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<table>
<thead>
<tr>
<th>Date</th>
<th>Signature</th>
<th>Address</th>
</tr>
</thead>
<tbody>
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ECONOMIC ANALYSIS - A DYNAMIC PROCESS

by

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A thesis submitted to the Faculty of the Graduate School of the University of Colorado in partial fulfillment of the requirements for the degree of Doctor of Philosophy

Department of Economics

1977
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CHAN YOUNG BANG

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This Thesis for the Doctor of Philosophy Degree by
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Date November 26, 1977
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Economic Analysis - A Dynamic Process

Thesis directed by Professor Kenneth E. Boulding

My thesis attempts to develop an antithesis to the accepted classic doctrine that our economic system is essentially self-adjusting. An analysis of the forces and developmental processes in a dynamic economic system shows that the system functions on a different principle from the classic self-equilibrium process in which gradualism and harmony without conflicting interest are supposed to prevail. Contrary to the classic model, once the system is disturbed by internal or external shocks which trigger a chain reaction, a self-sustaining disequilibrium will prevent the system generating stabilizing forces. I reinstate Keynes' tenet that our system is not self-adjusting, and that once a cyclical downswing is underway, the downswing will be prolonged.

In the process of analysis, I attributed the element of uncertainty and organizations' and economic agents' adaptive behavior to uncertainty as the prime cause of acute economic instability. Developing a theory of economic dynamics and applying it to the most significant cataclysms, the Great Depression of 1929-1933 and the oil-induced contraction of 1974-1976, I attempt to demonstrate the implication of the dynamic contractionary process. My theoretical findings support neither the monetary hypothesis by Friedman and Schwartz nor the spending hypothesis developed by the post Keynesians.
The sequence as well as the content of the rest of my thesis is: Chapter I is devoted to the critical probe of the chronological development of economic doctrine since Adam Smith. In Chapter II, I briefly examine the existing methodologic views in economics (Robbins, 1935; Friedman, 1935; J. Robinson, 1936; Samuelson, 1965). Keynes maintained that the lack of generality in the assumptions of classic economics prevented our solving any economic problems of the real world. I try to show that Keynes criticized the classic choice of methodology, yet, he could not extract himself from the deductive method in his General Theory and his criticism of the methodologic choice of the classics generated a mass confusion. I contend that propositions arrived at by pure logic do not reflect reality; the justification of the system must rest in the verification of empirically derived propositions. I propose the inductive method will prove to be superior to the deductive method in scientific analysis. Chapter III deals with the Walrasian General Equilibrium System from an analytic perspective of macroeconomics; Chapter IV is devoted to the critical examination of Marshall's economic theory, especially the assumption of perfect knowledge on which the existing microfoundation is based. In spite of major efforts, there are serious misconceptions in the concepts of perfect and imperfect markets. In Chapter V, I attempt to eliminate some of these misconceptions. In Chapter VI, I examine the transformations in the decision-making process from the microperspective.
This abstract is approved as to form and content. I recommend its publication.

Signed

Faculty member in charge of dissertation
ACKNOWLEDGMENTS

This essay is the product of a highly protracted effort and interaction at various academic institutions. It derives from my academic experiences as a graduate student at the University of Colorado and later as a faculty member at the University of California, Los Angeles and University of San Francisco.

I entered the graduate program at the University of Colorado with the background of two B.A.s in History and Political Science and two M.A.s in Economics. After entering the program with a broad educational background, I found that the teaching of economics at the University of Colorado, which was similar to other leading institutions in this field, failed to satisfy the need of students with such a broad background. My disenchantment by no means lay with the quality of the institution per se but was entirely due to the content of orthodox economics. Like most other institutions, the main emphasis of the teaching of Economics there was directed toward the understanding of orthodox economics, which consists of an analysis of statics and comparative statics. I found that there is an unbridgeable gap between the orthodox economics and reality. The analysis of statics or comparative statics is a pedagogical exercise, while the real
phenomenon is dictated by dynamic evolutionary process which is not characterized by an equilibrating process.

It has been and will be my unshakable conviction that the conventional equilibrium analysis has failed to explain the real world. Without proper development of the theory of economic dynamics, one cannot expect to understand or solve the problems we have now.

It was Professor Boulding and his many inspiring books which saved me from total despair. I was elated to find that Professor Boulding has encountered the same problem and has attempted to resolve the faulty foundation of orthodox economics. Since then my efforts have been directed toward developing a theory of economic dynamics. My teaching at U.C.L.A. further directed my effort toward developing a theory which is consistent with the real world.

It was through my mentor and friend Professor Axel Leijonhufvud and his continuous encouragement and valuable suggestion that my thought became mature and turned to this manuscript. Without his support, the completion of this work could not have been possible. In this regard, I owe deeply to these two great economists.

Finally, I would like to express my warm appreciation to Mrs. Ruth Martin and Mrs. Jane Kiuchi for their patience and dedication in typing the manuscript.

Chan Young Bang
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. INTRODUCTION.</td>
<td>1</td>
</tr>
<tr>
<td>II. METHODOLOGY</td>
<td>18</td>
</tr>
<tr>
<td>Introduction.</td>
<td>18</td>
</tr>
<tr>
<td>The Deductive Method.</td>
<td>21</td>
</tr>
<tr>
<td>The Inductive Method.</td>
<td>28</td>
</tr>
<tr>
<td>Summary</td>
<td>35</td>
</tr>
<tr>
<td>III. A NOTE ON THE WALRASIAN GENERAL EQUILIBRIUM</td>
<td>38</td>
</tr>
<tr>
<td>Introduction.</td>
<td>38</td>
</tr>
<tr>
<td>The Walrasian System.</td>
<td>41</td>
</tr>
<tr>
<td>The Implication of the Existence of General Equilibrium</td>
<td>46</td>
</tr>
<tr>
<td>Walras' Theory of Tatonnement</td>
<td>50</td>
</tr>
<tr>
<td>Walras vs. Keynes</td>
<td>59</td>
</tr>
<tr>
<td>IV. A SELF-ADJUSTING ECONOMIC SYSTEM: A MARSHALLIAN PERSPECTIVE</td>
<td>73</td>
</tr>
<tr>
<td>V. PERFECT VS IMPERFECT MARKET</td>
<td>130</td>
</tr>
<tr>
<td>Time.</td>
<td>138</td>
</tr>
<tr>
<td>Uncertainty and Expectation</td>
<td>145</td>
</tr>
<tr>
<td>Decision and Purposive Behavior</td>
<td>152</td>
</tr>
<tr>
<td>Statics, Comparative Studies and Economic Dynamics.</td>
<td>154</td>
</tr>
<tr>
<td>Equilibrium</td>
<td>161</td>
</tr>
<tr>
<td>Chapter</td>
<td>VI. THE BEHAVIORAL IMPLICATION OF THE FIRM IN A DYNAMIC SETTING</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Introduction.</td>
</tr>
<tr>
<td></td>
<td>Profit Goal</td>
</tr>
<tr>
<td></td>
<td>Liquidity Goal</td>
</tr>
<tr>
<td></td>
<td>Sales Goals</td>
</tr>
<tr>
<td></td>
<td>Inventory Goal</td>
</tr>
<tr>
<td></td>
<td>Organizational Decision Making Process and Feedback Control System</td>
</tr>
<tr>
<td></td>
<td>The Role of Uncertainty in Macroperspective.</td>
</tr>
<tr>
<td></td>
<td>VII. MACROECONOMICS IN A DYNAMIC PERSPECTIVE: GENERAL THEORY OF ECONOMIC FLUCTUATION</td>
</tr>
<tr>
<td></td>
<td>Introduction.</td>
</tr>
<tr>
<td></td>
<td>The Great Depression, 1929-1933</td>
</tr>
<tr>
<td></td>
<td>1974-1976 Recession</td>
</tr>
<tr>
<td></td>
<td>Variations of Product and Factor Input Prices as They Affect Effective Demand</td>
</tr>
<tr>
<td></td>
<td>Cumulative Dynamic Income Constraint Process</td>
</tr>
<tr>
<td></td>
<td>The Foreign Repercussion Effect</td>
</tr>
<tr>
<td></td>
<td>A Critical Analysis of Ideologies Regarding the Theories of Social and Economic Dynamics</td>
</tr>
<tr>
<td></td>
<td>BIBLIOGRAPHY.</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>ESTIMATES OF THE REAL MONEY SUPPLY, 1925-1934</td>
<td>198</td>
</tr>
<tr>
<td>II.</td>
<td>REAL EARNINGS, 1925-1934.</td>
<td>200</td>
</tr>
<tr>
<td>IIIa.</td>
<td>REAL GNP AND SELECTED COMPONENTS, 1919-1939</td>
<td>202</td>
</tr>
<tr>
<td>IIIb.</td>
<td>CHANGES IN REAL MACROECONOMIC VARIABLES IN THREE PERIODS</td>
<td>203</td>
</tr>
<tr>
<td>IV.</td>
<td>DOW-JONES INDUSTRIAL AVERAGE AND BANK RATES ON SHORT-TERM BUSINESS LOANS</td>
<td>224</td>
</tr>
<tr>
<td>VI.</td>
<td>HYPOTHETICAL REAL INCOME, CONUMPTION AND SAVING</td>
<td>237</td>
</tr>
<tr>
<td>VII.</td>
<td>THE RELATIONSHIP BETWEEN SAVING AND THE VOLUME OF INSTALLMENT CREDIT PAYMENTS AT VARIOUS LEVELS OF REAL INCOME</td>
<td>239</td>
</tr>
<tr>
<td>VIII.</td>
<td>COMMERCIAL BANK LOANS, U.S. GOVERNMENT SECURITIES, OTHER SECURITIES, DEMAND DEPOSIT, AND GNP, 1951-1976.</td>
<td>245</td>
</tr>
<tr>
<td>IX.</td>
<td>PER CAPITA GNP OF INDUSTRIAL EUROPEAN COUNTRIES AND THE USSR</td>
<td>263</td>
</tr>
<tr>
<td>X.</td>
<td>PER CAPITA GNP OF EUROPEAN COMMUNIST COUNTRIES.</td>
<td>264</td>
</tr>
<tr>
<td>XIa.</td>
<td>PER CAPITAL GROSS NATIONAL PRODUCT.</td>
<td>266</td>
</tr>
<tr>
<td>XIb.</td>
<td>AVERAGE ANNUAL PERCENT GROWTH OF GROSS DOMESTIC PRODUCT.</td>
<td>267</td>
</tr>
</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pure (Perfect) Competition</td>
<td>98</td>
</tr>
<tr>
<td>2.</td>
<td>Monopoly or Monopolistic Competition</td>
<td>100</td>
</tr>
<tr>
<td>3.</td>
<td>Dynamics of Market Price</td>
<td>110</td>
</tr>
<tr>
<td>4.</td>
<td>Feedback Model</td>
<td>180</td>
</tr>
<tr>
<td>5.</td>
<td>Organizational Decision Chart in Abstract Form</td>
<td>182</td>
</tr>
<tr>
<td>6a.</td>
<td>Three Short-Term Interest Rates, Monthly 1919-1939</td>
<td>195</td>
</tr>
<tr>
<td>6b.</td>
<td>Two Short-Term Interest Rates, Monthly 1919-1939</td>
<td>196</td>
</tr>
<tr>
<td>7.</td>
<td>Inventories</td>
<td>219</td>
</tr>
<tr>
<td>8a.</td>
<td>Corporate Profits</td>
<td>226</td>
</tr>
<tr>
<td>8b.</td>
<td>Plant and Equipment Spending</td>
<td>226</td>
</tr>
<tr>
<td>9.</td>
<td>Manufacturers' Orders and Shipments</td>
<td>229</td>
</tr>
<tr>
<td>10.</td>
<td>Consumer Installment Credit</td>
<td>230</td>
</tr>
<tr>
<td>11.</td>
<td>Personal Income, Consumption, and Saving</td>
<td>232</td>
</tr>
<tr>
<td>12.</td>
<td>Dynamic Consumption and Saving Function</td>
<td>240</td>
</tr>
<tr>
<td>13a.</td>
<td>Gross National Product (GNP) and GNP in 1972 Dollars</td>
<td>243</td>
</tr>
<tr>
<td>13b.</td>
<td>Bank Loans, Investments</td>
<td>244</td>
</tr>
</tbody>
</table>
CHAPTER I

INTRODUCTION

In Wealth of Nations (1937), Adam Smith developed a theory of the long-run forces that govern the growth and wealth of nations. He was influenced by the scientific revolution, especially Newtonian determinism; he used the mathematics of the static equilibrium method to describe the dynamics of economic growth (Hicks, 1965: Chapters 2 and 3). His choice of the static equilibrium as expository tool for demonstrating economic growth was unfortunate. The method led him to overlook the role of expectation, liquidity and, above all, uncertainty during economic growth or contraction. To Smith's followers the lack of correspondence between his premises and the facts of reality did not matter. The classic doctrine is based on the view that the world in which we live is capable of self-adjusting. Smith expressed it with the concept of the "invisible hand": Every individual, as seller operating within the framework of a competitive market pursuing his own interests, will, simultaneously, as if guided by an "invisible hand," promote the commonwealth (Smith, 1937:423). The doctrine of "the spontaneous harmony of interest," which acknowledges identity of the individual and economic efficiency for the maximization of wealth, is the same as the doctrine of perfect competition. The "invisible hand,"
as Blaug rightly points out, "is nothing more than the automatic equilibrating mechanism of the competitive market" (Blaug, 1968: 59).\(^1\)

The economic doctrine in the last quarter of the nineteenth century adhered to the classic tradition supporting laissez faire, free trade, the gold standard, and the presumed universally advantageous effects of the pursuit of profit by the individual economic agent. Employing a deductive system based on a priori premises, neoclassic economists refined the Smithian theory of income and employment and the theory of value. Say's law of markets, which represents the mainstream of classic economics, is largely inherited from Smith. Smith's exposition of how personal saving is channeled into the formation of capital reappears in Say's theme and is further consolidated into the concept that over-saving is virtually impossible.\(^2\)

\(^1\)The invisible hand is really more than perfect competition. It is a general problem of society as to how to achieve positive sum games through efficient coordination and specialization. I owe this suggestion to Professor K. Boulding.

