duopolists is 2/3 of the total of I00.

The Kinked Oligopoly Demand Curve

Paul Sweezy developed the Kinked demand curve model to explain the price rigidity under Oligopoly. The market situation contemplated by Sweezy is one in which rivals will quickly match Prices reductions, but only hesitantly and incompletely if at all follow price increases. This pattern of expected behavior produces a 'kink' at the existing Price.

There is no incentive for the Firm under Oligopoly to either raise the prevailing Price or decrease it. That is why Prices under Oligopoly remain stable. If the marginal Cost curve passes over the range of discontinuity of the marginal revenue curve. Output and Prices remain unchanged at the existing levels.

Stigler:

After a thorough analysis of empirical evidence, Stigler concludes that "evidence reveals neither Price experiences nor the pattern of changes of Price quotations that the theory leads us to expect".

Other Models:

There are other models Duopoly & Oligopoly. In the Collusion model the two duopolists act in concert to maximize their joint profits. In this model maximization proceeds in the same manner as in multi-plant monopolists. A German Economist Stackel Berg developed a leadership-followership model of duopoly named after him. According to the Stackelberg model, a firm which is a follower behaves exactly as the Cournot firm. A leader takes advantage of the assumptions that the other firm is behaving as a follower. The Market shares model of duopoly assumes that one firm always wishes to maintain a fixed share of the market and the other firm is willing to let it so. In the Dominant firm model of Oligopoly the dominant firm sets the price for the product and other small firms who cannot have any influence on price will take the price set by the dominant firm as given and act as perfect competitors in determining their outputs.

In a real world situations, we come across other complex situations and pricing practices. There are multiple products, and Joint products. There are peak-load pricing of products, Full cost pricing and pricing of bundled goods. There is price discrimination for differentiated products under imperfect markets and there are different degrees of price discrimination.

Managerial Theories of Firm

So far, we have analyzed optimal pricing and output decisions of Firms under different markets structures, using the assumption of profit maximization as the objective of a firm. As an alternative to profit maximization, Baumol suggests that Firms maximize sales revenue, subject to the constraint of earning satisfactory level of profits. O. Williamson in his book, Economics of Discretionary Behaviour develops a manager's discretionary behaviour model. He argues that a manager of a large company, has vast control over the management of the company vis-à-vis the share holders (owners) of the company, who have little control over management of the company. Williamson suggests that managers attempt to maximize managers' utility. Managerial utility primarily depends on 1) the salaries and other monetary benefits received by the manager, 2) the perquisites enjoyed by the manager, 3) the staff

under the control of the manager, and 4) the extent to which the manager can direct the investment of Firm's resourses.

Herbert Simon

Herbert Simon, who did his Doctorate in Political Science, has won the Nobel Economics Prize for his pioneering research into decision-making process within economic organizations and for his significant contributions to Organizations theory. While analyzing the Firm's goal, Simon offered an alternative hypothesis to that of the Classical assumption of maximization of profits. Firms, while choosing a particular course of action among several courses available are satisfied with a limited objective of 'satisfice' than maximize profits. It is a decision making strategy that aims at adequate rather than an optimal one. The practice of a fixed mark-up over costs in determining market price gives one example of such behaviour. Following the lead of Simon, others like Cyert and March have attempted to develop a Behavioral theory of Firm.

Transaction Cost Economics and Transfer Pricing

Though many have contributed to the discussion on transaction cost economics, Williamson's contributions to the subject have been many and important. His book 'The Economic Institutions of Capitalism' (Free press New York) provides a unified treatment of the subject of transaction costs.

Every transaction is placed within the context of a Firm. When undertaking a transaction, parties to the transaction incur several costs like negotiating the contract and drafting the contract before entering into the contract. Ex-post costs are incurred in consummating and safeguarding the deal that was originally struck.

Transaction costs depend on two types of factors: those pertaining to individuals who undertake the transaction and factors specific to the particular transaction. Williamson assumes that human beings are boundedly rational and opportunistic. The level of transaction costs depend on asset specificity, frequency and extent of uncertainty.

Firms in order to minimize transaction cost, choose to integrate vertically. As a result, we find firms producing intermediate products required in making of the final product. Suppose a car manufacturer enters into a contract with a producer of rear-view mirrors who makes them to the specifications of the car manufacturer. The car company might prefer to produce its rear-view mirror in house, for example by buying the mirror company. This would reduce time and resources spent over haggling over profits between parties to the transaction because decision would simply be taken by fiat.

Williamson's theory can be tested against decision by companies to integrate parts of their supply chain. Several studies have shown, for instance, that if an electricity generator producer buys its coal from a nearby coal mine, who is the only supplier, then the electricity generator company tends to own the coal mine. Pricing of intra-firm transfer products between a parent company and its subsidiary or between divisions of a large company is termed transfer price.

A Firm corresponds to unified governance. It is a legal entity in whose name various transactions are consummated with other firms and with individuals. Firm's governance

structure needs to match to the characteristics of the transaction.

Transfer Pricing

A transfer price is the price one sub-unit (segment, department, division and so on) charges for a product or service supplied to another sub-unit of the same organization. The transfer price creates revenue for the selling sub-unit and purchase costs for the buying sub-unit, effecting each sub-units income. The product transferred between sub-units of an organization is called intermediate product. Transfer pricing methods are widely and ably discussed in Managerial Economics Text books and Cost Accounting Books for Managers.

Williamson discussed above, won the 2009 Nobel Economics prize jointly with Elinor Ostrom. Williamson borrows insights from Organizational Theory and Behavioural Economics and uses them in his theories of Firms and Organizations. Elinor Ostrom, a political scientist devoted her whole life for researches in Economic governance, especially relating to common property resources. Standard economic models predict that in the absence of clearly defined property rights, common property resources such as pastures and fisheries will be over exp0loited. Over grazing and over fishing will result. In her book on Governing Commons (1990) Ostrom argues that people using these common resources formulate rules and regulations of governance which work much better than Government regulations. Ostrom concludes that there are ways of solving collective action problems within the public sector as well as in the private sector. She suggests that we should learn from highly successful policies the best policies to follow as guidelines. Her researches on policy analysis in the future of good societies titled MUSE can be downloaded through the internet (http://muse/hvoedu/gso/summary/ostrom.html)

Williamson and Ostrom have focused attention on transactions within firms, households and agencies. They have used economic analysis to explain these institutional arrangements and their governance.

Jean Tirol, a French Economist wins the Nobel Prize in 2014. While awarding the Noble Economist Prize to Tirol the award committee mentions is research on Market Power and regulation which helped Governments understand and regulate industries dominated by a small number of dominant firms are a single Monopoly. Left un-regulated, such markets often produced socially un-desirable results – prices higher than casts, or unproductive firms that survive by blocking entry of new and non productive funds. Tirol analyzed such market failures. His work has a strong bearing on how Governments should deal with mergers or Casters and how they should regulate monopolies.

In his books Dynamic Models of Oligopoly, The Theory of Industrial Organization, The Theory of Incentives and Regulation and Procurement and in a series of articles Tirol has presented a general framework for regulatory policies for application to number of Industries ranging from Tele Communications and Banking.

Milton Friedman (1912-2006)

Friedman served as professor of Economics at the university of Chicago for more than three decades and he was the leading figure of the “Chicago School of Monetary Economics.”

Next to Keynes, Friedman had most influenced government policies in many countries. Friedman came to India as an advisor in 1955.

Friedman championed the cause of Free Markets and he persuasively argued to free men from the shackles of government controls. He undertook this task as a crusader till his death in November, 2006.

Chapter - 11

MONETARY ECONOMICS
(Hayek, Friedman, Phelps, Tobin, Lucas, Sargent, Kydland, and Prescott)

Hayek

In the field of monetary theory Hayek has many works to his credit. They are: The pure theory of Capital, Prices and production, Monetary Theory and Trade Cycle and Interest and Investment.

His technical writings in Monetary Economics have not received much recognition and praise from his contemporary economists such as Keynes, Hicks and Milton Friedman. However, Hayek's Monetary Over-investment theory is discussed widely and is being discussed even now in the context of Business Cycles.

Hayek propounded' additional Credit theory of Trade cycle'. During phases of expansion Banks create Credit and such extension of credit lowers the Market rate of interest below the 'Natural rate' of interest. This makes producers to borrow more and invest more. Hayek tries to show how forced saving (credits expansion) changes the structure of production by an artificial increase in investment. This lengthens the process of production and leads to a dis-proportionality between Consumption and Investment, because the new money spent on investment becomes Consumers income and thereby results in increased demand for consumer goods. The rise of consumer goods prices and the consequent fall in real wages means a rise in the rate of profit in the consumer goods industries compared with capital goods production. A fall in real wages will encourage capitalists to substitute Labor for Capital, that is shorten the process of production. The Boom according to Hayek collapses because of the unwillingness of Banks to create credit any further. Investment can be sustained only by voluntary savings and reduced Consumption.

Hayek, rather than Keynes provides an explanation to the 2008 Recession, Carmen, Reinhart, Kenneth Rogoff Lawrence White and Hyman Minsky have argued that financial cycle led to economic volatility. There was evidence of low interest rates leading to financial booms and misallocation of resources. Long booms tended to result in excessive risk taking.

Hayek is a true Liberal. He attacked the trend towards Statism in his work, Road to Serfdom (1944) and the Constitution of Liberty.(1960) Milton Friedman regards Hayek "the Twentieth Century greatest Philosopher of Liberty".

Milton Friedman

Friedman's chief contribution is to Monetary Theory. Among his major works in Monetary theories are:

1) Studies in the Quantity Theory of Money and

2) Monetary History of United States (jointly authored with Anna Schwarz).

Friedman had many followers such as Modigliani, Tobin and others. All these persons are known as monetarists. They believe that money matters. Modigliani declares that "we are all

monetarists now".

In the 1960's the controversy between Monetarists and the Keynesians is widely debated. Both these groups were represented as holding extreme views. Monetarists holding the view "that only money matters" and the Keynesians holding that "money does not matter at all" The bone of contention between the Monetarists and Keynesians is in specifying the precise relationship between money and income. Keynesians have argued that money is merely an indicator; it merely registers a change in income. Monetarists contend that money can be or should be target variable.

To make the points in the controversy clear, let us briefly review the quantity theory of money. Irving Fisher's quantity theory is known as Equation of Exchange and it is given in equation (1)

(Eqn.1)MV = P.Y

Fisher assumed that velocity of money (V) is highly stable. According to him, money (M), determines nominal income, given by the product of price (P) and output (Y).

In Cambridge (England) economists, Marshal and Pigou stated the quantity theory as a Cash – Balance Equation, given in equation (2).

(Eqn.2) M = k.P.Y

Where k is the cash balance kept as a proportion of income.

Both the versions of the quantity theories of money discussed above are similar, as Velocity of money (V) is equal to 1/k by definition. Rewriting equation (1) we get equation (3)

(Eqn.3)M = P(Y/V)

Where V or 1/k are stable and constant.

Output (Y) is at a full employment level and is treated as constant. Hence, an increase in money supply causes an equi-proportional increase in prices.