\(^2\)There is an unmistakable similarity between Smith's discussion of parsimony and the spirit of Say's law.

Smith argued that voluntary saving creates capital:

Capitals are increased by parsimony, and diminished by prodigality and misconduct.

Whatever a person saves from his revenue he adds to his capital, and either employs it himself in maintaining an additional number of productive hands, or enables some other people to do so, by lending it to him for an interest, that is, for a share of the profits. As the capital of an individual can be increased only by what he saves from his annual gains, so the capital of society, which is the same with that of all the individuals who
Say extended his theme: Since the prices of all factors depend on the prices of their products, factor prices in turn depend on consumer demand. Therefore, the value of the means of production derives from the value of end products to which economic agents contribute. Say's logic follows:

... it is obvious, that the current value of productive exertion is founded upon the value of an infinity of products compared one with another; that the value of products is not founded upon that of productive agency, as some authors have erroneously affirmed; and that, since the desire of an object, and consequently its value, originates in its utility, it is the ability to create the utility wherein originates that desire, that gives value to productive agency; which value is compose it, can be increased only in the same manner.

Parsimony, and not industry, is the immediate cause of the increase of capital. Industry, indeed, provides the subject which parsimony accumulates. But whatever industry might acquire, if parsimony did not save the store up, the capital would never be the greater (Smith, 1937:321).

Following Smith, Say maintained that over-saving is virtually impossible.

It must on no account be overlooked, that, in one way or another, a saving such as that we have been speaking of, whether expended productively or unproductively, still is in all cases expended and consumed; and this is a truth, that must remove a notion extremely false, though very much in vogue--namely, that saving limits and injures consumption, provided the thing saved be reinvested or restored to productive employment. On the contrary, it gives rise to a consumption perpetually renovated and recurring. ... It must be observed too that the form, in which the value saved is so saved and reemployed productively, makes no essential difference (Say, 1954:53-54).
proportionate to the importance of its co-operation in the business of production, and forms, in respect to each product individually, what is called, the cost of its production (Say, 1954:238-239).

Say's idea that cost of production constitutes, in essence, the basis of exchange value logically assures the fundamental tendency of full employment since there could not be a shortage of purchasing power in the economy. If occasional disparity between saving and investment occurs, the interest rate would always rectify the situation through the automatic adjustment mechanism of the capital market. If economic agents saved more than was invested, the excess saving would force down the interest rate which would discourage further saving. And, in turn, the lower interest rate would stimulate the investment demand until the parity between these two is reinstated. Lacking the necessary mathematical knowledge, Say was not able to present his argument in the form of rigorous mathematics. Nevertheless, it anticipated Walras. The general equilibrium analysis, which, in essence, is the theory of the determination of all prices under an assumed regime of perfect competition, was a pivotal achievement for advocates of pure economics. The Austrian School of Economics, which, in the 1870s, analyzed the utility of basing a comprehensive theory of value on subjective elements, could not change the substance of equilibrium analysis or the objective (cost) theory of value of the classic economists.

The founders of the subjective value theory, Carl Menger, Stanley Jevons and Leon Walras, made a valuable contribution in the field of demand; yet, in spite of the obvious link between
diminishing marginal utility and downward sloping demand function, they failed to perceive this relationship. Nor did they perceive correctly the relationship between cost and supply function. Consequently, they left major problems unsolved. The task of perfecting the equilibrium theory of price was left to Marshall. Through Marshall's relentless effort, after Cournot failed to attract attention, the modern treatment of price formation between demand and supply finally emerged. In developing his theory, Marshall realized the deterministic theory of value required not only the supposition of a stationary state, but the revival of the classic doctrine of value—cost principle—which was initially perceived by Smith and elaborated by Ricardo. Marshall, subsequently, vindicated Smith's cost principle and reinstated the equilibrium theme, "saving equals investment." In Marshall's own words,

> Interest, being the price paid for the use of capital in any market, tends towards an equilibrium level such that the aggregate demand for in that market, at that rate of interest, is equal to the aggregate stock forthcoming there at that rate (Marshall, 1936:538).³

³Pigou paraphrased Marshall:

> The rate of interest and the amount of real income devoted to investment tend to be so adjusted that the quantity of real income demanded for investment at that rate of interest is equal to the quantity offered at that rate; in such wise that there are no demands unsatisfied and no offers declined (Pigou, 1953:27).
Hicks and Pigou, seemed to have overlooked the serious inconsistencies and flaws of the classic scheme.

The most serious flaw of the equilibrium theory of value is that in a stationary state it cannot deal with the concept of continuous growth. A stationary economy, as Joan Robinson argues (1971:xvii), cannot begin to grow without a drastic transformation in its fundamental structure. The assumption of a perfect competitive market is not consistent with the assumption that every trader is maximizing his gain. Unless concerted action by a group of sellers is prohibited, sellers of a particular commodity can easily increase their gain by acting in concert (Robinson, 1971:xvi). Moreover, applying these two conflicting assumptions to free trade makes their inconsistency vivid. As we have recently witnessed, a restriction in the supply of one country's product can alter the terms of trade in its favor and thus promote its gains; likewise, a reduction in its demand alters trade unfavorably. Thus, as Robinson pointed out, "in the pursuit of self-interest, each country will try to gain at the expense of the rest of the world (1971:xvi).

The fundamental flaw of the theory of a perfectly competitive market in static equilibrium is that it cannot solve the economic problems of the real world.

In spite of flaws and inconsistencies, the classic model was so well protected by the popularity of the classic doctrine that its methodologic foundation was never seriously questioned. Knight was the first to define the limitations of the orthodox value theory. He showed that under "ideal," perfect, frictionless
competition in which perfect foresight enters as an essential premise, profit cannot occur (Knight, 1921); neither could there be entrepreneurship nor genuine borrowing and lending in such a world. Profit, the difference between yield (capitalized value) and the going rate of return on cost, is the entrepreneur's reward for taking risks in a business environment in which uncertainty, imperfect foresight, and error, are prevalent. Without uncertainty, there will be no economic profit and no entrepreneurial role to be played. In such a world, there will be no economic growth. There is no country in the Western world whose economy can be characterized as being in a stationary state. On the contrary, most countries are experiencing remarkable economic progress. Therefore, there is no justification in treating economic problems as static equilibrium problems. Even Marshall conceded that "when economic problems are treated as problems of static equilibrium on the verge of economic progress, they are imperfectly presented (Marshall, 1936:461). As Knight declared, the static conditions which assume static technology and knowledge are the most treacherous concepts ever conceived by economists as a subject of scientific discourse (Knight, 1921:172).

Though Knight's work drew attention and praise from contemporary economists, it failed to produce a modified theory of value that could have evolved from his perception of the real market.

Piero Sraffa raised serious skepticism on the validity of orthodox value theory five years later. In his article, "The
(1926:536-537), he states,

...in the tranquil view which the modern theory of value presents us there is one dark spot which disturbs the harmony of the whole. This is represented by the supply curve, based upon the laws of increasing and diminishing returns. ... [In the law of increasing returns] consideration of that greater interval division of labor, which is rendered possible by an increase in the dimensions of an individual firm, was entirely abandoned, as it was seen to be incompatible with competitive conditions.

Sraffa's dilemma lay in the logical incompatibility of the horizontal supply function and the law of increasing returns. Logically, perfect competition means the individual firm can sell as much as it likes at a prevailing price which the market determines independently of this firm's output. If the output increases, the firm's cost of production per unit of output decreases. Therefore, the firm could expand indefinitely to swallow the whole market and destroy the fundamental structure of perfect competition. Marshall's was the same dilemma (1936:459). By Sraffa's logic, and rightly so, perfect competition applies not only to the product market but to the factor market as well. The firm supposedly must be able to buy each of the factor inputs at the prevailing price independent of its own output. Consequently, the demand curve for its product and the cost curve for its unit of output would be straight horizontal lines. However, the acceptance of two infinitely elastic demand and supply curves means that there will be no unique equilibrium solution and therefore the failure of all perfect competitive assumptions. Having removed the competitive foundation and after much soul
searching, Sraffa then suggests that the perfect competitive model should be abandoned and we should turn in the opposite direction toward monopoly (1926:542). For the construction of the theory of monopoly, Sraffa makes two important suggestions, namely, the downward sloping demand function and the separation of the product cost curve from the product demand curve.

The chief obstacle against which they have to contend when they want gradually to increase their production does not lie in the cost of production—which indeed generally favours them in that direction—but in the difficulty of selling the larger quantity of goods without reducing the price, or without having to face increased marketing expenses. This necessity of reducing prices in order to sell a larger quantity of one's own product is only an aspect of the usual descending demand curve, with the difference that instead of concerning the whole of a commodity, whatever its origin, it relates only to the goods produced by a particular firm (Sraffa, 1926:543).

It is well known that Sraffa's rejection of perfect competition and his suggestion of a monopoly solution led to the advancement of the theory of monopolistic competition by Joan Robinson (1934) and Edward Chamberlin (1933). It had taken forty years for the theory of monopolistic competition to emerge since Cournot and Marshall first glimpsed at the implications of monopoly and failed to exploit them. After it was first presented in 1933, the theory of monopolistic competition produced neither heated polemic nor violent opposition. Enthusiasm for the new theory ran high because it seemed to delineate an economic world of rival monopolies who compete with their prices, the quality of their products, and their sales efforts.
The enthusiasm for the theory of monopolistic competition soon gave way to disappointment and became the subject of harsh criticism.

First, the theory of monopolistic competition contains too few variables to be empirically meaningful. Second, the system never reveals sufficient information to warrant the methodologic choice of profit maximization with the marginalistic approach (Boulding, 1966:35-44). The second criticism is of a fundamental nature; its acceptance means the rejection of the theory of monopolistic competition. The incorporation of a few additional variables into the existing theoretic framework will not salvage the faulty foundation of the theory. Much has been written to defend or refute the theory; the debate neither erased doubt of its validity nor produced an alternate theory. 4

Two years after the theory of Monopolistic Competition by Robinson and Chamberlin (1933), Keynes' The General Theory of Employment, Interest, and Money (1936) revolutionized economic thinking. Aided by the Great Depression, Keynes waged

4 The debates on marginalism among the leading economists of the 1940s followed the empirical studies of business behavior by Harrod (1948) and Hall and Hitch (1939); essentially they questioned the validity of the structural assumption on which the marginal price theory was founded (Machlup, 1946; Gordon, 1940; Lester, 1946, Stigler, 1957; and Oliver, 1947). Though the issue has not been settled, the polemic has died down without solution.

In The Economics of Sellers' Competition (1952), Machlup includes a conciliatory note on his supporting view of marginalism. "This decision is of course only for the time being. If someone someday should represent a new theory that works better in all situations, such new theory may well replace the one now accepted" (1952:75).
an all-out attack against the classic economic doctrines and dismantled the underpinning of the classic model, namely, that saving implies a sacrifice of or abstinence from present consumption to increase productivity because saving and investment are two aspects of the same behavior.

For Keynes, the classic tenet that the rate of interest adjusts itself automatically to bring about the right amount of capital spending to keep national income at a maximum level is simply an untenable proposition because, without purposive redirection by the government, the economic system will prolong the misery of economic malfunction with continued or increased unemployment and concomitant reduction of national income. In spite of the persuasive insights of the General Theory, Keynes' work became the source of confusion and misinterpretation among contemporary economists. Keynes' theory was dynamic but he used the comparative static apparatus which he borrowed from Marshall as the expository devise (Leijonhufvud, 1970a:211). His major theme, that the system in which we live is essentially incapable of self-adjusting, was buried in a static argument and never fully expounded. It is indeed unfortunate that his incisive understanding of expectation and uncertainty did not lead him to develop a synthetic theory of dynamic disequilibrium with the incorporation of these two concepts. The lack of clarity in his theory and the failure to develop a consistent microfoundation for his macroeconomics made his theory vulnerable and susceptible to misinterpretation. Consequently, Keynes' model caused a counterrevolution by modern Smithian apostles and the old classic
doctrine was soon reestablished by a simple device. Robinson's statement supports this view:

A substitute for Say's Law was provided by the assumption that a well-managed Keynesian policy keeps investment running at full employment. The rest of the doctrine of the neoclassics could then be revived (Robinson, 1971:xvi).

The revival of the old doctrine not only barred the opportunity of empirically developing a more relevant dynamic theory but led to misguided management of economic policy. The chronic inflation which we experienced since World War II was mainly borne out of the malpractice of Keynesian economics.

Boulding's work represents one of the most significant developments of the post-Keynesian era. He proposed that economists abandon altogether the unrealistic approach of marginalism with profit maximization and replace it with the general theory of organization with control "feedback" mechanism (Boulding, 1952:35-44). According to Boulding, the most significant economic phenomena--inflation, depression, recovery, and economic growth--are simply dynamic transformation processes of the quality of asset structure; they are governed by the process of economic images through the transmission of a message evolving from such transformation (1961:90). Thus, the discourse of the transformation process of economic images through the passage of information becomes the core of economic dynamics.

Boulding's suggestion is highly significant and requires careful attention. To construct a model of the dynamics of general economics for more realistic theories of the firm we require a systematic analysis of the transformation of economic
images through a message without adhering to the methodologic apparatus of marginalism. Boulding's works were praised by many leading economists but did not lead to an advancement of a new dynamic theory. This failure, I believe, is mainly attributable to economists' reluctance to break away from the accustomed tradition, the holistic approach of the firm, and to preconditioned training in the marginalistic approach.

My thesis attempts to develop an antithesis to the accepted classic doctrine that our economic system is essentially self-adjusting. An analysis of the forces and developmental processes in a dynamic economic system shows that the system functions on a different principle from the classic self-equilibrium process in which gradualism and harmony without conflicting interest are supposed to prevail. Contrary to the classic model, once the system is disturbed by internal or external shocks which trigger a chain reaction, a self-sustaining disequilibrium will prevent the system from generating stabilizing forces. As a corollary, I reinstate Keynes' tenet that our system is not self-adjusting, and that once a cyclical downswing is underway, the downswing will be prolonged. The essential tenet of the dynamic disequilibrium process I discuss in Chapter VII; here I would like to point out the essence of the argument.

According to the classics, in the nature of the system any instability induced by the adverse effect of a single strategic variable is always accompanied by a compensating stabilizing effect of one or more variables so that overall equilibrium of the system is promptly restored. However, in our
analysis, the adverse effect on a strategically important variable is accompanied by the adverse effects of other variables. The efforts to stabilize one or more variables necessarily invite interactive effect from yet other variables. Thus the organization's attempts to stabilize an adverse effect of a strategically important variable (or variables) at a time of global uncertainty inevitably interact with other organizations that take similar actions. The chain reactions are the inevitable consequence of cyclic instability.

The analysis of our economic system hinges on two differing interpretations: one which does not account for the role of uncertainty and one which acknowledges uncertainty and describes its role in the macroperspective. We should ask how do the organizational attempts to stabilize strategically important variables produce interactions from other organizations that precipitate chain reactions of cumulative cyclic setbacks. The answer lies in the attributes of global uncertainty. Global uncertainty prevails when all organizational entities in varying degrees adhere to the opinion that the adverse situation in which they find themselves fails to generate definite information regarding the nature, duration, and continuance of the event. The opinion may not necessarily be pronounced, but is exhibited in the behavior of seeking liquidity and flexibility of asset structure. In other words, once the system is afflicted by global uncertainty, all organizational entities purposely seek to reduce the impact of uncertainty by improving their liquidity position with the implementation of a more flexible asset
structure. Nonetheless, the organizations' concerted actions to improve their liquidity positions inevitably draw interactive responses from other organizations, and as a corollary, accelerate the time rate of change for organizations and expedite chain reactions and cyclic downswing. Consequently, while the firm's quality of asset structure is progressively deteriorating, it transmits a pessimistic message which further reinforces the pessimistic economic image.

Owing to different reactive mechanisms and to sensitivity, the time rate of change for one organization may be different from that of another. Yet, if the relevant environments are changing, the behavior will reflect these changes if the organization expects to survive adversity. Every organization's decision-making mechanism has a built-in feedback control that responds to adverse changes of the environment. Paradoxically, organizations' concerted actions for adaptive adjustments in the face of adversity accelerate the time rate of change of their environment, increase the intensity of cyclic instability, and amplify uncertainty. This is the neglected concept of the "paradox of liquidity" which is the convex of the concept of the "paradox of thrift."

If the economy as a whole undergoes an unfavorable dynamic transformation with a deterioration of the quality of asset structure, the attribute of such a transformation will appear in individual firm's decision-making process. In Chapter VI I will examine the attribute of transformation in the decision-making process from a microperspective.
The sequence as well as the content of the rest of my thesis is: In Chapter II, I briefly examine the existing methodologic views in economics (Robbins, 1935; Friedman, 1953; Robinson, 1934; Samuelson, 1965). Keynes' criticism of classic economics is not so much directed toward any lack of analytic consistency in the classic superstructure than it is directed toward the lack of lucidity and generality incorporated in the premises of classic foundations. Keynes further maintained that the lack of generality in the assumptions of classic economics prevents our solving any economic problems of the real world. I will show that Keynes criticized the classic choice of methodology—deduction—by which the establishment of certain basic premises lead, by logic, to their consequence. Yet, he could not extract himself from the deductive method in his General Theory and his criticism of the methodologic choice of classics generated a mass confusion. I contend that propositions arrived at by pure logic do not reflect reality; hence, the ultimate justification (pure content) of the system must rest in the verification of empirically derived propositions. I propose the inductive method will prove to be superior to the deductive method in scientific analysis.

In Chapter III and IV, I examine the existing foundation of economic theory in conjunction with the methodologic scheme underlying this foundation. Chapter III deals with the Walrasian General Equilibrium System from an analytic perspective of macroeconomics; Chapter IV is devoted to the critical examination of
Marshall's economic theory, especially the assumption of perfect knowledge on which the existing microfoundation is based.

In spite of major efforts, there are serious misconceptions of the concepts of perfect and imperfect markets. In Chapter V I hope to eliminate some misconceptions.
CHAPTER II

METHODOLOGY

Introduction

For four decades so many things have been written about Keynes' "General Theory" that interest in its polemics markedly declines. However, recently, interest in Keynes' economics was renewed mainly through Leijonhufvud's book, *On Keynesian Economics and the Economics of Keynes*. When the "General Theory" drew severe criticisms from Taussig, Leontief, Robertson, and Viner, following its publication in 1936, Keynes defended its tenets and pleaded with fellow economists that his economic contribution—a departure from orthodoxy—should be understood from two aspects:

(1) The orthodox theory assumes that we have a knowledge of the future of a kind quite different from that which we actually possess. . . . The hypothesis of a calculable future leads to a wrong interpretation of the principles of behavior which the need for action compels us to adopt, and to an underestimation of the concealed factors of utter doubt, precariousness, hope and fear.

(2) . . . I doubt if many modern economists really accept Say's Law that supply creates its own demand. But they have not been aware that they were tacitly assuming it (Keynes, 1936:222-223).

If we accept that the future cannot be reduced to calculable events, the theory of supply and demand of output becomes
unsolvable within the existing methodological framework. In "Keynes and Today's Establishment in Economic Theory: A View," Shackle recently pointed out, "it is doubtless paradoxical to say that Keynes' book achieves its triumph by pointing out that the problems it is concerned with are essentially beyond solution" (1973:516). That the problems we face are essentially beyond solution may puzzle many modern economists accustomed to the dominant usages of deterministic methodology, who have accepted our analytic habit of the Pure Logic of Choice.

In "The Keynesian Counterrevolution," Clower, almost a decade ago, said, "much of what now passes for useful theory is not only worthless economics (and mathematics), but also a positive hindrance to fruitful theoretical and empirical research" (1969:295-296). The criticisms challenged many modern economists to formulate a meaningful and empirically sound economic theory by replacing the assumption of future knowledge with the more realistic assumption of incomplete information. Unfortunately, many efforts yielded few results because economists never seriously questioned the structural and methodological validity before they tried to reformulate existing economic theory.

Only a handful of economists occasionally questioned the validity of the methodology and held that our methodology as well as theoretic structure may have an unsound basis.¹ But their occasional challenges did not affect the mainstream economists or

¹Boulding, Hayek, Shackle, Lachman, Cornai, Clark, Knight, Clower, Hahn, and Kirzner.
their orthodox views. Economic science could not change because the maverick economists did not produce an alternate theory that was operationally meaningful and methodologically sound. Their methodologic choice relied on the deductive method with a static framework that limits empirical content. Baumol pointed out the limits of the deductive method because deduction is confined to its empirical premises (1959:9). Premises lacking empirical content yield conclusions lacking empirical substance. Regarding the classic methodological choice, Keynes observed:

Our criticism of the accepted classical theory of economics has consisted not so much in finding logical flaws in its analysis as in pointing out that its tacit assumptions are seldom or never satisfied, with the result that it cannot solve the economic problems of the actual world (1936:378).

The classic methodology is not without defenders, Milton Friedman being one of its staunchest. According to Friedman, a theory cannot be tested by comparing its assumptions directly with reality but its strength and merit lie in the ability of prediction (1953:8-9, 41). My examination will show that the conclusion drawn from the classic premises is not to predict the outcome of real economic events but to abstract an imaginary situation that is alien to the true content of the real economic system. If we accept Einstein's argument that propositions are arrived at by purely logical means, empty with regard to reality (1934:32), but that the justification (the truth content) of the system should rest in verification by sense experience (1960:322), the classic theory of economics falls short.
The nature of the classic methodology—the deductive method with static framework—should be examined in its application to economic theory so that we can propose a more meaningful methodologic apparatus. I would like to show that for an operationally meaningful and empirically significant framework, it is imperative that we break away from the self-imposed methodologic bondage—the deductive method.

The Deductive Method

The most extensively used methodologic model in economic analysis has been the deductive or hypothetical method. The orthodox value theory and the monopolistic competitive theory advanced by Robinson and Chamberlin are based on the application of the deductive method. In essence, the deductive method establishes certain basic premises or assumptions that are taken for real and, by logic or reason, advances to the consequence.

The deductive method as applied to economics consists of three steps. The first postulates a hypothesis about the determinants of economic behavior and their characteristics in a particular economic situation. The second deduces a specific consequence by proceeding through logic or reason from the hypothesis. The third tests the validity of the conclusion reached through logic against observed fact.

It behooves us to examine how the deductive method is used for the construction of the competitive equilibrium theory. Following the methodologic steps of the deductive method, the
analysis begins by specifying the assumptions. Although different authors list different essential conditions of perfect competition, the following will suffice for our analysis: 2

1. A homogeneous product is available and demanded by a large number of buyers and sellers; the buyers and sellers cannot exert any discernible effect on price.

2. There is free entry into the market and perfect flexibility without any constraints on prices and resources.

3. There is universal knowledge of the relevant factors on the part of all participants in the market.

4. All factors and conditions are given and remain unchanged--Ceteris paribus (all other conditions remain constant). By inference, the above competitive assumptions are used to obtain these theoretic results:
   a. A seller confronts a horizontal demand function.
   b. Long-run marginal cost equals long-run average cost only when long-run average cost is at minimum and hence at zero profit.
   c. Full employment without shortage, surplus or queuing. 3

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2 For a detailed analysis of the essential conditions of perfect competition, see Chapters IV and V.

3 The monopolistic competition worked out by Chamberlin essentially was based on four simplifying assumptions: 1) Although products are heterogeneous, there are sufficiently large gaps in the chain of substitution to make it possible to separate
Before we can test the validity of the conclusions reached only by logical inference and without empirical substantiation, we should examine whether the conclusions are indeed preconceived in the premises.