While Fisher stressed on the demand for money for transactions purpose, the Cambridge economists emphasized on the demand for money as a store of value. Keynes, on the other hand, said that money is demanded for transaction purposes, precautionary purposes and speculative purposes. Keynes observed that the link between money and income is through interest rates. In a liquidity trap situation, in times of a recession investors do not demand money for investment even at low interest rates. This implies that the LM curve is horizontal and changes in the quantity of money do not shift the LM curve. In such cases, monetary policy will have no effect on either the interest rate or the level of income. This explains Keynes argument that money does not matter. Monetarists argue that when the LM curve is vertical, monetary policy has a maximal effect on income and fiscal policy has no effect on income. This explains the monetarists argument that 'only money matters'. Monetarists use the framework of the quantity theories of money discussed above. The monetarists believe that the income velocity of money is regular, predictable and almost a constant. Hence, they argue that money supply is the main determinant of output. In course of time, both the monetarists and Keynesians gave up their extreme positions in the debate and began to be accommodative to other's opinion.

In his re-formulation of Quantity theory, Friedman provided a framework for the modern Portfolio approach to the demand for Money. He begins by postulating that money like many other assets yields a form of service to the person who holds it.

Friedman makes the demand for money depend on the real rate of interest on financial assets, the rate of return on nominal money, which is taken to be the rate of change of Price Level, P/P, the real income, Y, the ratio of non-human to human Capital, W and a taste variable, u . Friedman's demand function for money is:

(Eqn.3) $M/P = f(I, \Delta P / P, Y, W, u)$

The basic difference between Friedman and Keynesians are empirical, not theoretical. Friedman (along with Anna Schwartz) studies the relation between the stock of Money and its changes and the Business Cycles. Friedman suggested that holders of money can be regarded as adjusting the nominal amount of money they demand to their views of their long-term income status (which is a measure of their Wealth), of the long-run level of Prices, and the returns on alternative assets. Neglecting the returns on alternative assets, Friedman and Schwartz use the following equation (4) for empirical analysis:

(Eqn.4) $\text{Log } M(T) = \log .a + \log P(T) + b \log y(T)$

where a and b are numerical constants (or more generally, functions of omitted variables such as returns to other assets). M is money supply and T is time.

They have estimated the money – multiplier or the ratio of percentage change in income to the associated percentage change in the stock of money. For major Business Cycles studied, the Money –multiplier estimate is 1.84.

Monetarists believe that, changes in the quantity of money are the dominant influence on changes in nominal income and, for the short-run changes in the real income as well. According to them money causes business cycles. They argue that stability in the behaviour of money stock would go a long way towards producing stability in income growth. Friedman wants a constant growth rate in money stock. Monetarists believe that the demand for money is a stable function of permanent level of income; hence velocity of money is also stable. As a corollary to constant Velocity any excessive increase in money supply leads to increase in price level and therefore inflation.

Monetarists believe that Fiscal policy on the other hand has a limited effect on GNP of an economy because of the crowding –out hypothesis. The increases in Government spending increases aggregate demand initially. As income begins to rise, the transactions demand for money also increases. With the money stock fixed, increased demand for it results in an upward pressure on interest rates. This causes private investment to decrease substantially. Thus according to Monetarists, increased Government spending leads to decrease in private spending, which is termed as crowding-out. Further monetarists believe in lesser government than more.

Friedman was a true champion of Capitalism. In his Capitalism and Freedom, he writes that the great achievement of Capitalism is not the accumulation of property and wealth but the opportunities it offered to man and woman to extend develop and improve their capacities. Friedman was a true libertarian.

In an articles published in 1958, A.W. Philips indicated on the basis of U.K. data that there was a strong negative relationship between the rate of change of money wages and the level of unemployment. Soon after, it was also argued there was also a significant and stable negative relationship between the rate of change of prices (inflation) and the level of unemployment. Graph depicting inverse relationship between the above two variables is known as Philips curve.

Friedman and Edmund Phelps agree with Philip's notion of trade-off between unemployment and inflation in the short-run. They assume that prices and wages are flexible. In the long run they argue that un-employment rate will gradually return to the natural rate, and any expansionary policy will only result in higher inflation rate.

In the short run, unemployment could be cut by offering higher money wages to workers. Higher money wages translates into higher prices. But as Edmund Phelps says that "Man is a thinking expectant being". Soon, workers bargain for money wage increases to offset the fall in real wages experienced. The resulting increase restores real wages but threatens to cause a return of unemployment, as employers shed labor. The economy will recover its equilibrium only when workers expectations are fulfilled and prices turn out as anticipated. Phelps argued that inflation will not settle until unemployment reaches to its 'natural rate' (full employment rate). With 'real-wage bargaining', the long-run Phillips curve is vertical because there is only one unemployment rate (the natural rate) at which actual and expected inflation match. The only effect of increased demand in the long-run would be to increase inflation for the same level of unemployment.

The monetarists argue that the influence of the money stock is primarily on the price level and other nominal variables. Real variables such as output and employment have time to adjust to their natural levels in the long-run. The natural rates of output and employment depend on real variables such as factor supplies and technology. This is the reason for Supply side economics advocated by Laffer and practiced by Regan and Margaret Thatcher in U.S.A and U.K in 1970's and 1980's respectively. In essence supply side economics is concerned with increasing aggregate supply of goods. They argue for policies such as tax-cuts, removing unnecessary regulations, maintaining efficient legal system and encouraging technological progress. Supply side policies combined with sound monetary policies, have succeeded in 1970's in solving the problem of stagnation in production coupled with inflation – stagflation.

Tobin Model

Tobin agreed with Friedman in the statement that money matters but he disagreed with Friedman's opinion that money alone matters.

The rationale for the demand for money as an asset, Tobin pointed, lies in its role in reducing the riskiness of general portfolio of assets. In a simplified version of Tobin's model, there are two assets, Money which is risk less but it has Zero return, and a risky asset, perpetual Bonds, which has a positive expected rate of return. By holding money in his Portfolio the wealth – holder can reduce his Portfolio risk, but at the expense of sacrificing some expected return. Tobin followed the general equilibrium approach in developing his portfolio choice theory. This theory suggested that assets should be regarded as imperfect substitutes for each other, with their differences in expected yields reflecting marginal risks. Tobins portfolio approach has

provided a corner stone for specification of financial sector. The whole IS – LM – Classical approach came to be known as Portfolio balance Macro economic approach.

New Classical Approach:

Some macro economists took expectations as static or fixed. Others saw that expectations as adapting to past changes. Muth introduced the concept of Rational expectations in 1961 and the concept is generalized and developed by Lucas. Based on Rational expectations and on imperfect information assump0tion, Lucas developed his supply curve. The implications of Lucas supply curve is first spelt out by Thomas Sargent and Neil Wallace. The approach of Lucas and others is called New Classical approach.

The 'Rational expectations model' of Lucas assumes that agents make best use of whatever information is available to them and that expectations are formed in a manner consistent with the way the economy actually operates. Expectations are made subject to forecast error which on average is zero.

The Rational expectations model has the very strong prediction that anticipated monetary policy should have no effect on output, only un-anticipated changes in the money stock increase output. For instance, if people correctly anticipate, inflation, they ask for higher wages as soon as the policy is enacted (or even before). Their demands for higher wages leads to a shift in Labor supply reducing employment and output. Thus, government's policy becomes ineffective.

Economy reacts to anticipated and un-anticipated changes in the money supply differently. In response to an anticipate change money supply, agents will expect an equi-proportionate change in the price level. Both the actual price level 'p' and the expected price level P_e will change in proportion to the change in money supply, the real money supply will remain un-changed, and output is restored to its initial natural level. In contrast, the un-anticipated changes in money supply will have its full aggregate demand and aggregate supply (AD-AS) effects–precisely because an un-anticipated change will not affect expected price Pe. It will however raise the actual price level, thereby stimulates output expansion. Since only unanticipated policy changes have real effects, Demand Management policies are useless.

At first sight, the implication of Lucas model seems to be almost the same as the Classical model. Both models predict policy irrelevance – that neither monetary policy nor fiscal policy can affect the equilibrium level of income in the long-run. The Lucas model is more interesting than the classical model, though, because it allows at least transitory deviations from full-employment. However these temporary deviations are the result of expectations errors and they last only as long as the errors last and that cannot be very long.

Robert Lucas Jr. and Thomas Sargent argue that existing Keynesian macro economic models cannot provide reliable guidance in the formulation of monetary, Fiscal or other types of policy. While Keynes argued that most unemployment is involuntary, Lucas views unemployment as mostly voluntary. In Lucas opinion, labor supply decision is a choice that each worker makes between labor and leisure. If expected real wages are lower than normal, they take more leisure and wait until real wages rise before working. Suppose, the Central Bank decreases money supply, resulting in decreases in wages and prices. The decrease in money wages is experienced by workers but the decrease in the general price level is not known to the workers. Workers think that their real wages have gone down below their expected wages.

They supply less labor and turn down job offers with low wages. Thus, unemployment is explained as a voluntary choice made by workers who are waiting for real wages to rise to its normal level. As workers are rational, their mistake would be corrected in due course. Unemployment is looked at as a temporary disequilibrium that will remedy itself. Just like Friedman, who was Lucas teacher, Lucas also assume market clearing. Lucas approach came to be known as competitive business cycle approach.

Surgent and his co-author Neilwallace have put forward the policy ineffectiveness proposition according to which the Government could not successfully intervene in the economy of attempting to manipulate output. They argued that agents would foresee the effects of monetary expansion, leaving the economy exactly what it was in real terms. What the Government needs a stochastic shock-that is unanticipated change in policy to influence output. Lucas and Edward Prescot are good friends and did collaborative research on dynamic Economics and their joint work is titled Recursive Methods In Dynamic Economics.

Kydland & Prescot:

In the context of Rational expectations Kydland and Prescot have discussed the Time-inconsistent problem in Monetary policy.

Countries such as U.S.A., which follow a modest activist discretionary policy seem to have a bias towards too much Inflation. The Federal Reserve Banks (The Central Bank of USA) had followed during 1970's a policy of accepting rising inflation for a short-term decrease in unemployment. The preference for short-term gains will be inconsistent with the economy's long run interests. Finn Kydland and E. Prescot, have drawn our attention to this dynamic inconsistency problem. We know there is a short-run tradeoff between inflation and unemployment given by the short-run Phillips curve. But in the long-run, there is no such tradeoff between the two because of inflationary expectations. While the policy maker may choose the best long-run position for the economy of full employment with zero inflation, the decision maker seeks in the short-run to lower unemployment and slightly higher inflation. It is this split between announced and executed plans that gives rise to dynamic inconsistency problem.

In general an economic policy is said to be time inconsistent when a future policy decision forms part of an optimal plan formulated at some initial date is no longer optimal when considered at some later date.

The inconsistency of optimal plans have led them to argue (in 1977) that Central Bank should obey transparent rules rather than have discretion. They argue for pre-commitment over short sighted policy making. At the Carnegie Rochester Conference on public policy in 1993, John Taylor has observed that we can design rules that have counter cyclical features without at the same time, leaving any discretion about their actions to policy makers. Taylor proposed one such rule, which is discussed in his Macro-economics text book referred in the Appendix.

When Nobel laureates met

Chapter - 12

Amartya K.Sen:

Born, 3rd Nov. 1933 at Santi Niketan, India. He is a non-resident Indian, residing in USA. A.K.Sen is a many sided genius, a poly-math, who distinguished himself in the fields of Economics, Philosophy and Ethics. His principal contribution is to collective choice and Social welfare, which is discussed in this chapter and his other contributions are no less significant. They relate to Famines, Poverty, Inequalities, Entitlements and Capabilities, which are discussed in Chapter 16.