First, the inference that a seller in the competitive market faces a horizontal demand curve is preconceived in the premise. To a seller who provides an insignificant part of the total supply of some homogeneous goods, any price increase of his goods would reduce his sales to zero; however, if he withheld all his goods from the market, his action would not have any discernable effect on the market price. If he reduced the price, the instantaneously increased demand will deluge his available supply. Therefore, it follows that the demand curve he confronts for his product is a horizontal line of the prevailing market price. Second, the conclusion that the long-run equilibrium occurs when the long-run average total cost equals the selling

"groups" of firms and to allow entry into a group. 2) Both demand and cost curves for all the products are uniform throughout the group. 3) Any adjustment of price and of products by a single seller spreads its influence over so many of his competitors that impact felt by anyone is negligible. 4) Because of consumer preference attached to product differentiation, the demand curve faced by an individual seller is slightly downward sloping. From these assumptions, Chamberlin derived three curves, a negatively sloped demand curve on the assumption that the quantity of the products of competitors and the prices of competitor's products are given, a demand curve assuming that competitors' price is identical with the firm's price, and an average cost curve for the firm. Assuming that each firm expects competitors not to follow its behavior to maximize profit, Chamberlin advances the long-run tangency solution with zero profits (Chamberlin, 1933).
price at zero profit is based on the logic that any commodity that can be freely produced without any artificial restraint cannot be worth more than what it actually cost. Third, since the price of goods is established by open-market competition among all buyers and sellers and is represented on the curve as the intersection of demand and supply, there would be no shortages, surplus or queues of waiting buyers or sellers (Alchian and Allen, 1972:111). It further follows that if the competitive premises are extended to the entire economy, as Cassel pointed out, "the economy in question is so directed that there is no surplus of commodities nor of productive services including laborers which cannot find employment" (1957:75).

Needless to say, the conclusion of uniform price at full employment and zero profit is inherent in the premise of the competitive market. As Robbins stated,

If the data they postulate are given, then the consequences they predict necessarily follow. In this sense they are on the same footing as other scientific laws, and as little capable of "suspension." If, in a given situation, the facts are of a certain order, we are warranted in deducing with complete certainty that other facts which it enables us to describe are also present (1935:212).

However, the fact that the conclusion is contained in the premise does not mean we cannot gain new knowledge through deduction. Much fruitful knowledge can be and has been obtained through the proper application of the deductive method. In orthodox economic analysis, however, the deductive method is used in a peculiar manner. The static equilibrium model coupled with the competitive premise cannot be met in the real world. Under
the orthodox scheme, all relevant information necessary for
perfect coordination of all the traders in the system is assumed
to be available. However, there is no explanation of how the
knowledge is ever acquired. By the assumption of perfect informa-
tion, and other premises, all important and relevant issues and
behavioral phenomena are explained away.

The defenders of deductive methodology in orthodox
economic analysis contend that a theory should not and cannot be
tested by comparing its assumptions directly with the conditions
of reality but that it should be judged by its ability of predic-
tion. The defenders should realize that predictions arrived at
by competitive premises by no means represent the outcome of real
economic activities but an imaginary state. The shortcoming of
the deductive method is even more evident when it is used with
the static equilibrium model in the analysis of real economic
issues such as unemployment, economic fluctuation and growth. As
Keynes argues, classic economic theory can never solve real
problems. Keynes' criticism of classic economics was not
directed toward finding logical flaws in its analysis but to
emphasize that the classic postulates can never be satisfied by
real conditions. The classic premise that the outcome of busi-
ness activities is subject to the Benthamite calculus and that
future outcome of business activities can be accurately calcu-
lated is clearly an untenable proposition. To refute the basic
scheme of classic economics, Keynes in his argument introduced
two important elements--expectation and uncertainty; both had
been neglected in orthodox economic analysis. By showing how the
factor of current short- and long-term expectations can affect entrepreneurial decisions through oversaving, Keynes demonstrated how a deficient effective demand can yield unemployment and reduction of output.

The classic tenet that the rate of interest adjusts itself more or less automatically to maintain the right amount of capital goods to keep our income at the full employment level is a proposition that cannot be substantiated. Rejecting the doctrine of the self-adjusting school, Keynes refuted Marshall's thesis that the interest rate--the cost of capital use--tends to balance the aggregate demand for capital in the market, namely, that rate of interest increases equally to the amount of stock issued (Marshall, 1936:176). Keynes' message was quite clear: Our system lacks the forces of self-adjustment; that without purposeful redirection, the economy is incapable of converting poverty into potential plenty (Keynes, 1935:36).

The deductive method assumes a stationary condition that allows us to predict the requirements of the future (Marshall, 1936:146). We can easily understand Marshall's frustration in accounting for growth within the framework of long-run competitive theory. Marshall was confronted by the inconsistency of the assumed stationary state on which the long-run competitive value theory was based as well as the concept of continuous growth for which the proper recognition of the role of uncertainty as a dynamic force was essential. A stationary economy, Robinson pointed out, cannot grow without drastic transformation (1971: xvii). For the economy to grow, the investment institutions must
be willing to add some positive net investment to the current level of capital stock, which has barely kept the operating level intact and individuals must channel an adequate amount of savings into capital markets. However, investment institutions will not provide new net investment unless they can expect the current as well as the prospective yield of capital to exceed current cost, namely, the market rate of interest. But based on these competitive premises, profit cannot occur nor can growth. We are frustrated in explaining economic behavior if we adhere to the deductive method with its incorporation of the competitive premises. The existing theories are based on abstract premises that cannot satisfy real conditions. The conclusions deduced from the premises are tautological and inoperational. In classic economics, neither propositions nor conclusions have been refuted through empirical test.

When Paul Samuelson wrote Foundation of Economic Analysis (1965), he made clear his intention to recast economic theory into a set of mathematical propositions that could be verified or refuted through empirical test. Although Samuelson and his followers succeeded in expressing economic theories in complex mathematical symbols, contrary to his wish, not one of his propositions has, as a consequence, been refuted by empirical test.

4 The formation of profit is essentially dynamic phenomenon and indeterminate in a price system. The formation process of profit must be understood in the structure of investments and business distributions. For further details, see K. Boulding, 1950, Chapter 3 and especially pp. 42, 74-75, and 97.
(Sola, 1976:25). Therefore, the existing propositions of economics remain tautological; the acceptance or rejection of economic theory is not based on empirical validity but on intuitive judgment. Keynes understood that an operationally meaningful theory cannot be built on a rationalistic hypothesis and he, therefore, adopted a behavioristic hypothesis. Keynes' emphasis that inventory accumulation and depletion affect mainly short-term expectation while long-term expectation affects fixed capital formation, and his distinction between borrowers' confidence and lenders' confidence, clearly mark a departure from the rationalist approach of classic economics. With the inductive method we can overcome the limitation of methodology.

The Inductive Method

Many scientific advances are the result of induction, which established generalizations from a number of specific facts. Because induction proceeds from known facts (immediate judgments of experience) to new knowledge (the general law) by the vehicle of an extrinsic medium (experience), the imaginary character of the underlying assumption that cannot be verified by experience has to be removed from the theoretical foundation. By eliminating premises of no empirical validity and replacing them with observed facts, abstract economic theories become relevant arguments about real problems and afford us operational conclusions. The classic assumptions of perfect knowledge and perfect rationality has made it impossible for the theorist to take into account the important behavioral aspect of uncertainty and had
reduced the problem to the pure choice of logic. Leontief argued that the tendency to base models on assumptions that have no empirical validity has been the major shortcoming in the development of economic theory (1976:32). Noted economists have argued that the methodologic choice of induction makes economic analysis empirically more relevant, and enhances the standing of economics as a branch of science:

Not one in a hundred (of the academic economists)... seems to understand... the scientific approach, namely, the careful systemizations of all observed facts, the framing of hypotheses from these facts, prediction of fresh conclusions on the basis of these hypotheses, and the testing of these conclusions against further observed facts (C. Clark, 1940:vii-viii).

Although scientific investigation cannot be either purely deductive or purely inductive, a theoretic formulation of assumptions that gives empirical validity to observed facts can improve understanding of economic behavior and ability of prediction. The hypothesis and the summary of conclusions, extensively treated in Chapter VII, are presented here without proof of their validity.

The hypotheses are:

1. Economic agents in the system possess imperfect information and imperfect knowledge. It follows that the market institutions are neither price takers nor price searchers—in the Robinsonian sense—in which the prime task of sellers is to determine the equilibrium price and output by equating the given
marginal revenue and marginal cost function with the relevant demand function.

2. Every firm in the system has apparatus which can handle the inflow of information and make decisions after appraisal of the information.

3. During uncertainty, people prefer liquid assets (flexible asset structure) to illiquid assets.

4. Capital expenditure on equipment and plant is not only a function of interest rate but also a function of expected profit and the level of utilization of the existing capital stock.

5. Firms prefer to reduce their inventories rather than prices when there is an excess supply of commodities.

6. Price is set on the basis of the full-cost principle. With these specifications for a structural hypothesis, the following analytic argument is advanced.

Suppose consumption expenditure declines in the household sector. The restraint of consumption expenditure in the household sector will instantaneously be transmitted to the business sector in the form of a reduction of sales volume. The curtailment of sales volume and sales proceeds increases illiquid inventories, business balance sheets undergo unfavorable transformations that adversely affect current ratio, debt ratio and activity ratio. Because of the adverse development reflected on the balance sheet, firms will be pressured into corrective actions through their decision-making processes. At the initial stage of the business downswing, the firms will attempt to
improve their liquidity position in two ways: First, retail business firms will attempt to reduce their inventories by reducing new orders or cancelling them. Manufacturing firms, encountering fewer orders for goods and increased cancellation of new orders, will be forced to cut the volume of production and so lower the rates of production. Second, when precious assets are tied up in illiquid inventories and sales proceeds are declining, the firms cannot maintain the current level of employment. A reduction of the level of employment becomes inevitable. As sales proceeds decline, because the firms are unable to sell all they want at the prevailing market price, the firms can no longer sustain employment of workers at earlier levels. This is the beginning of unemployment. Business decisions to reduce employment add new uncertainty to the household sector and inevitably cause a decline of realized household income. The reduction of realized household income induces further curtailment of consumption expenditure for goods. The impact of the reduction of consumption expenditure and effective demand is reverberated into the business sector by further increase of unwanted inventories. As time elapses, the income constraint process is continued and amplified via the multiplier effect. As adverse information transmission increases, the degree of uncertainty increases in both sectors. The deepening adverse trend increases pressures on business firms and consumers to take further corrective measures. In the household sector, consumers will attempt to improve their liquidity position by reducing the total amount of outstanding loans. Since the loan payment can
only be made at the sacrifice of consumption expenditure, it can be considered a predesignated saving. If the household sector previously accumulated a large volume of outstanding loans, during the initial stage of the income constraint process the volume of saving may increase, although the level of realized aggregate income declines. Because of uncertainty about reduction of employment and household income, consumers attempt to reduce the purchases of durable commodities that require long-term commitments. The consumers' decision to reduce purchases of durable commodities is especially significant because durable commodities are produced by a handful of large firms, in heavily concentrated industries, and any depressing effect on them is quickly transmitted to subsidiary firms which supply parts for durable goods. Consequently, the adverse complementary effect, and the resulting reduction of effective demand, will reduce the subsidiary firms' production. As the liquidity positions of firms progressively deteriorate through lower sales proceeds and lower profits, the firms are pressured to curtail the distribution of corporate dividends. This measure is inevitable if the firms expect to retain more cash assets. Needless to say, the cancellation of the distribution of corporate dividends during a business slump not only reduces the realized household income but depresses the bond market. In addition, with cumulative reduction of sales volume, business firms will liquidate the remaining inventories, bringing about a further reduction of production and employment. As the degree of uncertainty deepens, firms sharply reduce the amount of capital spending for new equipment and
plants or completely suspend these expenditures. Now business activities are in a slump, net profits decline, long-term expectation, which affects the current demand for investment, is beclouded and becomes less attractive. With idle productive capacities an incentive to add new capital equipment no longer exists. Attempts to secure the necessary funds needed for the procurement of new capital equipment become increasingly more difficult, reinforced by the reluctance of the banks to grant loans. As business failures rise, the risk of default on bank loans increases. Consequently, the banks are reluctant to grant loans because they, like firms and consumers, prefer a more flexible asset structure. The banks seek safer sources of investment. In time of adversity, only government bonds can satisfy the need for flexibility of assets with improved liquidity and safety of investment. The banks naturally step up their purchases of government bonds. Consequently, the funds that flow into commercial banks during the contractionary business cycle are not rechanneled into businesses through increased loans, and so fail to reverse the downtrend and to stimulate business activities through the injection of cash funds. As the default rate increases, the banks must increase the rate of interest that is charged to firms and consumers, even though loanable funds have increased in banks. Therefore, the popular classic tenet that a large inflow of loanable funds into banks will exert a downward pressure on the prevailing rate of interest, and the resulting lower interest rate will stabilize the aggregate income by increasing investment, proves untenable and cannot
satisfy observed fact. The behavior of the banks supports Keynes' tenet that the capital market does not possess automatic self-adjusting mechanisms which insure equality between planned saving and realized investment at full employment.