Prof. Sen is a person of many Identities. He is an eminent scholar, best teacher, a leading thinker, an argumentative Indian, a gentleman and a humanitarian.

He is awarded the Nobel prize in Economics in 1998. He received the title of 'Bharat Ratna' the highest civilian honour from Government of India.

A Festschrift volume,Choice,Welfare and Development, is brought out in honour of A.K.Sen by his former students and Collegues (ed.K. Basu et.al,O.U.P.) It contains more details about A.K.Sen's biographical details and Bibliographical details

May God bless Prof. Sen, in the remaining part of his autumnal life, with sound health, fulfillment and peace.

Chapter - 12

PUBLIC FINANCE &WELFARE ECONOMICS
(James Buchanan, Coase, Arrow and Sen)

James Buchanan

Buchanan's works relate primarily to the area of Public Finance., specially to an area of collective decision making. According to Buchanan, Public finance as a field of study, is essentially a study of political economy. Economic and political analysis must join in studying the effects of political or collective decisions on the economy.

Buchanan has written an excellent introductory text book, The Public Finances. In it he discusses new topics not found in any conventional text book, such as political basis of decisions, simple and complex models of majority voting and fiscal Constitution. His most significant publications in the area of Public Finance include:

The demand and supply of Public Goods, Fiscal Theory and Political Economy and Public Finance in Democratic Process.

Buchanan has no faith on government's actions which only sets limits on individual actions. So he wants Constitutional constraints on Government's actions.

Buchanan's methodology is individualism. Individuals are final decision makers and they need maximum freedom of choice. As individuals differ in tastes, capacities and their environmental setting their expectations of events and their knowledge of information is not uniform. Hence their decisions are subjective in nature.

Buchanan believes that individuals, through exchange can achieve improvements in their position. Exchange can only be effective, Buchanan argues, if individuals acknowledge the mutual existence of others and admit their property rights. Mutual agreement is fundamental in Buchanan's analysis of collective action. His concept of State is purely individualist. Collective action is taken when individuals choose to use Government to achieve some purpose jointly rather then acting individually.

Buchanan is mainly concerned with how property rights arise (between individual sand between individuals and the State) and how they are modified. With in the realm of collective action, he focuses on individuals responses to different collective institutions. His subject mater is positive Public choice, among individuals, holding property rights and a propensity to trade; who enter into voluntary contracts to their mutual benefit.

How laws arise to uphold contracts between individuals and how they are modified and enforced are examined by Buchanan in his major works. The Limits of Liberty, and Freedom in constitutional contract. Following the calculus of consent individuals formulate a set of rules, a constitution. From the formation of a social Contract two distinct types of Government emerge. Self-interest leads an individual to default on contractual agreements when he believes that this can be achieved unilaterally. Consequently, at the Constitutional stage, an agency is created to perform the function of enforcing contractual agreements. Buchanan terms this agency the protective State. At the post-Constitutional stage, individuals may choose to

provide a good collectively rather than through private or voluntary organizations. So a productive state is devised to provide public goods.

So long as the Governmental action is restricted to largely if not entirely, to protecting individual rights, persons and property and enforcing voluntarily negotiated private contracts, the Market process dominates economic behaviour, and ensures that any economic rents that appear will be dissipated by forces of competitive entry. If however, Governmental action moves significantly beyond the limits defined by the minimal or protective state, if the Government interferes on a large scale in the market adjustment process, the solution lies in constitution revolution.

Coase:

Coase too believes in the Market mechanism to resolve any divergence between Private costs and Social costs.The standard example for external economies is that of a factory, the smoke from which has harmful effect on those of neighbouring properties. There will be divergence between private costs and Social costs. In such cases, the suggestion often made by many is that it would be desirable, to make the owner of the factory liable for the damage caused, or alternatively, to place a tax on the factory owner or to exclude the factory from the Residential areas. It is Coase's contention that the suggested courses of action are inappropriate in that they lead to results, which are not necessarily or even usually desirable.Coase argues that regardless of the specific initial assignment of property rights, the final outcome will be efficient provided that the initial legal assignment is well defined and that the parties can reach and enforce an agreement at zero cost. So long as the legal rights are marketable and well defined, the 'Invisible-hand' of market forces leads the parties to an efficient outcome. A Pareto optimal allocation can come about regardless of how property rights are initially assigned provided the negotiations required are feasible.

Welfare Economics originated with the ethical hedonism of Bentham, Sidgewick, Edgeworth and Marshall. The traditional Welfare economics is based on Utilitarianism. This tradition was criticized by Gunnar Myrdal and Lionel Robbins as involving inter-personal comparison of Utility. This has led to the modification of Utilitarian tradition. In fact an important part of the so called now Welfare-Economics had explicit use for only one criterion of social improvement Viz; the Parete criterion. The Parete criterion of social state 'X' is to be judged better then social state 'Y', if at least one person has more utility in 'X' then 'Y' and everyone has at least as much Utility in 'X' as in 'Y'. Kaldor, Hicks and Schitovsky have suggested Compensation criteria of Social choice. The Kaldor criterion states that a change is an improvement if those who gain evaluate their gains at a higher figure than the value which the losers set upon their losses. According to Hicks, state 'A' is socially preferable to 'B', if those who would lose from 'A' can not profitably bribe the gainers into not making the change from 'B' to 'A'. Schitovsky suggested a criterion requiring a double test. State 'A' is socially preferable to 'B' if the gainers can bribe the losers into accepting the change and simultaneously the losers cannot bribe the gainers into not making the change. In this criterion, if the change from one situation to another passes both parts of the double test, then only the move is an improvement. Bergson suggests a different approach. He suggests formulation of a set of explicit value judgments. His suggestion amounts to the construction of an indifference map, ranking different combinations of Utility which may accrue to member of a society. Such an indifference map is

called a Social Welfare function. The modern theory of Welfare – Economics, founded by Bergson has been further developed by Samuelson and J de V. Graff.

Arrow

Kenneth Arrow won the Nobel Prize for his contributions to Welfare Economics specially to Social choice theory, a collective choice made by entire society. Arrow's path - breaking article "social Choice and Individual Values" is well – known as 'Impossibility Theorem'. Arrow did away with real valued welfare function and he said that ranking is enough. Arrow formulated his 'Social – Choice Problem' using individual preferences and call it as 'General Possibility Theorem'. Arrow considered a set of conditions relating Social choices or social judgments to the set of individual preferences and showed that it is impossible to satisfy those conditions simultaneously. That is why Arrow's theorem came to be known as 'Impossibility Theorem'.

Arrow defines a Social Welfare function as a functionalrelation which specifies one Social ordering R, for any set of individual preference orderings. Arrow proposed the following conditions which social choices must meet in order to reflect individual's preferences. 1) Unrestricted domain of the Social Welfare function .The domain should include every possible combination of individual orderings .The number of distinct Social orderings should be at least three. 2) Fulfillment of weak Pareto principle. If every one prefers any x to any y ,then that x is socially preferred to that y. 3) Social choice must be transitive in the sense that if X is preferred to Y and Y is preferred to Z, then X will be preferred to Z. 4) Another condition is that of non-dictatorship, which requires that the social ordering shall not coincide with the ordering of any particular individual regardless of the ordering of others.

Arrow's 'Impossibility theorem' states that there does not exist any social welfare function that simultaneously fulfills the above conditions. The standard procedure for reaching group decisions is by voting and the criterion of choice is majority rule. Let us suppose three persons: Anu, Dhanesh & Santosh vote for three candidates, X, Y & Z. Their preferences indicated by Ranking among the candidates are

Voter	Preferences or Ranks		
	X	Y	Z
Anu	1st	2nd	3rd
Dhanesh	3rd	1st	2nd
Santosh	2nd	3rd	1st

There is a two to one majority in favor of X over Y and Y over Z. Anu and Santosh preferred X over Y. Anu and Dhanesh preferred Y over Z. By transitivity rule X should be preferred to Z. But Dhanesh and Santosh preferred Z over X and it is intransitive. Thus it is impossible to make Social Choices on the basis of individual order of preferences alone.

A.K. Sen:

Now, coming back to general discussion of Arrow's problem, exclusive reliance on Utility information and the Pareto criterion make the information base narrow. Non-Utility information on distributional inequality, or positive right and freedoms, for instance can enrich a modified Arrow framework. A.K. Sen suggested the use of non-utility information. .

With the distancing of Ethics from Economics, Welfare – Economics role became very restricted. The traditional Welfare Economics has Pareto optimality as the only criterion of judgment, and self – seeking behaviour as the only criterion. As such, Sen feels that the scope for saying something interesting and useful in Welfare Economics became exceedingly small.

According to Sen, persons may have reasons for pursuing goals other than personal well-being or individual self-interest. This is the agency aspect of the person. Further, well-being need not always be judged by Utility, It can be based on some objective circumstances such as a person's functioning achievements. Finally a person's freedom can be seen as being valuable in addition to his or her achievements. All these ethical issues must be borne in mind while taking individual and public decisions. Sen argues for closer contact between Ethics and Economics.

In his book, The Idea of Justice, Prof. Sen reiterated the need for social norms. Besides mutual benefit, social norms are especially relevant for cooperation among small homogenous groups.

Prof. Ostrom, another Nobel Laureate, observed many cases of collective cooperation. She describes in her book, Governing the Commons, the advantages of cooperative behaviour and the vindication of that behaviour through voluntary restraint of members of a group. Prof. Ostrom's field observations corroborates Prof. Sen's hypothesis of Social norms.

Chapter - 13

INTERNATIONAL ECONOMICS
(Ohlin , Meade, R.Mundell and Krugman)

Inter National Trade is one of the oldest branches of Economics. Leaving aside the exact dating of its origin, let us start with the Theory of Comparative Cost in the early 19-century. The gist of the theory is that where two Countries specialize in producing goods in which they have a Comparative advantage, both Countries gain from trade.

According to Ricardo, Labor Cost determines domestic value of any commodity. In International Trade however, the labor cost principle does not govern value in exchange. It is determined by Comparative advantage arising out of differences in labor productivity. Ricardo assumes the following figures for labor costs of production for wine and cloth in Portugal and England.

	Labor cost of producing	
	Wine, (x, 1 unit)	Cloth (y, 1 unit)
Portugal	80	90
England	120	100

Costs of producing both commodities are lower in Portugal. In spite of that, it will pay Portugal to specialize in the production of wine and exchange it for Cloth made in England. For by doing so, Portugal would procure Cloth for an outlay of 80 days of Labor (man-years) what would cost her 90 days to produce. Both would gain from the exchange. This theory lends support to free trade argument.

If labor were the only factor of production as the Ricardian model assumes, comparative advantage could arise only because of international difference in labor productivity. In the real world, however, while trade is partly explained by difference in labor productivity, it also reflects difference in countries resources. Heckscher and his students Ohlin have developed a theory which states that international trade takes place largely due to difference in countries resources. This theory is often referred to as Heckscher – Ohlin theory (H - O theory). This H-O model says, in Ohlin's words.

"Commodities requiring for their production much of abundant factors of production and little of scarce factors are exported in exchange for goods that call for factors in the opposite proportions."

Further, H-O theory implies the Factor price Equalization Theorem, which states that exports result in the decrease of some factors of production and imports increase certain other factors. The newly created export industry will raise the relative prices of the domestically abundant cheap factor required in its production; imports will reduce the returns to the domestically relatively scarce and expensive factor previously utilized in its home production. Under certain restrictive assumptions, this results in the international equalization of factor prices.

Ricardo's example of Trade between Portugal and England reflects inter-industry trade. But, much of the International Trade takes the form of intra-industry trade. In the intra-industry trade countries will export as well as import differentiated manufactured goods, if manufactures is a monopolistically competitive industry. For example Germany exports and imports cars from France. Intra-industry trade is driven largely by economies of scale. By producing fewer varieties of goods a country can produce each at a large scale, with higher productivity and lower costs. International trade thus leads to reduced prices and a wider choice of goods to the consumers. Krugman, winner of the 2008 Nobel Prize, explained the causes and patterns of International trade by focusing attention on economies of scale and the economics of imperfect competition. His analysis reveals that similarly placed countries in capital labor ratios, skill levels etc., such as EEC countries should trade, as opposed to countries that are different. Most trade occurred between countries with similar factor endowments and often involved different varieties of products from within the same industry.

International trade and capital flows gives rise to problems of surpluses and deficits, causing Balance of Payments (B.P) dis-equilibrium. Meade's book Balance of Payments is a classic on the subject. The B.P is a comprehensive record of economic transaction of residents of a country in question (say India) who have received external currency (purchasing power) and how it is used. Since the payments side of the account enumerates all the uses which are made of the total foreign currency (purchasing power) acquired by India in a given period, and since the receipts side of the B.P account enumerate all the sources from which foreign currency is acquired by India in the same period , two sides must balance.

Balance of Payments Accounts are divided into Current account and Capital Account. Also the Current Ac.(CA) is equal to the difference between National Income and Domestic Residents spending which is known as Domestic absorption.(C+I+G).Further in a closed economy Saving is equal to Investment. In an open economy S= I + CA where CA is Current Account balance. Developing Countries can borrow from foreign nations for investment purpose and make good the Current Ac. Deficit. That is why the C.A surplus (Or deficit) is referred as Net foreign investment.

The current and capital accounts together make-up the overall Balance of Payments. If BP is in deficit, the Central Bank loses Foreign Reserves and if BP is in surplus the Central Bank gains Foreign Reserves. The BP always balances because the statement of BP includes the monetary movements and other balance items.

In an Open economy, sustainable B.P position over time is an important objective to go along with economic growth, low unemployment and as low inflation. The effects of policy instrument in achieving the objectives depend on the exchange rate system; the system may be a fixed exchange rate system; a floating exchange rate system and a managed exchange rate system.

Now let us consider the effect of Monetary and Fiscal instruments on the internal and external objectives of a country. Mundell extended the Keynesian IS*- LM framework, referred to in chapter 2, by incorporating a Balance Payments Schedule. While Keynesian aggregative demand approach focuses entirely upon Current account, Mundell's model (and also of Fleming) takes into account Capital flows as well. The overall BP, is the Current account plus Capital account. The Current account gets worse as National Income (Y) rises, just as in Keynesian system. Thus, if BP equilibrium is to be maintained (at Zero) as national Income

rises, the domestic rate of interest must also rise so that improved Capital account compensates for current account deficit. The schedule of External Balance Curve (EB) or BP Curve is a locus of zero overall BP positions. Add the EB curve to IS – LM curves, we get the Mundell model.

Visualize a graph showing interest rate on the vertical axis and income level on the horizontal axis; the IS curve downward sloping and LM curve upward sloping. Assume perfect capital mobility so that domestic and foreign interest rates tend to be equal. At that point only, a country can have external balance of Zero. Add, a horizontal BP (EB) Line at the point of intersection of IS-LM curves.

Fixed Exchange Rates:

Let us assume that a country cannot influence world interest rates and the economy is having external balance but not full-employment level of income. The Government attempts to eradicate unemployment through expansionary Fiscal policy. Fiscal expansion shifts IS curve up and to the right tending to increase both the interest rate and the level of output. The rise in domestic interest rates sets off a capital inflow from abroad. This would lead to the domestic currency to appreciate. But under Fixed Exchange rates this cannot happen. To maintain exchange rate, the Central Bank buys Foreign Currency (sells domestic currency). Hence, money supply in the economy increases causing LM curve to shift down and to the right, thereby causing output to increase a little more. Adding both the output expansions, we get a large increase in output. To conclude, Fiscal expansion under fixed exchange rates with perfect capital mobility is effective in increasing output.

In the case of Monetary expansion, the LM curve shifts to the right and this would result in reduced interest and capital flight. It results in BP deficit and hence, pressure for the exchange rate to depreciate. To maintain fixed exchange rate, the Central Bank must intervene, selling foreign currency and receiving domestic currency in exchange. This causes decline in the supply of domestic currency in the economy. As a result LM curve shifts back up and to the left. The process continues until the initial equilibrium point is reached. Hence, output do not expand.

Flexible exchange rates and Perfect Capital mobility

The situation is different under Flexible exchange rates. Market determines the exchange rate and there is no need for a Central Bank to intervene in the market. Without any such intervention, any deficit in the Current account of BP, must be financed by private Capital inflows, and in the case of Surplus in Current account it should be balanced by Capital outflows. As for perfect Capital mobility, any slight rise in domestic interest rate above the World interest rates leads to massive inflow of Capital from abroad making EB(BP) schedule horizontal at World interest rate. Assuming price stability domestically, let us consider the effect of expansionary Fiscal and Monetary policy instruments under flexible exchange rates. The effects of contractionary policies are similar but reverse.

A tax cut or an increase in Government spending would lead to an expansion of demand for domestic goods. This shifts the IS curve to the right. Fiscal expansion leads to increased Government borrowing and thus leads to a rise of domestic interest rates. This results in inflow of foreign capital which in turn leads to exchange rates appreciation. Consequently, domestic exports will decrease and imports will increase. Balance of Trade worsens. IS curve

shifts back to the original position. But LM curve remains the same, as supply of money under flexible exchange rate is exogenous. There is no obligation for the Central Bank to intervene in foreign exchange market. The unchanging LM curve and the shifted back IS curve to the original position interact at the old equilibrium position. Hence, output do not change due to Fiscal expansion under flexible exchange rates.

Monetary expansion under Flexible Exchange rates results in increased real stock of money. This results in reduced domestic interest rates which in turn results in capital out flows to foreign countries. This leads to exchange rate depreciation, increased exports and reduced imports. The I.S. curve shifts to the right and output will increase.

To summarize the effects of policy instruments Monetary policy has no impact on output under fixed exchange rates, while fiscal policy has no effect on output under flexible exchange rates. On the other hand, fiscal policy has a strong effect on output under fixed exchange rates, while monetary policy has a strong effect on output under flexible exchange rates." If the assumptions and parameters change then the effects of policies on output and employment will also alter.

There is a conflict among the three policies of full capital mobility, fixed exchange rate and monetary policy independence; termed as 'impossible trinity'. This is a direct implication of the Mundell-Fleming (IS –LM-BP) framework wherein capital in fully mobile and the domestic interest rate is tied to the foreign interest rate. However, these three policies, taken in pairs, are feasible and practicable.

I.M.F. and IBRD

During the inter-war years, the great Depression took place leading to widespread unemployment and world wide recession. The 1930's were marked by major trade in balances which in turn led to widespread Protectionism, the adoption of deflationary policies, competitive devaluations and abandonment of Gold-exchange Standard.

In this context representatives of 44 Countries met in July 1944 at Brettenwoods, new Hampshire and decided to set up Inter-National Monetary Fund (IMF) and International Bank for Reconstruction and Development (IBRD). The IMF agreement tries to provide sufficient flexibility in exchange rates to allow Countries to attain external balance in an orderly fashion, with out sacrificing internal objectives of fixed exchange rates.

The articles of agreement agreed by the member countries provided for the creation of a pool of international reserves that countries with temporary payments imbalances could draw upon. In the case of fundamental disequilibrium in B.P. Position IMF permits the country to change the exchange rates.

It is believed that both IMF and World bank followed a policy of 'Liberalisation, minimal State and toughness in Monetary and Fiscal matters". This came to be known as Washington consensus. In his WIDER Lecture Stiglitz has attacked total regulation of Financial markets and supported their intelligent regulations. He suggested better focussing of Government action on fundamentals of economic policies: basic education, health and sustainable development and equitable and democratic government. He criticized the policy of market fundamentalism of IMF. To a large extent Stiglitz is responsible for the transition from the Washington to post-Washington consensus.

Both the IMF and IBRD came into being in an era of fixed exchange rates and stable Capital flows. IMF was designed to meet temporary Current account deficit of member Countries by providing access to its Credit facility. These Brettonwood institutions now find themselves ill-equipped to deal with the problems of instability and volatility in exchange rates and capital flows.

The IMF making efforts to build-up its revenues and strengthen its finances. It is serving as a platform for the deliberations of G.20 countries. It is restructuring itself to make it more representative by giving more say to developing countries in the conduct of its affairs.

Trade Policies

Governments adopt several policies towards International Trade such as Tariffs, Quotas and Subsidies.

One of the basic arguments in favor of direct controls over Inter-National Trade in the 'Second-best argument'. It is argued that we should not remove one particular Tariffs or Trade control so long as some other Tariff or Trade control or domestic duty or other divergences between marginal values and costs remain in operation. It is argued that maintenance of one particular divergence between marginal values and costs may help to offset the evil effects of another divergence. As a precept for practical policy, Meade does not find this argument very compelling. The only type of practical Inter-National welfare policy is to remove barriers to Trade, argues Meade. Meade wants re-building of liberal inter-National economic order.

Global Trade negotiations take place periodically under the aegis of GATT, now called World Trade Organization. The last Trade negotiations were held at Doha.

Joseph Stiglitz, coauthored with Andrew Carlton, a book titled 'Fair Trade for All'. In that book Stiglitz argues for establishing a global trade regime which represents fair trade for all – both developed and developing countries. The authors argue that if there is to be widespread support for the continuing agenda for trade reform and liberalization, the developed world must make a stronger commitment than it has in the past to give assistance to the developing world. The developed countries should reduce their tariffs and subsidies on the goods of interest to the developing countries.

Mundell has pioneered the theory of Optimal Currency Area and was influential in shaping the European Union (E.U). The birth of European Monetary Union (EMU) in 1999 resulted in a single currency, Euro for all its 16 members. By joining the EMU, countries have achieved Exchange Rate stability, foregoing independence of monetary policies. Countries like England wishing to retain monetary flexibility preferred to stay out of the European Monetary Union.

In recent years, several bilateral Free Trade Agreement have been concluded in Asia. Several countries including China and Japan have signed trade deals with the Association of South East Asian Nations (ASEAN).

Paul Krugman's excellent text book (coauthored with Obstfeld) titled, International Economics deals exhaustively with the theory of economics of scale, the political aspects of free trade and the geographical aspects of economic development and many other policy issues of International Trade.

Chapter –14

FINANCIAL ECONOMICS
(Modigliani, Markowitz, Merton Miller, Sharpe, Robert Merton and Scholes, Eugene Fama, Lars Peter Hansen, Robert J. Shiller)

Of the financial economists who received the Nobel Prize in Economics, Franco Modigliani was the first to receive the prize in 1985. He was followed by Markowitz, Merton Miller and Sharpe who received the Nobel Prize together in 1990. And in 1997, Robert Merton and Myron Scholes received the prize.