On the theme of self-adjustment, there is one additional misconception in classic equilibrium analysis, namely, that the decline of wages and prices in a glut market will quickly restore the full employment equilibrium, increase the demand for goods and production, and so promote increased demand for labor. The proposition is untenable. In reality, commodities are priced on the full-cost principle and any reduction in price must be preceded by the decline in wages. Apart from the probable resistance to wage cuts by labor unions, a decline in wages will more likely contribute to a reduction of effective demand than to stimulate commodity and labor markets. The classic remedy of wage reduction as a counter-cyclic prescription is not effective. Any reduction in wage and effective demand will activate the deviation-amplifying feedback loop via the multiplier effect and trigger a repercussionary chain reaction. Even if price reduction were preceded or accompanied by wage reduction, it would not stabilize the downward trend because price reduction will induce profit loss and depress the investment demand. Therefore, the classic hypothesis that wage and price reduction will quickly restore full employment equilibrium is an untenable proposition that cannot be proved by real sense experience. The erroneous conclusion of classic economists is based on the imaginary hypothesis of a static equilibrium. Keynes' tenet that the
economic system is incapable of self-adjusting and cannot avoid prolonged misery in spite of its potential plenty without purposive redirection is reaffirmed.

Summary

The argument presented here, derived from an empirical hypothesis, does not support the implications of the Hicksian IS-LM model which is deduced from two imaginary hypotheses: First, at every level of national product equilibrium, the level of saving is equal to the level of investment (commodity market), and second, at every level of national equilibrium, the demand for money is equal to the supply of money (money and bond market). If such a system existed, the economy could never experience unemployment nor recession.

Following Keynes' suggestion, many economists blindly accepted that underemployment equilibrium is not only theoretically possible but also empirically observable. The conjecture must be rejected on the following ground: First of all, the mathematical logic dictates that if n-1 markets are in equilibrium where n represents 1, 2, ..., n, the nth market must be in equilibrium. A further reflection will show that since the Hicksian IS and LM model is constructed and represents the equilibrium loci of three markets, namely, money, bond, and commodity market, the remaining market, labor must be in equilibrium. On the other hand, if there is unemployment in the labor market, there won't be equilibrium in the product market. Nonetheless, Patinkin is right in emphatically pointing out that this position
is not one of equilibrium (Patinkin, 1965:320, 324). The reason lies in the fact that while an excess supply of labor exerts a downward pressure on wage, the decrease in commodity demand and hence the accumulation of unwanted inventories generates a price decline. Consequently, a positive real balance will exert pressure and force this demand up again. As Patinkin further pointed out, "As the demand curve rises, it pulls commodity output up after it and this pulls labor input up concurrently" (1965:325). As a consequence, full employment will be re-established. Therefore, underemployment equilibrium has no place in a perfect market. On the other hand, in an imperfect market, in which dynamic forces are continuously creating interactive forces either favorable or unfavorable, the underemployment equilibrium has no meaning. It is my view that the underemployment equilibrium is a manifestation invented by economists, which has no validity whatsoever, either theoretical or empirical.

My findings do not support the Keynesian expenditure model which is derived from the premises that equilibrium level of national income is determined by the intersection of aggregate demand and aggregate supply with equality between saving and investment. One may recall Samuelson's emphatic argument on the Keynesian expenditure model:

The only equilibrium of GNP is at E, where the saving and investment schedules intersect. At any other point, the desired saving of families will not match the desired investment of business, and this discrepancy will cause businessmen to
change their production and employment levels in such a way as to return the system to the equilibrium intersection (Samuelson, 1976:223).

Samuelson adds:

> Before we go on, a warning is in order. An equilibrium level like \( E \) is a point where the system tends to stay. But there is nothing necessarily optimal about every equilibrium point (1976:223).

Although the equilibrium the GNP attains is supposedly stable, there is no assurance that there will also be full employment equilibrium except by accident. That is Samuelson's message, a synthesis devoid of empirical content.

Clearly the propositions deduced from a purely imaginary hypothesis are of limited value because deductions can have no other empirical content than the premises from which they are derived. It follows that the safest propositions are tautologies which are always true by definition; but they are never operational and can never be refuted through the test of real sense experience.

For empirically more meaningful propositions, a theory must be based on empirical hypothesis whose meaningfulness is demonstrated by the implications which are derived from them. The inductive method, a process whereby the theorist proceeds from individual truth to universal truth, can overcome the serious shortcomings of the deductive method.
CHAPTER III

A NOTE ON THE WALRASIAN GENERAL EQUILIBRIUM

Introduction

The orthodox reasoning about the nature of an economic system is essentially based on the view of the self-adjusting school. The rate of interest and price adjust themselves more or less automatically to insure just the right amount of production of capital and consumption goods to keep our income at the maximum level. The mechanism of the self-adjusting school can best be illustrated by the application of homeostatic devices.¹

The system consists of a set of markets. Each of the product markets has two variables, namely, prices and the rate of output to be controlled. Corresponding to these two variables, the market has two homeostatic devices which are capable of producing deviation-counteracting (negative) feedback. As long as the demand curve has a negative slope and the supply curve a positive slope, any deviation of the value of the respective controlled

¹The familiar illustration of a homeostat is that of a heating system controlled by a thermostat. This automatic control system is equipped to observe discrepancies between desired and actual temperatures and to respond to them by changing the actual temperature. When the response reduces the size of the error, the feedback is said to be negative (Leijonhufvud, 1969:25 and 1970b).
variable from the equilibrium value will be corrected automatically through the device of homeostasis.

The first device is known as the Walrasian homeostat designed to regulate price. This device is not only capable of observing any excess demand error but also obeys the built-in rule of search for the equilibrium price by raising price when excess demand is positive and lowering price when excess demand is negative.

The second device is known as the Marshallian homeostat, which regulates the rate of output. It adjusts actual output in response to the discrepancy between supply price and actual market price, automatically raising the rate of output when the excess supply price error is negative and lowering it when the error is positive.

Each of the above mechanisms assumes negative feedback and the convergence of the process on the equilibrium price and the equilibrium quantity, respectively. The Walrasian as well as the Marshallian homeostat is a remarkable mechanism in the sense that it can readily read the errors involved in the system and also correct them automatically without any outside assistance. This is the familiar concept of orthodox reasoning.

Keynes vehemently opposed the orthodox reasoning of the self-adjusting school. For him, the system is not self-adjusting and thus, without purposive direction, it is not capable of converting an actual poverty into a potential plenty (1935:36).
When we consider that the orthodox reasoning—self-adjusting school—reigned over almost the whole body of organized economic thinking and doctrine for the past hundred years, Keynes’ is certainly a serious renouncement of the school. Moreover, if the existing economic system is lacking the capacity for self-adjustment, a radical reformulation of the existing analytical scheme is indeed necessary.

The question economists must pose is: Why does the system, which assumes the existence of the deus ex machina and whose task is to provide all the information needed to obtain the perfect coordination of the activities of all traders, go wrong? Because it does, the problem of coordination failure—disequilibrium—cannot be solved with the existing analytical paradigm. With this critical query in mind, we will turn to the task of examining the implication of Walrasian and Marshallian system in the following two chapters. First, we will examine the Walrasian System.

In the history of economic analysis few economists have so profoundly influenced other economists as Leon Walras (1834–1910) has. Schumpeter says that Walras' Elements constitute nothing less than the "Magna Carta" of exact economics. Recently, Patinkin called Walras' theory of tatonnement (French: groping) "one of the most imaginative and valuable contributions to economic analysis" (1965:377). In spite of his profound influence on the formulations of economic analysis, Patinkin lamented, Walras' major works were neglected, misunderstood, and even disparaged for many years (1965:337). The New Economic Theory
after Keynes' General Theory renewed attention to the Walrasian system, to classic economics for that matter, from a fresh perspective. Economists, who see Keynes' economics in a new light, currently argue that the Walrasian system and Walras' law are not adequate analytic tools to deal with the disequilibrium model of the dynamic theory; that it may in fact be irrelevant. In this chapter I will examine the essence of the Walrasian system and contrast it with the theoretic framework of Keynes.

The Walrasian System

In 1874, in Elements of Pure Economics, Walras attempted to answer some fundamental questions left unsolved by his predecessors. The questions were: Business firms enter product markets as suppliers, whereas they enter factor markets as buyers; in turn, households are buyers in product markets, suppliers in factor markets. Is equilibrium in product markets necessarily consistent with equilibrium in factor markets? Does the market mechanism guarantee convergence within a general equilibrium solution? If so, is the solution unique or are there several or infinite numbers of prices that will satisfy a solution? Suppose there exists a general equilibrium. Will any disequilibrium produce forces that will return the system to equilibrium? The questions were difficult to answer. As Walras searched for an adequate answer, the notion of his general equilibrium gradually emerged.

It was Cournot who first realized that for a complete and precise solution of the partial problems of the economic system,
it is necessary to consider the system as a whole. But Cournot thought the problem of general equilibrium to be beyond the resources of mathematical analysis. Walras was the first economist who designed the framework of the general equilibrium system, at least in principle.

Although a more elegant version of the general equilibrium system is available, my abstract of the Walrasian system is based on Lesson 20 in his Elements of Pure Economics. Walras begins with these parameters:

1. Technical coefficients de fabrication constitute nm in numbers, which represent the fixed amounts of n productive services of land \( (T, T^1, T^{11}, \ldots) \), labor \( (P, P^1, P^{11}, \ldots) \) and capital \( (K, K^1, K^{11}, \ldots) \) required to produce m finished products, \( A, B, C, D, \ldots \). In matrix form, it constitutes \( n \) columns of \( m \) rows;

\[
\begin{align*}
(A_t, A_p, A_q, \ldots) \\
(B_t, B_p, B_q, \ldots) \\
(C_t, C_p, C_q, \ldots)
\end{align*}
\]

2. Final products possess a utility for each individual which Walras expressed by the familiar utility equation:

\[
\text{Marginal utility} = \phi = \phi(g)
\]

\(^2\)For the modern version, see Hansen, 1970.

\(^3\)\( T, T^1, T^{11}, \ldots \) and \( P, P^1, P^{11}, \ldots \) represent different kinds of lands and different kinds of labors, respectively (Walras, 1954, translated by Jaffe).

\(^4\)All prices are normalized by being arbitrarily defined in terms of the consumer goods, the numeraire.
Since there are marginal utility functions (rareté functions) for n productive services and m consumer goods, the total number of equations involves nm in the additive form.

The individual budget equation is expressed in quantities of the factor services offered \((o_t, o_p, P_q, \ldots)\) times their prices \((P_t, P_p, P_q, \ldots)\) to equal the quantities demanded of consumers goods \((d_a, d_b, d_c, \ldots)\) times their prices \((1, P_b, P_c, \ldots)\)

\[ o_tP_t + o_pP_p + o_qP_q + \ldots = d_a + d_bP_b + d_cP_c + \ldots \]

The equimarginal rule for utility maximization requires that the marginal utilities of the various goods purchased and the marginal utilities of the productive services rendered for direct consumption be proportional to their prices. This provides n equations for productive services for each individual in which \(P_a = 1\);

\[ \phi_t(q_t - o_t) = P_t\phi_a (d_a) \]
\[ \phi_p(q_p - o_p) = P_p\phi_a (d_a) \]
\[ \phi_k(q_k - o_k) = P_k\phi_k (d_a) \]

But there will be m - 1 equations for goods since the equation for commodity A, which is numeraire, drops out;

\[ \phi_b (d_b) = P_b\phi_a (d_a) \]
\[ \phi_c (d_c) = P_c\phi_a (d_a) \]

But, there will be \(n + m - 1\) equations to solve \(n\) unknown individual supply functions for productive services;
\[ o_t = f_t (P_t, P_p, P_q, \ldots P_a, P_b, P_c, \ldots) \]
\[ o_p = f_p (P_t, P_p, P_q, \ldots P_a, P_b, P_c, \ldots) \]

a) In this way, Walras derived, for all the other holders of services, their individual offer and demand equations for services and their individual demand equations for product.