Franco Modigliani and Merton H. Miller are popular through their widely discussed theory named as Modigliani – Miller Theory (referred to here after as M and M theory). In their pioneering article "Dividend policy, Growth and The Valuation of Shares", (in J.B. Oct, 1961) M & M have showed the irrelevance of dividend policy. M and M assumed a world without taxes, transaction costs or other market imperfections.

**Fn This Chapter is written by my daughter, Dr.V.Rama Devi, who has been working since June 2008 as Professor in the School of Management Studies, K.L.C.E.(KLCE became K.L. University in 2009, Guntur-2 (A.P.). Earlier, she worked as Associate Professor, College of Management, GITAM University, Visakhapatnam and as Asst. Professor at ICFAI University, Hyderabad. She is now working as Professor in Management in Sikkim Central University. An adapted version of this Chapter is published in Southern Economist, 1st Dec., 2008, Bangaluru.*

The crux of MM's position is that the effect of dividend payments on shareholders wealth is offset exactly by other means of financing. Where the firm has made its investment decision, it must decide whether to retain earnings or to pay dividends and sell the new stock in order to finance the investments. But the issue of an additional stock of shares will cause a decline in the terminal value of shares. What is gained by the investors as a result of payment of dividends will be neutralized completely by the reduction in the terminal value of shares. MM suggest that the sum of discounted value per share after financing and dividends paid is equal to the market value per share before the payment of dividends. In other words, the stock's decline in market price because of external financing offsets exactly the payment of dividends. Therefore the investors according to MM will have no preference between getting the increase in wealth in the form of dividends now or capital appreciation later. The dividend pay out is irrelevant.

1) <u>Irrelevance of Capital Structure:</u>

Modigliani and Miller also showed the irrelevance of capital structure for investment decisions in perfect markets. The market value of a firm is independent of its capital structure. The sum of the parts must equal the whole; so regardless of financing mix, the total value of the firm stays the same, according to MM. The basic premise of MM approach is that, the total value of a firm must be constant irrespective of the degree of leverage

If the market values of any two firms differ then the process of arbitrage operates to equalize the values of the two companies. The central proposition of MM is that the weighted average cost of capital (WACC) is independent of the debt-equity ratio and equal to the cost of capital which the firm would have with no gearing in its capital structure. MM argue that company value and the overall required return, Ko, are invariant to capital structure.

Markokwitz and Sharpe are widely known for their path breaking contributions to portfolio theory. According to Markowitz's mean-variance maxim, an investor should seek a portfolio of securities that lies on the efficient frontier. A portfolio is not efficient if there is another portfolio with a higher expected value of return and with the same or a lower standard deviation or the same expected value with lesser risk. If inefficient portfolios are deleted, we get a set of efficient portfolios or efficient frontier. It is possible to draw a Risk-Return indifference map such that the investor is indifferent between any combination of risk and return on any indifference curve. The slope of the indifference curve is the investor's marginal rate of substitution between risk and earnings. The point of tangency between the efficient frontier and the indifference curve is the optimal portfolio combination.

Markowitz devised an algorithm, using quadratic programming to calculate a set of efficient portfolios. His model is extremely demanding in its data needs and computational requirements.

Sharpe views that relationship between securities occurs mostly through their individual relationships with some index. This is known as Sharpe's Index model. Sharpe's model reduces the data requirement considerably.

In an article titled "A simplified model for portfolio analysis," published in 1961, Sharpe relates each stocks return to the market as a whole rather than to every other stock. One way to capture this relationship is the market model. This can be expressed as

$r_s = \alpha + \beta r_I + e$

where r_s = return on security

α = intercept term

β = slope

r_I = return on market Index and

e = error

This market model specifies that every risky security in a portfolio is related to the return on the market index such as SENSEX. The market model assumes that the return on a security is sensitive to the movements of the market Index (factor). Hence, the market model is also called Index model or Factor model.

Capital Asset Pricing Model (CAPM):

The CAPM shows the relation between risk and expected return for efficient portfolios. In the CAPM graph, we represent returns on the vertical axis and risk of the Portfolio on the horizontal axis. Efficient portfolios, plot along the line going from risk free return through the Market Portfolio. Efficient Portfolios consist of alternative combinations of risk and expected

returns obtainable by combining market portfolio with risk free borrowing and lending. The lenear efficient set of the CAPM is known as the Capital Market Line (CML).

Because all investors face the same efficient set, the only reason they will choose different portfolios is that they have different preferences towards risk and return resulting in distinct indifference curves. Although the chosen portfolios will be different each investor will choose the same combination of risky securities. As a result each investor will spread his or her funds among risky securities in the same relative proportions, adding risk free borrowing or lending in order to achieve a personally preferred combination of risk and return. The tangency portfolio is referred to as market portfolio and it is same for all investors. Only there will be a certain amount of either risk free borrowing or lending that depends on that person's indifference curves. The optimal combination of risky assets for an investor can be determined without any knowledge of the investor's preferences toward risk and return. This feature of the CAPM is often referred to as the separation theorem.

In CAPM, the market will ultimately achieve equilibrium. In equilibrium the proportions of the tangency portfolio will correspond to the proportions of the market portfolio. The tangency portfolio is commonly referred to as market portfolio.

The vertical intercept of the Capital Market Line (CML) is the risk free rate of return which is often referred to as the reward for waiting. The slope of the CML is equal to the difference between the expected return of the market portfolio and the risk free security divided by the difference in their risk. The slope of the CML is often referred to as the reward per unit of risk borne. The intercept and slope of CML can be thought of as the price of time and the price of risk. In essence, security markets provide a place where time and risk can be traded, with the prices determined by supply and demand.

We have seen that the market model (Index model) uses market Index, whereas the CAPM involves the market portfolio. In practice the composition of the market portfolio is not precisely known; so a market Index must be used. As such beta determined by using market Index is used as an estimate of beta determined by market portfolio.

The Capital Market Line (CML) represents the equilibrium relationship between the expected return and standard deviation for efficient portfolios. The relation between covariance of security with the market and expected return is known as Security Market Line (SML). The securities with larger covariance with the market will be priced so as to have higher expected returns. Suppose the beta of an individual security is 1.5, the required rate on the market is 15% and risk free rate is 6% per annum. Then the required rate of return for the security is

$0.06 + 1.5 (0.15 – 0.06) = 0.195$ or 19.5%

The expected return for a security is the product of beta and the market risk premium plus the Risk free rate of return.

MYRON SCHOLES AND ROBERT MERTON:

In the 1970's, Fischer Black, Myron Scholes and Robert Merton made a major contribution to the pricing of stock options. Before their work is recognised by the World, Black died. The remaining two received the Nobel Prize in 1997. Of their work, the most popular model is the Black-Scholes model. The Black-Scholes formula (BS formula) for pricing European Call Option on a non-dividend paying stock is given below. The buyer of Call Option gets the right

but not the obligation to buy the Stock at a certain price. European call options can be exercised only on the expiration date only. The BSO formula for call options is given below.

$C = S_0.N(d_1) - K.\ e^{-r.t}\ .\ N(d_2)$

Where C is the value of the stock option

S_0 is the current stock price at time zero.

K is the exercise price of the option

N (d) is the value of the cumulative Normal density function

e is an exponential, equal to 2.718

r is the short-term annual interest rate continuously compounded

t is the length of time to the expiration of the option, usually expressed as a proportion of an year

For the computation of d1 and d2, the formulas are

$$d_1 = \frac{l_n\,(S/K) + (r + \sigma^2/2)t}{\sigma\ .\ \sqrt{t}}$$

$$d_2 = d_1 - \sigma\ .\ \sqrt{t}$$

Where l_n = The natural Logarithm

σ = The standard deviation of the annual rate of return on the stock

The BSO formula is taken from the well known text book by Hull. The formulas appear differently in other text books like Redhead book. But they are one and the same.

For Stocks providing a dividend yield at rate Q, the BSO formula for European Call options is modified on the basis of results derived by Merton. In the revised formula, Stock price is reduced from S_0 to $S_0.e^{-QT}$ where Q is dividend and d_1 computation also changed accordingly.

The revised BSO (Merton) formula can be used for calculating European Call option for Stock Index. S_0 is the value of the index and K is the exercise price of the index and Q is equal to the annualized dividend yield on the index.

For currency options also we use the same BSO (Merton) formula. We define S_0 as the spot exchange rate and replace Q (dividend rate) with r_f , foreign risk free interest rate.

In the case of American Call options on Stocks, the right to buy the stock can be exercised at any time upto the expiration date of the option. When there are no dividends on Stocks, the American and European Call option prices are equal and the BSO formula can also be applied to determine the price of American Call options on Stocks. When there are dividends on stocks, Black suggested an approximate procedure to determine the price of American Call option.

While the Call options give the right, but not the obligation to buy stock (underlying asset) at a specified strike price on a future expiry date, the Put options give the right but not the obligation to sell the stock at a specified price on a future date. So Put options are exact

opposites of Call options. So BSO formula of Call options can be used for Put options also, by changing signs of formula C and rewriting the formula for Put option. The calculation of d_1 and d_2 remain the same.

The Global Financial crisis of 2008 has led to blaming the Financial models and question their underlying assumptions, that markets function efficiently. Actually, the financial industry consisting of Banks, Investment Funds, Hedge funds and such others are to be blamed for causing the Financial crisis. Fiscal stimulus policies and liquidity injection policies have averted the Financial crisis deepening into a Depression.

Eugene Fama, Lars Peter Hansen, Robert J. Shiller won the Nobel Price for 2013 for their work on predictions in Financial Market and also for spotting trends in Financial Markets.

Chapter 15

INFORMATION ECONOMICS
(Mirrlees , William Vickrey, Akerloff, Spence, Stiglitz, Hurwitz.Myerson, Maskin & Alvin Roath)

In the 1950's George Stigler explained that price differences of products are due to expensiveness of search and information. Since then, information economics has grown steadly.

Stiglitz observes that information is costly and further it is asymmetric. Because of asymmetics of information between buyers and sellers, markets fail and misallocate resources. As such Stiglitz argues for government intervention.

Three main themes arise in situation in which asymmetric information exists in a contractual relationship, that is to say, in which one participant knows something that another does not. They are: Moral Hazard, Adverse, Selection and Signaling. In the Contractual relationship in which the participants could be individuals, institutions or firm, let us refer to the participants as Principal and Agent. The Principal is responsible for designing and proposing the Contract, while the Agent, who is contracted to carryout some task decides, if he is interested, in signing or not.

In the context of Information asymmetry, Moral Hazard problems have to do with the behaviour of the Agent during the contractual relationship. The Agent's behaviour is not observable by the Principal, it is not verifiable (for a Court of Law). The first formal papers on Moral Hazard are those of Mirrlees. A classic example here is Fire insurance where the insure (agent) may or may not take adequate care while storing the flammable materials. It is possible for the Fire insurance company to send inspectors to see that the insurer takes proper care. But perfect monitoring is not possible.

Agents frequently do not act in the best interests of the Principals. Against the interest of the employer (Principal), the workers may not be working very hard, preferring to idle away time by doing work at a slow pace. Similarly, in a company, the shareholders are owners and the managers are the agents. The managers (agents) may pursue goals other than that profit maximization. The resulting inefficiency due to such conflicting goals is termed 'X' inefficiency.

Such problems can be tackled by proper monitoring of the performance of the agents by the principals. Further, there must be incentives for the agents to behave in the principals interests. Thus, managers' salaries could be linked to firms' profitability.

William Vickery won the Noble Prize jointly with Mirrless in 1996. Vickry deals with the problems of design mechanism in economics, especially with the writing of Contracts among parties who will come to have private information. Vickery suggested a design mechanism known as 'Second-Price Sealed Bid Auction'., termed as 'Vickery 's Auction'

In this type of auction system suggested by Prof. Vickrey the person who is willing to pay the highest price gets the chance to buy the good and he pays the social opportunity cost, which

is the second highest bid. Hence, this auction design is socially efficient. The bidders are induced to reveal their true valuations of the good.

The 'Adverse Selection' problem is present, when before signing the Contract, the party that establishes the conditions of the Contract (the Principal) has less information than the Agent on some important characteristics affecting the value of the Contract.

Early important contributions to 'Adverse Selection' problems came from Akerloff. Akerloff gives the illustration of the used cars, which are in good condition (Peaches) and in bad Condition (Lemons). In a secondhand car market, there is a tendency of 'Bad Used cars' driving out the good cars.

If the good and bad cars are sold at the same price, owners are more likely to offer a bad car for sale than a good one. Potential buyers of used cards suspect that the cars on the market are bad. Accordingly, they reduce the price they are willing to pay. At the reduced prices, the sellers will have no incentive to sell good cars. In such a vicious circle, the market for used cars may even collapse.

While information is imperfect and asymmetric, persons can take steps to provide others with the signals or proxies for the relevant variable. Michael Spence in a path-breaking article points out that education of candidates for a job serves as a signal to the employer. Employer has no prior information about the ability of candidates. They initially believe that persons having education, say degree are more able than others., who are believed to be less able.

On this basis, the employers offer higher wages or salary to more able candidates and low wages to less able persons. The candidates in turn fulfill the employers expectations. It is assumed that the cost of education (acquiring a degree) is higher for less able persons as they take more time to get it than the less able persons. In such a context, only the more able persons find it worthwhile to acquire the needed degree as a signal about their ability. And For the Employer taking the degree as a signal of their ability offers higher wages to all those candidates having a degree.

In the Moral hazard example, we referred to Employer and Employee relationship. The Employer (Principal)designs the contract to induce high effort on the part of the Agent. The agents expected pay-off for high effort must be at least as great as his pay-0ff from low effort. This kind of inequality is called the incentive compatibility constraint.

In the car example above it was assumed that the buyer had no information about the quality of the car. However, the buyer (the Principal) while designing the contract can motivate the seller (the agent) to reveal his private information about the quality of the car. The Contract specifies a guarantee for the car'. The seller would accept the contract only if the car is a good quality.

The 2007 Nobel Prize is awarded to Hurwitz, Myerson and Maskin for their Contributions to mechanism design theory. An important feature of collective decision making is that it takes into account individual preferences. But the individual preferences are not publicly observable. How the information can be elicited, and the extent to which the information revealation problem constrains the ways in which collective decisions can respond to individual preferences, is known as mechanical design problem. As Engineers design bridges and machines, analogously economists design exchange mechanisms such as telephone

exchanges and auction markets. According to Hurwitz, the theory attempts to achieve incentive compatibility among the agents. Meyerson Revealation Principle induces people to reveal their private information truthfully. Maskins Implementation theory clarifies when mechanisms can be devised that only produce Nash equilibrium that is incentive efficient.

The work of these Nobel Economists of 2007 is closely related to that of non-cooperative game theories of Hasranyi, Nash and Selten and to the theories of Vickrey and Mirrlees referred earlier in this chapter.

As design theories form a constituent of game theory, books and chapters on game theory may be consulted for more details.

The Nobel Prize 2012 is awarded jointly to Professors Shapely & Alvin Roath. While Shapely used Game Theory to analyze different matching methods in the 1950's & 960's, Roath applied matching methods for allocations and the practice of market design. Those interested in knowing more about Roath's contributions they may read his book (Co-edited with J.Kagel), Handbook of Experimental Economics, Princeton University press, 1995.

Design theories, Game theories and Experimental Economics are interrelated.

Chapter 16

W. Arthur Lewis (1915 – 1991)

Arthur Lewis was born in 1915 at St. Lucia, an island in the Caribbian and other America's Region. He had faced many difficulties during his childhood days. His father died when he was seven years old and his mother brought him up. He was a Black and from a Colonial country. Naturally he faced initial difficulties. He made best use of what opportunities came in his way.

He graduated from London School of Economics and worked as Professor in the Universities of Manchestor, U.K. and Princeton, U.S.A. He spent several years in administration also. He became a citizen of U.K.

Chapter 16

ECONOMIC GROWTH AND DEVELOPMENT
(Solow, Lewis, Kuznets, Schultz, Becker, Myrdal, Angus Deaton)

The genesis of Growth theory in the last Century can be traced to. Harrod and Domar Model.s As theyare similar we discuss. Harrod- model. Explanations of Harrod model are many and the one given by A.K.Sen, in his Introduction to Growth Economics, is brief and excellent. As such, we follow Sen's explanation of Harrod model.

It can be shown that the following relation holds between the actual and the expected growth rate.

1) $g_t \geq \hat{g}_t$, according as $\hat{g}_t \geq s/C$

The actual growth rate $g_{t,}$ is equal to expected growth rate $\hat{g}_t$ if and only if the expected growth rate, is equal to the warranted rate of growth, s/C where 's' is the saving rate and 'C' is capital-output ratio otherwise there will be Harrod's instability problem. If the investors expect more than the warranted rate of growth, s/C then the actual growth rate of demand will exceed expected growth rate.

Suppose, the saving rate is a 20% and the Capital-Output ratio C is 4, then the warranted growth rate is 5%. Suppose the current output level is 95, so that a 5% increase will, mean a movement to 100(approximately). If the investors in fact expect an output of 100, they will invest 20 units,(5.4) to create an additional capacity for an additional units of demand. The investment of 20 units will generate a demand level of 100,so that expectations will be realized.Suppose, the investors expect more, say 102 units of demand they have to create capacity to meet additional demand of 7 units (102-95). They invest 28 units (7.4) and through the multiplier investment of 28 units will generate a demand level of 28. 5=140 Investors will feel that they have expected too little demand. Similarly if the investors expect less, say 98, then they will invest 12units(3 . 4) and it will generate demand of only 60 units. So they feel that their expectations are very high.

Harrod employs another growth rate, the 'Natural' rate of growth. Harrod's Natural rate of growth is the maximum sustainable rate of growth in the long run given by the rate of growth of the Labor force, 'n' and the rate of labor-saving Technical progress, 'm'. if the warranted rate of growth given by s/c is equal to the natural rate, there is no problem. But if the warranted rate 'G_w' is greater than the Natural rate, G_n, then actual reaches a ceiling limit of full-employment, which may result in departures from equilibrium. On the other hand $G_w<G_n$ then a, growing portion of un-employment will emerge.

Thus according to Harrod an economy achieves a steady growth at a constant rate only when the saving rate is equal to the product of the Capital-Output ratio and rate of growth of the (effective) Labor force.

Dissatisfied with Harrod's crucial assumptions and its main conclusions, Solow published his classic article" A contribution to the Theory of Economic Growth" in 1956. His article marks the

beginning of the Neo-Classical Model of Economic Growth"; the gist of the article is presented below.

Solow's growth model is presented in the following fundamental Equation.

$r^1 + n.r = sF(r,1)$ or $r^1 = sF(r,1) - n.r$

Where 'r^1' is the rate of change in capital-labor ratio.

The function F(r,1) gives the total product as varying amounts of capital are employed with one unit of labor. Alternatively, it gives output per worker as a function of capital per worker.

Consider the right hand side of the equation. we know sF(r,1) is simply saving per worker and since in this model, saving automatically become investment, it can be interpreted as the flow of investment per worker. The second term in equation, n.r is the amount of investment that would be required to keep the capital – labor ratio 'r' constant, given that the labor force is growing at a constant proportional rate of n. Thus the rate of change of the capital – labor ratio, (r^l) is determined by the difference between the amount of saving (and investment) per worker and the amount required to keep the capital – labor ratio constant as the labor force grows.

When the two are equal, r will be constant at the equilibrium value, re ($r^1 = 0$).

Using the above equilibrium point, there is a simple mechanism to make the equilibrium stable. Suppose for example; there is a departure from equilibrium value, r_e. If savings fall short of the required investment nr, then Capital labor ratio decreases toward the equilibrium value. If savings exceed the required investment, then the Capital-labor ratio will increase toward the equilibrium value.

The following conclusions are drawn from Solow's model.

1. The long-run rate of growth of the Capital stock and the National income is the rate of growth of Labor force, which is assumed to be exogenous and constant, n.
2. The economy invariably tends to a Balanced growth path, whatever the initial Capital-Labor ratio.
3. Output per worker, Capital per worker, consumption per worker, are all constant in the long-run. This is called steady state. At the steady state aggregate income grows at the same rate as Population.
4. An increase in the savings rate raises the growth rate of output in the short-run. It does not affect the long-run growth rate of output, but it raises the long-run level of output and output per head.

Solow and other Neo-Classical writers argued that relative shares of Labor and Capital depend on the ratio of marginal and average productivities of the Factors. The share of a Factor of Production is equal to the elasticity of production with regard to that factor. Under the assumption of constant returns to scale and competitive markets, Solow suggested that the rate of growth of output is equal to the rate of growth of labor multiplied by its share in output plus rate of growth of capital multiplied by its share in output plus the residual. This Solow's residual is termed multifactor productivity growth. It is observed that in U.S. the

output-capital ratio is relatively constant for a long period. This implies a positive Solow residual, equal roughly to the labor share times the rate of growth of labor productivity. The rate of change of multifactor productivity of Solow residual is estimated to be 1.7 in U.S. during 1950 to 1975, accounting for approximately half of the growth of the private economy of U.S. over the whole period. The source of the residual is not known.

Modern Growth theory is devoted to analyzing properties of Steady-states in industrial economies. However, Growth Theories provide useful insights to growth problems of developing Countries also. Solow's endogenous model of growth has relevance for developing countries and it is discussed below.

Solow's Endogenous model of Growth

In the Solow's exogenous model discussed earlier, the relative rate of Population growth in treated as constant, n. Later, Solow relaxes this assumption and make Population an endogenous variable. This model is discussed in his book Growth Theory (2000). Suppose, for example, for very low levels of income per-capita the (real wage) Population tends to decrease; for the next stage higher levels of income, it begins to increase and that for still higher levels of income, the rate of Population growth levels off and starts to decline. The rate of growth of population depends on the level of per-capita income. Since per-Capita income is given by Y/L = F(r.1), the upshot is that the rate of growth of the labor force becomes n = n(r). The earlier Fundamental Eq. now becomes:

$r^1 = s\ F(r,1) – n(r).r$

Thus, the rate of change capital/labor is constant if per capita savings are equal to the investment requirement. With Population growth nr(r), the investment requirement rises slowly, then sharply and eventually flattens out. The per-capita savings remains the same.