The market supply equations for product services provide \( n \) in number which \( o_t, o_p, o_k \ldots \) designate the sum total of the several offers of services;

\[ o_t = \Sigma o_t = F_t (P_t, P_p, P_q, \ldots P_a, P_b, P_c, P_d, \ldots) \]
\[ o_p = \Sigma o_p = F_p (P_t, P_p, P_q, \ldots P_a, P_b, P_c, P_d, \ldots) \]

b) Similarly, the market demand equations for finished goods constitute \( m \) in number.

\[ D_b = \Sigma d_b = F_b (P_t, P_p, P_q, \ldots P_a, P_b, P_c, P_d, \ldots) \]
\[ D_c = \Sigma d_c = F_c (P_t, P_p, P_q, \ldots P_a, P_b, P_c, P_d, \ldots) \]

c) Furthermore, the quantity of factor services demanded must equal the quantity offered and the price of finished goods must equal their average costs of production. This provides two further sets of equations.

Market-clearing conditions for \( n \) factor markets where \( a_t, b_t, c_t, a_p, b_p, \ldots \) are known:

\[ a_t D_t + b_t D_b + c_t D_c + \ldots = o_t \]
\[ a_p D_a + b_p D_b + c_p D_p + \ldots = o_p \]
d) Equality of unit costs and prices for m final goods:

\[ a_t P_t + a_p P_b + a_q P_q + \ldots = 1 \]

\[ b_t P_t + b_p P_b + b_q P_q + \ldots = P_b \]

There are thus \(2m + 2n\) equations. By Walras' law, one of these equations is redundant in the sense that it is automatically satisfied if the budget equation for each individual holds.\(^5\)

We are left with \(2m + 2n - 1\) equations to determine \(2m + 2n - 1\) unknowns which are: i) the \(n\) total quantities of services offered, ii) the \(n\) prices of these services, iii) the \(m\) total quantities of the products demanded and iv) the \(m - 1\) prices of finished goods as \(P_a = 1\).

Initially, Walras assumed that all exchange is carried on with accounting money, so that the demand and supply functions are homogeneous at zero degree in absolute prices. This creates a problem since the price level of the accounting money is

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\(^5\)Proof: Let \(S_2 = D_2, S_3 = D_3, \ldots S_b = D_n\). We have, multiplying by the corresponding prices, \(P_2 S_2 = P_2 D_2, P_3 D_3, \ldots\) and adding these equations together, we obtain

\[ \sum_{i=1}^{n} P_i S_i = \sum_{i=2}^{n} P_i D_i \]

Subtracting this equation from Walras' law of identity

\[ \left( \sum_{i=1}^{n} P_i S_i = \sum_{i=1}^{n} P_i D_i \right) \]

we obtain our result \(P_1 S_1 = P_1 D_1\).
indeterminate. However, at a later stage, Walras dealt with desire encaiser (French: desire to hold cash) by including the demand for money as circulating money in all the utility functions. At a later stage, Walras dropped the assumption of fixed input coefficients and adopted the general marginal-productive theory of distribution. However, Walras retained the assumption of constant return to scale and identical cost functions of all firms. Thus, we have to account for \( nm \) additional unknown input coefficients, but this adds \( nm \) additional equations, namely, \( n \) equations stipulating the proportionality of the marginal productivities of different factor services to their prices multiplied by \( m \) final goods in the economy. Now, we have \( nm + 2m + 2n - 1 \) independent equations to determine \( nm + 2m + 2n - 1 \) unknowns. As Walras suggested, general equilibrium may be possible.

The Implication of the Existence of General Equilibrium

The mere counting of equations and unknowns to insure that there are as many equations in the system as unknowns to be determined is neither sufficient nor a necessary condition. A few simple examples should convince us that an equal number of equations and unknowns (endogenous variables) does not necessarily guarantee the existence of a unique solution. Consider

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6See Patinkin's presentation on "The Indeterminacy of Accounting Prices," in Money, Interest, and Prices (1965:38).

the following simultaneous equation system with which we can extend the set of values of \( n \) variables in \( n \) dimensional space:

\[
\begin{align*}
\begin{cases}
X^2 - 6X &= -9 \\
X^3 - 3X &= 18
\end{cases} \\
X + Y &= 8 \\
X + Y &= 9 \\
2X + Y &= 12 \\
4X + 2Y &= 24 \\
2X + 3Y &= 58 \\
Y &= 18 \\
X + Y &= 20
\end{align*}
\]

(1) (2) (3) (4)

In equations (1), in spite of two equations in one unknown, the system has a unique solution, \( X = 3 \). In equations (2), two unknowns are linked by two equations, but there is no solution. These two equations happen to be inconsistent, for if the sum of \( X \) and \( Y \) is 8 then it cannot possibly be 9 at the same time. In equations (3), which is another case of two equations with two variables, the two equations are functionally dependent, which implies that one can be derived from the other. Consequently, one equation is redundant and thus an infinite number of solutions are possible including \((0, 12), (2, 8)\), etc., all of which fulfill that equation. Lastly, the case of equations (4) involves more equations than unknowns; yet the ordered pair \((2, 18)\) does constitute the unique solution to it. In view of the existence of functional dependence among equations (the first equation is equal to the second plus twice the third), we have
only two independent, consistent equations, in two variables. These simple examples demonstrate the importance of consistency and functional dependence as the prerequisite for the application of the process of counting equations and unknowns. It does not suffice that we have a unique solution for a general equilibrium system. We have to demonstrate that the system determines prices which are economically meaningful. Any meaningful solution of equilibrium price vectors implies that they are real, nonnegative, and finite prices unless we consider all possible goods, including free goods, and depart from the Walrasian system. It is quite possible to find a system of two equations in two unknowns that have no solution in the domain of real numbers, the only domain that has any economic meaning.

For instance,
\[
\begin{aligned}
\begin{cases}
    x^2 + y^2 = 0 \\
    x^2 - y^2 = 1
\end{cases}
\end{aligned}
\]
gives \(x = i^{1/2}\) and \(y = i^{1/2}\) where the imaginary number \(i\) satisfies \(i^2 = -1\). But \(x^2 + y^2 = 0\), which is a single equation in two unknowns, does have a unique solution for \(X\) and \(Y\) in the domain of real numbers, namely \(X = 0\) and \(Y = 0\). The example suggests that a unique general equilibrium solution may involve zero prices and even negative prices reflecting the positive cost of disposing of free goods.

Blaug argues that, even if it is merely a free good at a zero price, it cannot be excluded from the Walrasian system since it is the market that determines which good should be free and which scarce (1968:580). Blaug contends that Walras never
realized his equations must include all goods and not merely those that are normally economic goods (1968:580). In this respect, mere demonstration of the existence of a general equilibrium is unsatisfactory.

In 1933, A. Wald, a German mathematician, attempted to prove that market-clearing equations for factors can be satisfied at nonnegative prices. Since then, Wald's original proof has been generalized and refined by Arrow and Debreu. The major content of the theorem presented by Arrow and Debreu reveals that the Walrasian system does possess a unique, economically meaningful solution, provided that return to scale is constant or diminishing and that there are no joint products or external effects either in production or in consumption. The theorem that states that a unique solution exists for a set of equations, however, does not reveal any meaningful economic behavior.

Until the analysis of the tatonnement process and the stability implication in the Walrasian system is completed, the search for an answer as to whether Walras merely counted equations and unknowns to demonstrate the existence of general equilibrium solution should be postponed.

8R. E. Keune (1967) presents a comprehensive review of the main body of general equilibrium theory from Walras to Arrow and Debreu.
Walras' Theory of Tatonnement

Walras' main objective in *Elements* is to demonstrate that the mathematical solution is basically identical with the solution worked out by the market. Walras himself asked: "Que la solution théorique et la solution du marché sont identique?"

According to Walras, the task is simply to demonstrate in the case of pure exchange that upward and downward movements of prices solve the system of equations of supply and demand *par tatonnement* (Keune, 1967:170). One of Walras' aims was to show empirical relevance of his abstract mathematical model of general equilibrium at each stage of tatonnement. Walras painstakingly proved that the relative prices which emerge in free competition in a purely competitive market are the same as the elements of his system of equations, in which the unknowns are the prices of equilibrium and the quantities exchanged.

The important question is: Has Walras succeeded in proving that the mathematical solution is fundamentally the same as the solution of relative prices that emerge in the process of free competition?

Since Walras adopted the theory of tatonnement as the means of reaching such a solution, the concept of tatonnement itself should be explained. I quote Patinkin:

"...this theory states that the free market itself acts like a vast computer. For start with any arbitrary set of prices--Walras' "prix criés au hasard." In general, it will not be an equilibrium one. That is, at this set of prices there will be some markets with positive amounts of excess demand and others with negative amounts. Prices will then rise in the former markets and..."
fall in the latter, bringing us to a new set of prices. In general, this set, too, will not be an equilibrium one. Once again prices will change in accordance with the state of excess demand in the various markets, a third set of prices will thereby be reached, and so the process will go on. It is by this continuous groping--tatonnement--that the economy ultimately finds its way to the equilibrium position (Patinkin, 1965:38-39).

Thus, tatonnement is a groping process that feels or searches because no one in the real world can know in advance the parameters of the equation. The most vexatious concepts in the tatonnement process are the concept of false price in the exchange sector and the concept of false quantity in the production sector. Unfortunately, in his preliminary description of how the mechanism of competition operates in the real market, Walras allowed for the trading at false prices (1954:84-86). The allowance of trading at false prices creates a serious problem since the effect of the false trading yields income effect in the form of a redistribution of wealth. J. Hicks states that "a change in price in the midst of trading has the same sort of effect as a redistribution of wealth" (1957:128).

Jaffe expresses a similar view, namely, that Walras should have accounted for trading at false prices in his analytic argument because such trading generally involves a change in the value of the assets when considered in numéraire either at the initial set of prices or at any arbitrary set of prices (1967:2). Uzawa demonstrates that the dependence of the excess demand and consequently of the adjustment in prices in the course of tatonnement creates changes in the value of endowment
parameters. The analytic essence of Uzawa's demonstration can be summarized (1960:182-194): In vector notation, the initial quantities of consumer goods held by individual $r$ ($r = 1, 2, \ldots, R$) can be described as $Y^r = 0, 1, \ldots, n$. One cannot state meaningfully an increase or decrease in $Y^r$ unless at least one component increases while none decreases. Thus, individual $r$'s demand function for commodity $i$ can be described as $X^r_i (P, M^r)$ where $P = (P_0, P_1, \ldots, P_n)$ is a market price vector and $M^r$ is income, that is, the value of the initial endowment collection held by individual $r$. Once a market price vector $P = (P_0, P_1, \ldots, P_n)$ has been announced, then the value of $r$'s endowment becomes

$$M^r (P) = \sum_{i=1}^{n} P_i Y^r_i,$$

and his demand function for commodity $i$ becomes

$$X^r_i [P, M^r (P)].$$

Writing the aggregate demand function as

$$X^i (p) = \sum_{r=1}^{R} X^r_i [p, M^r (p)]$$

Uzawa defines the aggregate excess demand function, $z(p) = [z_0(p), \ldots, z_n(p)]$, as $z_i (p) = X_i (p) - Y_i$, where

$$Y_i = \sum_{r=1}^{R} Y^r_i.$$

Since $X_i (p)$ is a function of $M^r (p)$ and of $p$, the dependence of the excess demand $z_i (p)$ and consequently of the adjustment in
prices in the course of tatonnement will induce changes in the value of the endowment $M^r$.

In trading at false prices and the resulting redistribution of ownership of assets in the course of tatonnement, a variety of market solutions are possible, rather than a unique solution identical with the mathematical one. We can now conclude that, if trading at false prices is regarded as essential to real tatonnement in actual markets, whatever equilibrium is arrived at in the competitive market through tatonnement cannot be the same as the equilibrium. We can observe the analytic development of Walras' thinking as it progressed from the first to the fourth edition of *Elements*. In the first edition (1874-1875), Walras dealt with the process of tatonnement in production along the same lines as he had delineated for the tatonnement in exchange.

Walras states, "il s'agit d'arriver, a l'équilibre de la production de la même façon que nous sommes arrivés a l'équilibre de l'échange, ..." (Walras, 1874-1875:234 or 4th edition:582). The logic of the tatonnement process in the exchange sector as well as in the productive sector depended on: 1) adjustments in the output rate of products forced on entrepreneurs by competitive pressure until the selling prices everywhere equaled cost of production and, 2) market adjustments in the prices of productive services until the total quantities demanded of several services everywhere equaled the total quantities offered (1974-1875:234-235). In the first edition the
simple operation of the competitive mechanism was considered sufficient to culminate in a unique solution.