The investment requirement may equal the savings at low and high points r_1 and r_2. Point r_1 is the Poverty trap point, with high Population growth and low income. The equilibrium point r_1 is stable. If the initial Capital-labor ratio is less than r_2 the system will move back towards r_1. Point r_2 is unstable. If the initial capital-labor ratio can be raised substantially by investing in a big way, so as to make it go beyond the critical level r_2, then economy experiences a self-sustaining growth with increased income. The economy can avoid the Poverty trap by increasing savings and reducing the rate of Population growth.

W.A.Lewis

W.A.Lewis classic article, "Economic Development with Unlimited Supply of Labor" published in 1954, gave rise to enormous Research on the contemporary problems of large areas of the earth (of developing countries). As such the salient points in that article are presented here.

Lewis, like Classical writers, assumed the existence of disguised labor in agriculture in developing countries. In the Lewis model there are two sectors-the agricultural sector and the manufacturing sector. The two sectors may as well be described as 'subsistence sector' and the 'capitalist sector'. The Capitalist sector is that part of the economy which uses reproducible capital and pays for the use thereof. The remaining part of the economy is the subsistence sector.

The Capitalist sector can expand indefinitely at a constant wage rate for un-skilled labor, drawn from the Agricultural sector. The actual wage rate will be determined by earnings in the subsistence sector, which is equal to average product and not marginal product. It is because by convention everyone in a household received an equal share of what is produced. Capitalist will have to pay some margin-perhaps 30% above average of a subsistence pay because the surplus workers in agriculture need some incentive to move to urban areas for being employed in the manufacturing sector. Supply of labor is perfectly elastic to the manufacturing sector at the current wage so determined at the institutional wage in agriculture.

In the Capitalist sector, the marginal product curve will be concave (from origin) and will be decreasing. In the Capitalistic labor will be employed up to point where its marginal product equals wage. The Capitalist will get Producer's surplus. The surplus is reinvested by the capitalist which raises the schedule of marginal productivity of labor. And the process continues as long as there is surplus of labor. The Lewis model, in effect says that unlimited supplies of labor are available at a constant real wage and if any part of profits is reinvested in productive capacity, profits will grow continuously relative to national income and capital formation will also grow relatively to national income.

The central fact of economic development is rapid capital accumulation. Lewis model popularized the concept of Dualism in which a small industrial sector grows to absorb greater amounts of agricultural surplus labor, without adversely affecting agricultural production.

And, extending the migration mechanism suggested in Lewis model, Michael Todaro developed two-sector migration model. In the Lewis schema, people migrate from rural to urban areas in response to assured urban employment, and with out a real wage differential. In Todaro model, however, the parameters become variables. According to Todaro, an individual's decision to migrate is a function of income gain of an urban job weighted by likelihood of finding such job. Lewis & Todaro models of Dualism are more realistic than the earlier Sociological Dualism, proposed by Dr. Boeke. According to Dr. Boeke; "Social Dualism is the clashing of an imported social system with an indigenous social system of another style". The imported social system of high Capitalism (from the West), clashes with the existing pre-Capitalist system (in the East). According to Boeke, Dualism arises from a clash between East and West, specially between the Cultural traits of their societies.

Kuznets

Kuznets is well known for his significant contributions to Economic Growth. A Bibliography of his works is given in his latest book (published posthumously), Economic Development, the Family and Income Distribution.

As the books of Kuznets are available and accessible to Indian students and non-technical and understandable there is no point in giving all the findings of Kuznets researches. We present one important empirical finding by Kuznets.

Based on Kuznets empirical findings and conclusions a tentative hypothesis is formulated which states that income inequality first rises and then falls with development. A plot of inequality (on vertical axis) against a measure of development such as per-capita income (on horizontal axis) would then look like an inverted 'U' (looks like '∩'.

Gunnar Myrdal

Gunnar Myrdal's methodology is characterized by an interdisciplinary approach, to social problems. In analyzing social problems he takes into consideration not only 'pure economic factors but also the social, demographic and institutional aspects', Further, he states his value premises explicitly.

Myrdal's contributions to Monetary Economics are significant. But his contributions to policy issues of developing countries are widely known and appreciated. He is responsible for popularizing the concept of vicious circle. In his seminal work on U.S.Race Relations: An American Dilemma, he explained the Race relations in terms of 'White Prejudice' and 'Low Negro standards'. These forces operate in a circular way in a static context, balancing each other. White Prejudice and the consequent discrimination against the Negros, block their efforts to raise their low plane of living. This on the other hand, forms part of the causation of the prejudice of the Whites.

This hypothesis of circular causation is used by Myrdal again in his works on economic development of Backward Countries. He argues that the principle of circular interdependence within a process of cumulative causation has validity over the entire field of social relations and economic development. The problem of Economic development, according to Myrdal, consists in generating cumulative movement in an upward direction. In such a case, the circular constellation of forces, instead of being vicious will become beneficient.

Myrdal wrote many books and his Magnus-opus is Asian Drama-An Enquiry into the Poverty of Nations. Many have acclaimed Myrdal as Adam Smith of Poverty.

Myrdal disagreed with the Inter-National Trade theory proposed by Heckscher-Ohlin. They argued that trade worked for equalization of Factor prices and income. Myrdal argued that Inter-National Trade (and Capital movements) will generally tend to breed inequality and will do so the more strongly when substantial inequalities are already established. Developed Countries with higher productivity and incomes will continually acquire more internal and external economics and develop, further, while under-developed countries will face back-wash effects from developed Countries and they continue to remain under developed.

Critics of Free Trade includes Paul Prebisch and others. Prebisch divides the World into Centre and Periphery; the Centre comprises of Industrial Countries and the Periphery encompasses the Underdeveloped World. Trade between the two results in adverse terms of Trade for the Periphery.

The Dependency School of writers argued that foreign Trade, foreign investments would entangle the Periphery into Capitalistic network of Centre and profits arising from these investments would be transferred as surplus from the Periphery to the Centre, aggravating the Poverty of the Periphery.

Robert E. Lucas has proposed a new theory of growth in his book Lectures on Economic Growth (2002). He developed the human capital model. It involves an external effect of human capital patterned on the external effects of knowledge capital that Romer introduced. The central idea in Lucas book is that the successful transformation from an economy of traditional agriculture to a modern growing economy depends crucially on an increase in the rate of human capital accumulation.

Economics of Education

T.W.Schultz

Economists have long known that people are an important part of the wealth of nations. Investment in human capital will further the economic growth and development of nations. Modern economists have not paid as much attention to human resources in economic growth as did some of the great Classical economists like Adam Smith and Marshall.

T.W.Schultz felt that investment in human beings has seldom been incorporated in the formal core of economics even though its relevance is recognized. In his Presidential address at the annual meeting of the American Economic Association (28, Dec.1960). Schultz has drawn attention to the need for investment in human capital.

He argues that worker need skills and knowledge which is largely a product of investment in education and improved skills of the workers, account predominantly for the productive superiority of the technically advanced nations.

When we take account of investment in education, we can find explanations for the following apparent paradoxes.:

When farm people take non-farm jobs they earn substantially less than industrial workers of the same race, age and sex, this difference in earnings correspond closely to their difference in education levels.

Schultz argues that the observed growth in productivity per worker and a large increase in real earnings of workers is partly due to improvements in investment in physical capital but largely due to steadily growing amount of human capital per worker.

Gary Becker

Becker also stressed the importance of investment in human capital. In his classic work, Human Capital: A Theoretical and Empirical Analysis, he provided a general analysis of investment inhuman capital. In his book he discusses of investment in, on the job training and also of investments in schooling, information and health. The concept of human capital embraces such activities as the purchase of health care, time spent searching for better job than accepting the first available job, migration, and acceptance of low paying jobs which have a large element of learning on the job. According to Becker, in the long-run, all such investments in human capital will be undertaken up to the point where the marginal returns to such investments are equal to the marginal cost of investment funds.

The growing realization of the need for Human development has led to the construction of Human Development Index (HDI) by World Bank. Prior to the construction of the HDI, the World Bank advocated ‘Basic needs’ approach. Human Development goes beyond ‘Basic needs’ in that it is concerned with all human beings-not limited only to the Poor Persons and Poor Countries. Of course, the main target groups are the Poor in all Countries.

Human Development Index:

Human Development Reports have been released annually under the auspicious of UNDP. The preparation of the Human Development Reports is made possible due to collective effort of many individuals and organizations. Sen served as Advisor for preparing the Human Development Reports and fruitfully interacted with many economists like Mahabub – ul-haq,

Sudheer Anand, Paul Streeten & Richard Jolly. Sen, in collaboration with Sudheer Anand provides a detailed analysis of Human Development Index, Methodology and Measurement (Occasional paper12, UNDP)

HDI and India

The HDI is based on three indicators as measured by

1. Life expectancy at birth (years).
2. Educational attainment, as measured by a combination of adult literacy (two-thirds weight) and combined primary, Secondary and tertiary enrolment ratios (one-third weight)
3. Standard of Living, as measured by real GDP per capita (PPP$)

The average of the three indices is the HDI

HDI in 1994 = .605+.528 +.206 / 3 = .1339 / 3 = 0.446

The HDI value in 1999 for India is 0.571 (HDI rank is 115) The HDI value of India in 2005 is 0.6 but India's rank declined to 127 in 2005 and improved its rank to 126th in 2006. (The top country in HDI gets rank 1). Based on 2007 data, the HDI for India is estimated to be 0.612 and its HDI rank is 134 out of 182 countries.

The Human Poverty Index (HPI) focusing on the proportion of people below certain threshold level in each of the dimensions of the HDI is estimated at 28% for India. Using HPI, India ranks 88th out of 135 countries.

Even the HDI is viewed as inadequate measure of human well being. Recently President Sarkozy of France has set up a commission in July 2008 to suggest alternative measures of economic and social progress. The Commission has Joseph Stiglitz as Chairman, A. K. Sen as Chair advisor and an impressive list of eminent economists and social scientists. The Commission submitted its report in September, 2009, which is titled as "Report by the Commission on the Measurement of Economic Performance and Social Progress". The report attempts to measure quality of the life of people. The report argues for concentration on Household incomes, consumption and wealth rather than total production.

Angus Deaton Daniel Kahneman (also a Nobel Economist) distinguish between Emotional well-being and life evaluation. Emotional well-being (sometimes called hedonic well-being) refers to the emotional polity of an individuals everyday experience – the frequency and intensity of experiences of joy, fascination, anxiety, sadness, anger and affection that makes one's life pleasant and unpleasant. Life evaluation refers to a person's thoughts about his life. It is measured using Cantril's self-anchoring scale, which has the respondent rate his or her current life on a ladder scale in which '0' is the worst possible life for you and '10' is the best possible life for you. The authors conclude that when plotted against log of income, high income includes evaluation of life. High income results in an increase in emotional well-being also, but there is satiation point beyond which there is no progress in emotional well-being. Low income is associated both with low life evaluation and low emotional well-being. For that, high income buys life satisfaction but not happiness. (in an article, 10th September, 2010.)

Angus Deaton wins the Nobel Prize in Economics in 2015 “for his Analysis of Consumption poverty and welfare”. The Royal Swedish Academy of Sciences has said that “by emphasizing the links between individual consumptions decisions and outcomes for the whole economy” is work has helped transform modern Micro Economics, Macro Economics and Development Economics.

According to Deaton, we must first understand individual consumption choices to design economic policy that promotes welfare and reduces poverty. Individual consumptions levels of source can be used to get a better understanding of their leaving standards and possible paths for economic development. His research, contributions are many and varied. Look at the list of publications of Deaton, Princeton University.