When Walras prepared the second edition in 1889, he realized that the problem of tatonnement which he encountered in the productive sector is not as simple as that in the exchange sector. Walras states:

We propose to arrive at equilibrium in production in the same way that we arrived at equilibrium in exchange, that is by assuming the data of the problem invariably over the whole period during which our tatonnements take place... But tatonnement in production runs into a complication which was not present in the case of exchange... In production (on the other hand), productive services are transformed into products. After certain prices for services have been cried and certain quantities of products have been manufactured, if these prices and quantities are not the equilibrium... [then] A cycle of tatonnement runs its course... at certain prices... at random... rising or falling according to circumstances, our entrepreneurs will borrow... the quantities of productive services required for manufacturing... products which are first determined at random and then increased or decreased according to circumstances. Then they will sell these products in the products market, through the mechanism of free competition, to... those who possess the same quantities of services as before and have the same needs for products as before. The tatonnement process will be completed when, in exchange for the products they have manufactured, the entrepreneurs... will repay their debts and shut up shop, or, more likely, they will continue their production indefinitely at the rate to which it has now become adjusted, so long as there is no change in the data, that is to say, in quantities possessed of the services and in the utilities of the products (1874-1875:234-235).

In the fourth edition, in 1900, Walras apparently decided to present a modification of the tatonnement theory to eliminate the complications arising from the production of false quantities by introducing an imaginative usage of "bons" (= tickets):
In order to work out as rigorous a description of the process of groping (toward equilibrium) as we did in exchange and yet take this additional circumstance into account, we have only to imagine . . . that entrepreneurs use tickets ("bons") to represent the successive quantities of products which are first determined at random and then increased or decreased . . . until selling prices and cost are equal; and . . . that landowners, workers and capitalists also use tickets to represent the successive quantities of services (which they offer) at prices first cried at random and then raised or lowered . . . until the two become equal. . . . Thus equilibrium in production will first be established in principle, then it will be established effectively through reciprocal exchange between services employed and products manufactured within a given period of time during which no change in data is allowed (1874-1875:242).

An important question remains: Whether the introduction of fictitious tickets itself implied the assumption of the presence of reconstructing; because in the absence of reconstruct, the intermediary purchases which are carried out at false prices must affect the nature of the market excess demand functions that determine the subsequent evolvement of the tatonnement. Jaffe and Schumpeter argue that Walras made his theory of tatonnement logically valid by assuming the presence of reconstructing through the introduction of fictitious tickets (Schumpeter, 1954:1002). Jaffe gave his own interpretation on the usage of tickets:

These tickets or bons, as Walras calls them, are provisional contracts to buy or to sell given quantities of goods or services at stated prices. What makes them provision is the stipulation that the contracts are binding only if the stated prices turn out to be equilibrium prices for the economy as a whole. Otherwise they become null and void (1967:528).

However, Patinkin contends that Walras was not fully aware of the logical necessity for reconstructing. As evidence for the lack of
understanding the significance of recontracting, Patinkin points out that Walras never provided for consumers to use tickets (1965:380). Patinkin argues that the adoption of fictitious tickets was based on the logic that tatonnement in a production economy can affect the quantities of commodities produced for the market and hence their equilibrium prices, whereas in an exchange economy there is no danger of this because the quantities are fixed. The given data of a production economy are not the quantities of commodities, but the quantities of productive services. As the tatonnement does not affect the given data of the exchange economy, so it does not affect those of the production economy. Patinkin concludes that there can be no difference between two economies as to the logical necessity for assuming the existence of tickets (1965:380). Obviously, Walras himself introduced a crucial weakness in his analytic work by neglecting to emphasize the existence of the logical necessity of recontracting in the exchange economy.

The introduction of fictitious tickets into the production economy itself poses the question whether Walras' original aim to demonstrate that the mathematical solution is fundamentally identical for both economies. According to Jaffe, Walras abandoned his initial objective of such demonstration:

True, the real market system Walras had in mind was not a replica of the infinitely complex network of the heterogeneously organized markets of the real world, but a simplification of that network idealized in the sense that it was assumed to operate as a perfectly competitive mechanism (1967:11-12).
In short, Walras presented a remote picture of the real world, not a replica of it. However, this by no means detracts from the significance of his theory of tatonnement.

When Walras prepared the fourth edition, he stepped further into the abstract world by eliminating the time element required for production. He states: "There is still another complication. Production, however, requires a certain lapse of time. We shall resolve the second difficulty purely and simply by ignoring the time element at this point" (1874-1875:242, 4th edition).

The elimination of time lapse from the productive economy of the Walrasian system implies that his model is static. The consistency and the existence of equilibrium in a static and a dynamic system can be illustrated with the following equations; the existence of a stationary equilibrium can be expressed in mathematical form.9

(1) \( D = D(P) \)  
(2) \( D = S(P) \)  
(3) \( \frac{dp}{dt} = f(D - S) \)  
(4) \( \text{sign } \frac{dp}{dt} = \text{sign} \ (D - S) \)  
(5) \( D = S \)  

In the above equations, \( D \) and \( S \) represent demand and supply while \( P \) and \( t \) represent price of a particular good and time respectively. The equation (4) expresses that if \( D - S > 0 \), then

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9This analysis is based on the presentation by O. Lange (1945:91) and Patinkin (1966:240-241).
\( \frac{dp}{dt} > 0 \), which indicates price increases and if \( D - S < 0 \), then \( \frac{dp}{dt} < 0 \), which indicates price decline.

In a static system, equation (3) replaces equation (5) \( D = S \) and thus (1) \( D = D(P) \), (2) \( S = S(P) \), (3) \( D = S \), (4) \( \frac{dp}{dt} = 0 \). As long as \( D \neq S \), the system will not be in equilibrium. Equations (1), (2), and (3) represent a dynamic system in simple form; equations (1), (2), and (4) represent the static system. The existence of a solution to the static system, which lies in the consistency of equations (1), (2), and (4), is a necessary condition for the existence of a stationary solution for the dynamic system. But this does not constitute a sufficient condition. If the dynamic system is not convergent, a consistency will never be reached even though the static system (1), (2), and (4) may have consistency.\(^{10}\)

Thus, the analytic entity of the Walrasian system possesses a static, but not a dynamic nature. Jevons supports this argument by stating that the equations of exchange in the Walrasian system are of a static, not a dynamic character. The equations define a position of equilibrium, but they afford no information as to the path by which that point was reached. Walras' labored lessons indicate a way, but not the way of descent to equilibrium (Edgeworth, 1889:435). We should clarify here that Walras' stability analysis was based on the assumption that the rate of price change varies directly with the amount of

\(^{10}\)For a detailed discussion of the concepts of static and dynamics, see Chapter V.
excess demand. As a stability condition, the Walrasian system requires that excess demand equals zero at equilibrium level and a positive excess demand always leads to a rise in price and vice versa. When the supply curve is positively sloped, upward shift of the demand curve generates positive excess demand which makes prices rise to a new equilibrium. Walras' main objective was to show that in a competitive market equilibrium would be attained because prices would reach their equilibrium values instantaneously as exchange took place. This is only possible when every trader has perfect knowledge of alternative trading opportunities and arbitrage would be carried out without time consumption on the basis of perfect information provided by an auctioneer at zero cost. For that matter, the process of tatonnement does not allow the market to remain at a nonequilibrium set of prices. As far as the stability condition of the Walrasian system is concerned, a stable system is one in which the process of tatonnement will succeed in establishing equilibrium prices while an unstable system is one in which it will not (Patinkin, 1965: 39).

Walras vs. Keynes

No one will have any difficulty realizing how deeply Walras influenced other economists through his theories of tatonnement and general equilibrium analysis. Walras' immediate successors include Wicksell, Antonelli, Aupetit, Osario, Pareto, Auspitz, Lieben, Baron and Cassel (Patinkin, 1965:531-540). Even today, Walras' basic framework of general equilibrium system is
much alive in a modified form of neoclassic economics. The much publicized macroeconomics of Patinkin are no exception.

For the sake of clarification, we should briefly review the Patinkin model (1965:228-229). It consists of four markets, namely, labor, commodities, bonds, and money. For each market, there are three equations: a demand equation, a supply equation, and an equilibrium equation. For each market there are also three variables: the amount demanded, the amount supplied, and the price of goods in question. The price of money is, by definition, unit. Hence, there is a total of only eleven variables to be determined. By Walras' law, however, there are only eleven independent equations.

By substituting these demand and supply equations, the foregoing system can be reduced to:

\[
\begin{align*}
\text{Condition for Equilibrium} & \\
1) & \quad Q(W/P, K_0) = R(W/P) \\
2) & \quad F(Y_0, r, M_0/P) = Y_0 \\
3) & \quad rp \cdot H(Y_0, 1/r, M_0^H/P) = rp \cdot J(Y_0, 1/r, M_0^F/P) \\
4) & \quad P \cdot L(Y_0, r, M_0/P_0) = M_0
\end{align*}
\]

Here, the level of output is assumed to be fixed at \( Y_0 \). By Walras' law only three of these equations are independent. Correspondingly, there are only three unknown variables to be determined: the money wage rate, \( W \); the price level, \( P \); and the rate of interest, \( r \). Patinkin then states that, "We then take this equality between the number of equations and unknowns as justifying the reasonableness of the assumption that this system
of equations does have a solution" (1965:229). Along the Walras fashion, Patinkin states that the equality between the number of equations and unknowns provides a justification for the reasonableness of the assumption that the system of equations does have a solution. It is sufficient to point out that Walrasian theoretical essence is still alive in contemporary economics. However, the serious shortcomings of Patinkin's system like that of classic or neoclassic economics is that it can only display the properties of equilibrium, i.e., full employment, zero unwanted inventories, zero economic profit, etc. The subsequent analysis will show Patinkin's painstaking efforts to incorporate the theory of involuntary unemployment into his competitive system can be viewed as a major failure. 11

Recapping the theory of involuntary unemployment advanced by Patinkin, the central theme of his theory is based on the relaxation of perfect competitive assumptions, i.e., the absence of sufficient interest and price-elasticity, and the extensive application of the real balance effect, as a dynamic force (1965:318). Without sufficient interest and price-elasticity, a downward shift in the consumption or investment function implies the accumulation of unsold outputs--inventories--since the observed reduction in demand creates a "glut" on the commodity market. As Patinkin states, "Not being able to sell all they want, they cannot employ all they want" (1965:322). This is the essence of involuntary unemployment. With the assumption that

11 For further discussion, see Chapter V.
wages and prices always decline in exactly the same proportion, however, a positive real-balance effect, generated by a price decline during a "glut" on the commodity market, tends to force the demand up again. As the demand curve shifts upward, it pulls up commodity output which, in turn, pulls up labor input. The full employment equilibrium will be reinstated when the dynamic processes have taken their full turn.

Although the scenario is a happy one, Patinkin overlooks many important analytic elements that may arise in the process of adjustment.

To begin, in the framework of perfect competition on which Patinkin's system is based, the prices of factor inputs—wage and rent—are determined by the interaction of supply and demand. At the equilibrium of output, the revenue from sales proceeds in the commodity market is just enough to cover the cost of factor inputs incurred during production. From a dynamic aspect, the cost of factor inputs starts before output of sales begins. Any accumulation of inventories and the effort of firms to reduce inventories by price reduction implies that the firms must incur economic loss since they paid the equilibrium prices of factor inputs. Where the income consists of wage, interest, rent and profit, what is spent on a product is income to those who have contributed their human and property resources in getting the product produced and to market. The assumption that wages and prices always decline in exactly the same proportion is not a sufficient condition to maintain the real income constant if the firms incur negative profit and thus are not able to pay
the factor input costs to the resource owners. As Patinkin correctly pointed out, since the entity of real income, Y, enters as an essential variable of the commodity, bonds, and money markets, any change of real income will affect the equilibrium of these markets. Patinkin states,

“For when firms planned the inputs of labor . . ., they assumed they would be able to pay for these inputs with sales proceeds of the resulting outputs. Therefore, when these sales fail to materialize, firms find themselves with their funds tied up in nonliquid inventories and are hence financially unable to carry out their original plans (1965:320).