A.K. Sen

Sen was born in 1933 at Shantiniketan in Bengal and spent his childhood at Dhaka. As a child he witnessed the dire effects of the Bengal Famine of 1943. Millions starved to death and this made a deep impression on young Ses’s mind. This has led him later to study the causes and effects of Famines. In his book ‘Poverty and Famines’ Sen examines the causes and effects of the Bengal Famine of 1943, the Ethiopian Famine of 1974 and the Bangladesh Famine of 1974. His analyses reveals that decline in food availability is not often the cause of Famine. It is the failure in Exchange Entitlements that have led to the Famines, Sen terms the former approach as FAD (Food Availability Decline) approach and the later as FEE (Failure of Exchange Entitlement) approach. Entitlement is a semi-legal concept focussing on the bundles of goods and services that a person or family can legitimately establish command over using the laws, regulations, conventions, opportunities and rights. In market economics entitlements reflect ownership on the one hand and opportunities of production and exchange on the other. The application of the entitlement approach helps to explain why the Malthusian focus on food availability per capita is often so badly misleading since the entitlements of specific groups could easily collapse even when average food availability per head declines very little or even rises. If one person in eight starves regularly in the World, Sen sees it as the result of his inability to establish entitlement to enough food.

Sen on Poverty

In 1971, Dandekar and Rath have studied Poverty in Indian in a comprehensive manner and since then many have made useful contributions to discussion on Poverty. Earlier studies focused attention on the Head-Count ratio and the Income-Cap ratio. Head- count ratio is obtained counting the number of poor people and expressing it as a ratio of the total population. Income gap is measured by the difference between the poverty line and the mean income of the poor. . While the head – Count ratio tells us the percentage of people below the Poverty – line, the Income –gap ratio tells us the percentage of their mean income shortfall from the Poverty Level. The Head-Count ratio ignores the extent of Poverty and the Income - gap ratio is completely insensitive to numbers involved. Sen proposed a measure of Poverty which is sensitive to income distribution. The product of the Head-Count ratio (H) and the Income-gap ratio(I), plus the product of the Head-Count ratio and the distribution of income among the poor (G_P) weighted by one minus the Income gap ratio, gives Sen’s Index of Poverty (SIP). The formula suggested by Sen is:

1) $SIP = H. I + H(1 – I) G_P$

in the above formula,

SIP =Sen's Index of Poverty

H =Head – Count ratio

I = Income-gap ratio

G_P= Distribution of income among the Poor

The G_P can be computed using the following formula:

2) $GP = 1/100.100 |(^{n} X_i Y_{i+1} - (^{n} X_{i+1} . Y_i|$

In eqn. (2) Xi represents the cumulative percentage of the number of Poor people, n and Yi stands for cumulative percentage of incomes of the poor. We take the absolute value of the difference between the sums given in the brackets.

Sen on Functioning's and Capabilities

Sen introduced the concept of Functioning's and Capabilities and he uses this framework to examine the issues of Poverty, Standard of living and freedoms. Functioning's tell us what a person is doing, capability to function reflects what a person can do. According to Sen the various living conditions we can or cannot achieve are functioning's and our ability to achieve them are our Capabilities. Poverty in nothing but a failure of basic Capabilities. In the context of extreme poverty in developing Countries, we are concerned with a small number of centrally important functioning's and the corresponding basic Capabilities, such as the ability to be well nourished and well sheltered, the capability of escaping avoidable morbidity and pre-nature mortality. Similarly, standard of living focuses attention on what life we lead and what we can or cannot do. As such, Sen argues, the standard of living is really a matter of Functioning's and Capabilities. Likewise, Sen interprets positive Freedoms in terms of Capabilities, to function. The positive Freedoms specify what a person can or cannot do, or can or cannot be. Taking Sen's multi dimensional view of poverty, Sabina Ali and Emma Sanosh at Oxford University have constructed in June 2010, a new multi dimensional poverty index (M.P.I). In the M.P.I. a household is considered as poor if it is deprived on over 32% of the ten indicators used. The ten indicators of poverty considered in the M.P.I. are the deprivation of basic things such as: nourishing food, proper shelter, clean drinking water, electricity, literacy and assets. Persons who are deprived along many of the dimensions of poverty are considered as poor. The extreme cut off ratio is equal to or greater than 0.32. As the research study is backed by U.N., full details of M.P.I. are published in the U.N. development Report of 2010.

Sen on Development

Sen defines Development as Freedom. Development, he says, is a process of expanding real freedoms that people enjoy. This view is different from the traditional conceptions of Development which identify development with the rate of growth of GNP or per capita GDP. Economic Growth, Sen opines, cannot be treated as an end in its self but the freedom that people value can be the end as well as the means to Development. Sen gives top priority to the promotion of substantive freedoms which include elementary Capabilities like being able to avoid such deprivations as starvation, under nourishment, escapable morbidity and premature mortality. The substantive freedoms also include such freedoms that are associated with literacy, and basic political freedoms and civil rights. Such freedoms are intrinsically important.

Sen also advocates Instrumental freedoms to people. They include Political freedoms, economic facilities, social opportunities, transparency guarantees and social safety nets.

The main aim of Development should be to enhance the opportunities the people have to improve the quality of their lives. The crucial role of economic and social opportunities is “to expand the realm of human agency and freedom, both as an end in itself and as a means of further expansion of Freedom”. What is needed is a People Centered and Peoples’ Participatory approach (PC and PP approach) to Development.

To achieve these goals of development, the following are needed.

1. A political democracy that promotes the well - being and freedoms of people.
2. A state which complements the work of markets
3. Suitable institutions to enhance peoples’ capabilities and freedoms.

APPENDICES

Chapter-
Appendix – A.List of Nobel Economists
S.NoNameYear of
Award

1. Rangnar Frisch and John Tinbergen 1969
2. Paul Samuelson 1970
3. Simon Kuznets 1971
4. J.R.Hicks and K.J. Arrow 1972
5. Wassily Leontief 1973
6. Gunnar Myurdal and Hayek 1974
7. Koopmans and Kantarovich 1975
8. Milton Friedman 1976
9. Bertil-Ohlin and James Meade 1977
10. H.A.Simon 1978
11. T.W. Schultz and Arthur Lewis 1979
12. Lawrence Klein 1980
13. James Tobin 1981
14. George Stigler 1982
15. G.Debreau 1983
16. Richard Stone 1984
17. Franco-Modigliani 1985
18. James Buchanan 1986
19. R.M.Solow 1987
20. Maurice Allais 1988
21. Trygve Havelmo 1989
22. Morkowitz, Merton Miller and Sharpe 1990
1. Ronald Coase1991
2. Becker, Gary.S1992

25. Robert Fozel and Douglas North1993

1. Hasranyi, John Nash and Shelton1994
2. Rober Lucas, Jr.1995
3. Mirrlees and William Vickrey1996
4. Robert Merton and Myron Scholes1997
5. A.K.Sen1998
6. Robert A.Mundell1999
7. James Heckman and Danial McFadden2000
8. G.Akerloff, M.S.Spence and J.Stiglitz2001
9. Danial kahneman and Vernon L.Smith2002
10. Engle and Granger2003
11. Finn Kydland and Edward Prescot2004
12. Robert Aumann and Thomas Schelling2005
13. Phelps Edmund S.2006
14. Hurwitz, Myerson & Maskin 2007
15. Paul Krugman2008
16. Elinor Ostrom & Oliver Williamson 2009
17. Peter A. Diamond, Dale Mortenson and Christoper A. Pissarideo2010
18. Thomas Sargent and Christopher Sims 2011
19. Lyod Shapely and Alvin Roath2012
20. Eugene Fama, Lars Peter Hansen, Robert J. Shiller)2013
21. Jean Tirol2014
22. Angus Deaton 2015

Note: Through the google search, we can find most of the books and articles of noble economists and articles about them and they may be down loaded.

For details, contact www.nobel.se/laureates/economics

Appendix – B ,

Text Books by Nobel Economists

1. J.R. Hicks, Value and Capital, Oxford University Press and ELBS
2. Samuelson, Economics, Mcgraw –Hill Book Co., New York, 1970 (12th edition with William D. Nordhus)
3. Robert Mundell, Man and Economics, TMH Pub. Co, 1968
4. George J. Stigler, The Theory of Price, Collier Macmillan, New York 1966.
5. Milton Friedman, Price Theory, Aldine Pub.Co., Chicago, Illinois.
6. Paul Krugman (and Obstfeld), International Economics, Addison.
7. Gunnar Myrdal, The Asian Drama.
8. Klein, Introduction to Econometrics.

Some other Text Books

1. Jack Hirshleifer and Amihar Glazer, Price Theory and Applications, Prentice –Hall. New Delhi. 1993
2. Ferguson and Gould Micro Economic Theory, Richard D. Irwin, Indian Reprint. 1996.
3. William Baumol, Economic Theory & Operations Analysis.
4. Henderson and Quandt, Micro – Economic Theory, Mcgrawhill Inc. 1958
5. David M. Kreps – A Course in Micro Economic Theory, Prentice –Hall, EEE, India. 1999.
6. Robert Pindyek etel, Micro Economics
7. Andrew Mas-Collel etel, Micro Economic Theory
8. Compbell R. McConnel and H.C. Gupta, Introduction to Macro Economics, TMH Edn. New Delhi.1984.
9. Rangarajan and Dholakia – Principles of Macro Economics
10. Rudiger Dornbusch et. al. MacroEconomics, TMH New Delhi 1998.
11. Robert E. Hall & Papel – Mcro Economics.
12. Richard T. Froyen, Macro Economics, Addison Wesley 2001.
13. Olivier Jean Blanchard & Fisher, Lectures on Macro Economics.
14. Stephen J. Turnovsky, Methods of Macro Economic Dynamics.

15. Lance Taylor, Reconstructing Macro economics, Viva.

Note: Micro & Macro economics books are arranged in an ascending order of difficulty group-wise.

Other Books:

1. Perry Lewis – Introduction to Mathematics for Students of Economics.
2. Chiang – Fundamental Methods of Mathematical Economics.
3. Taro Yamane – Mathematics for Economists.
4. Johnson – Econometric Methods.
5. Bernard Hebber – Modern Public Finance.
6. Ken Binmore – Fun & Games, AITBS, Delhi
7. Lamberten – Economics of Information and Knowledge, Penguin
8. K.Basu – Economic Graffiti, OUP New Delhi.
9. Brearly & Myers – Principles of Corporate Finance
10. Keith Pilbeam – International Finance.
11. Kalman J. Cohen & Cyert – Theory of the Firm.
12. Chatterzee – Linear Programming and Game Theory.
13. Steven D.Lewitt & Duvner, Super Freakonomics

Books on Nobel Economists:

1. Shakelton and Loksley, Twelve Contemporary Economists, Macmillan Press, London, 1981
2. Leonard Silk, The Economists, AVON Books, New Yark.
3. Michel Szenberg, Eminent Economists, Cambridge University Press, 1992.
4. William Breit & B.T. Hirsch, ed. Lives of the Laureates.
5. Dr. P.R. Brahmananda, Nobel Economics, Himalaya Publishing House, Mumbai.
6. Steven pressman,Fifty Great Economists,Foundation Books. Delhi
7. Michael Lewis, The Real Price of Everything (Strand)

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