Unless we assume the firms are able to pay the cost of input factors with goods instead of money, any effort to increase liquid assets through loans or money will inevitably affect the rate of interest, thus disrupting the equilibrium state of the bond and money markets. This is the neglected side of the theoretic implication generated by the customary mental habit of comparative static economics where an exogenous shock introduced into the system is always limited to one segment of sectors. Since we deal with human objects, currently involuntarily unemployed laborers whose incomes are reduced to zero, who must rely, as a means of sustaining their daily lives, either on their savings or on the loan market, money and bond markets will be affected.12

Incidentally, the unemployed may live on grants as well as borrowing. In spite of the existence of the grant or one-way transfer in our modern society and its importance, the issue has received a scant treatment from orthodox economists. As K. Boulding pointed out in The Economy of Love and Fear (1973), “this failure to recognize the grant as an essential element in
Within our methodology, a competitive system, where individual economic agents are assumed to possess knowledge of past, present, and future or of a mutually incompatible planning scheme that includes involuntary unemployment, is not consistent. As we will show, a "glut" or involuntary unemployment which resulted from "not being able to sell all they want" represents uncertainty, i.e., the phenomenon that produces overlapping distribution of potential outcome or high dispersion of given expectation.\textsuperscript{13} If the essence of the competition system means a price taker's market where the individual seller confronts horizontal demand, the existence of a "glut" or involuntary unemployment not only invalidates the meaning of perfect competition, but obscures the true meaning of these terms. The popularized version of the Hicksian national-income model known as the IS-LM model is a static equilibrium analysis of similar shortcoming, i.e., it always displays the static equilibrium properties--the equilibrium income and equilibrium interest.\textsuperscript{14} Since the

\textsuperscript{13}For the further implication of uncertainty, see F. Knight (1921); A. Alchian (1950:211-221); and A. G. Hart (1951).

\textsuperscript{14}The mathematical representation of the IS-LM can be shown by: Applying the concept of injections and leakages, the equilibrium condition of goods market - injections = leakages, or \[ I + X = S + M \] where \( I \) = investment, \( X \) = export, \( S \) = saving, and \( M \) = import. By analogy, the equilibrium condition of the money market is demand for money = supply of money, \( M_d = M_s \). The attainment of equilibrium in this model requires simultaneous satisfaction of the equilibrium condition of the goods market and that of the money market. With the proper specification of
equilibrium loci of IS and LM curves were drawn from three markets--bonds, money and commodity markets--the remaining market, the labor market, is, by the Walrasian law, automatically equilibrated. The widely practiced method of using the IS-LM model as the probing of policy implication of attaining full employment is sheer sham, since the IS-LM cannot exhibit the attributes of disequilibrium unemployment, providing the system of equations has a solution (Dernberg and McDougall, 1960). For a meaningful analysis of the imperfect coordination of economic activity, we must recognize the fact that the knowledge possessed by individual agents is never perfect.

The emergence of Keynes' economics is an epoch-making event in modern economic analysis. Leijonhufvud states:

functional relationship, the equilibrium state may be described by the following pair of equations:

$$\begin{align*}
1(i) + X_0 &= X(Y, i) + M(Y) \\
L(Y, i) + KY &= M_{SO}
\end{align*}
$$

(1.1)

Where $1 = 1(i)$ and $\partial l/\partial i < 0$, $X_0$ = export, $S = S(Y, i)$ and $0 < \partial S/\partial Y < 1$, $\partial S/\partial i > 0$, $M$ = import and $\partial M/\partial Y > 0$, $L$ = liquidity preference and $\partial L/\partial Y > 0$, $\partial L/\partial i < 0$, and $K$ = positive constant.

Since there are only two endogenous variables to be determined in (1.1), i.e., income $Y$ and interest $i$, the equality between the number of equations and unknowns can be taken as justifying the reasonableness of the assumption that this system of equations does have a solution. The equilibrium solution of the model can thus be expressed generally in

$$\begin{align*}
Y_e &= Y_e (X_0, M_{SO}) \\
i_e &= i_e (X_0, M_{SO})
\end{align*}
$$

Where $X_0$ and $M_{SO}$ are two exogenous variables.

See, A. Chiang (1967:223-228.)
[Keynes'] assault was directed towards habitual modes of thought, towards the unimaginative and sterile discussion where, in a situation of dire emergency, lack of initiative was repeatedly defended by invoking classical economics—not the best though that classical economics could offer—but a stereotyped, cliché-ridden version of received doctrine (1968:34).

Here I will briefly examine some controversial interpretations of Keynes' economics by Clower and Leijonhufvud in comparison with classic economics. The examination not only will improve understanding of classic economics but enhance our perspective of the future development of economic theory.

The main characteristics of Keynes' economics as presented by Leijonhufvud and Clower can be summarized.

First, the main objective of classic economics is to represent the world of perfect coordination while Keynes' objective is to show the world of imperfect coordination (Leijonhufvud, 1971). The analytic entity of classic economics is always the general equilibrium analysis of full employment using many restrictive assumptions such as wage and price flexibility, perfect knowledge, perfect information, perfect rationality, etc. However, Keynesian economics means disequilibrium analysis where the information theory plays the vital role.

Second, in the Walrasian general equilibrium theory, all transactors are regarded as price takers. Walras' *deus ex machina* (auctioneer) is assumed to inform instantaneously all traders of prices at which all markets are going to clear at zero cost. In addition, all goods are perfectly liquid, their full market values being at any time instantaneously realizable. To
make the transition from Walras' economics to Keynes' economics, Keynes dispensed with the existence of auctioneers. Thus, the removal of the auctioneer implies that the generation of the information needed to coordinate economic activities in large systems where decision-making is decentralized will take time and will involve cost (Leijonhufvud, 1970b:211). Hence, information theory plays a crucial role in Keynes' economics.

Third, Leijonhufvud contends that Keynes' theory is dynamic, his model is static. Keynes attempted to analyze dynamic processes with a comparative static apparatus borrowed from Marshall (Leijonhufvud, 1968:221). In other words, Keynes dealt with dynamic processes by means of a comparative static period analysis which is known as the method of a comparative pseudo-dynamics. Many economists failed to understand correctly Keynes' economics, because they tried to analyze his economics within the boundary of static and comparative static apparatuses.

Fourth, the aggregate structure of the standard model and the general theory model are basically different (Leijonhufvud, 1968: Chapter III):

<table>
<thead>
<tr>
<th>Standard Model</th>
<th>General Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commodities</td>
<td>Consumer Goods</td>
</tr>
<tr>
<td>Bonds</td>
<td>Non-Money Assets</td>
</tr>
<tr>
<td>Money</td>
<td>Money</td>
</tr>
<tr>
<td>Labor Services</td>
<td>Labor Services</td>
</tr>
</tbody>
</table>

The classic model as well as the Keynesian model contrasted to Keynes' own model can be categorized as the standard model.
The aggregate production function makes the standard model a one-commodity model since capital goods are not only combined with consumer goods but the price of capital goods is fixed in terms of consumer goods. Hence, the capital theory in the standard model is virtually dead. However, the capital theory in the general theory model is much alive since Keynes' model treats capital goods and bonds as one aggregate. The model of the general theory is a two-commodity model in which consumer goods and capital goods are distinct.

Fifth, there are many confused issues among economists that Walras' concept of effective demand is essentially the same as Keynes' concept of effective demand (Clower, 1969:270-277).

The entire examination of the controversial issues related to effective demand would take a lengthy discussion. It may suffice to examine briefly the central issue of effective demand by examining Clower's and Keynes' approach.

From theories of household and business behavior, the following two equations can be derived; the familiar household behavioral equation is:

\[
\sum_{i=1}^{m} p_i d_i - \sum_{j=1}^{n} p_j s_j - r = 0
\]

(1)

And the business behavioral equation is:

\[
\sum_{i=1}^{m} p_i s_i - \sum_{j=1}^{n} p_j d_j - \bar{r} = 0
\]

(2)

Where \(s_1, \ldots, s_m\) and \(d_m + 1, \ldots, d_n\) denote quantities supply and demand respectively, \(P_1, P_2, \ldots, P_{n-1}\) \((P_n = 1)\) stand for
prevailing market prices. Subtracting the equation (2) from (1), we obtain:

\[
\sum_{k=1}^{n} P_k [d_k - \bar{s}_k] = r - \bar{r} \tag{3}
\]

In the case of market experiment, \( r = \bar{r} \) provided that the variables \( s_1, \ldots, s_m \) and \( d_m + 1, \ldots, d_n \) are their equilibrium values. Thus, equation (3) leads to Walras' law:

\[
\sum_{k=1}^{n} P_k [d_k(p) - \bar{s}_k(p)] = 0
\]

which we rewrite in this familiar form:

\[
\sum_{k=1}^{n} P_k \bar{s}_k = \sum_{k=1}^{n} P_k d_k
\]

Walras' law might be said to assert that supply creates its own demand which requires a special assumption about the relationship between the two functions. According to Keynes (1936:25) the special assumption is that the aggregate demand price (proceeds) always accommodated itself to the aggregate supply price in classic economics. Keynes' explanation follows: For supply to create its own demand implies that \( f(N) \) and \( \phi(N) \) are equal for all values of \( N \), i.e., for all levels of output and employment. When there is an increase in \( z = \phi(N) \) corresponding to an increase in \( N \), \( D[= f(N)] \) necessarily increases by the same ratio as \( z \).\(^{16}\)

\(^{16}\) Keynes' (1936:25). \( Z \) is the aggregate supply price of the output from employing \( N \) men, the relationship between \( z \) and \( N \) being written \( z = \phi(N) \) which Keynes calls the aggregate supply function and \( D \) is the proceeds which entrepreneurs expect to
Thus the classic theory assumes that the aggregate demand price (proceeds) always accommodates itself to the aggregate supply price; so that, whatever the value of $N$ may be, the proceeds $D$ assume a value equal to the aggregate supply price $z$ which corresponds to $N$. Keynes contends that this is the classic concept of effective demand (1936:26).

Keynes' concept of effective demand in his *General Theory* is entirely different from the classic one. Keynes simply implies that the value of $D$ at the point of the aggregate demand function where it is intersected by the aggregate supply function is the effective demand. Hence, if $z$ is greater than $D$, then there will be an incentive to decrease employment beyond the present level of $N$. From this viewpoint, the concept of effective demand of Keynes shows a sharp contrast to that of the classics.

Sixth, many economists argue that Keynes' economics is basically the same as classic economics (Blaug, 1968:Chapter 11), that the major difference is a matter of assumption instead of a matter of subject (Modigliani, 1944). In addition, Walras' law is fundamentally valid even in the context of Keynes'. Clower attempted to refute such a contention and concludes that the Walrasian law is incompatible with Keynes' economics, if not entirely irrelevant (1969:287-294). According to Clower, Keynes himself made tacit use of a more general theory and this more

receive from the employment of $N$ men, the relationship between $D$ and $N$ being written $D = f(N)$ which is the aggregate demand.
general theory leads to the market excess demand function which specifies quantities and prices as independent variables. Except at full employment, the excess demand functions so defined do not satisfy Walras' law. In classic value theory, the total value of commodities (goods and money) offered for sale is always equal to the value of commodities (goods and money) demanded for purchases because all purchase orders are presumed to be effective regardless of prevailing demand and supply conditions. But in Keynes' context, purchase orders are not validated automatically and sales orders do not necessarily generate effective demand for other commodities. In other words, effective demand in the Keynesian sense is confined to purchase orders executed, not purchase orders placed (Clower, 1969:295). Hence, Walras' law, which states the total value of all goods demanded is always equal to the total value of all goods supplied, is basically incompatible with Keynes' disequilibrium model.

Seventh, and last, in the macrosystem of Keynes, the Marshallian ranking of price and quantity adjustment speeds is reversed. In the Marshallian period analysis of a single market, the reaction velocity of price, output rate, and capital stock are subject to a qualitative ranking (Samuelson, 1965:329; also Leijonhufvud, 1968:52). In the Marshallian short run, the speed of price adjustment is considered infinite. In the short run of Keynes' macrosystem, flow quantities are freely variable, while the admissible range of variation for the rest of prices is limited. The application of the quantity adjustment criteria
contrasted to the price adjustment may yield theoretically quite different results. 17

These seven issues constitute the polemic difference between the economics of classics including neoclassics and of Keynes. Nevertheless, from my point of view the revolutionary concepts of Keynes' economics lies in the fact that by removing the deus ex machina--auctioneer--from the classic foundation, Keynes attempted to bring abstract economics down to relevant reality. 18 The absence of the deus ex machina, however, has a more far-reaching implication than most economists believe.

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18 Quite often, economists who attempted to analyze the economics of Keynes in a Walrasian context failed to observe the difference as well as the importance of Keynes' economics compared to classics. A recent article contributed by Grossman still asserts that the Keynesian model known as income expenditure model not only correctly represents Keynes' economics but also that Patinkin's model is the extension of Keynes' economics (Grossman, 1972:26-30).
A SELF-ADJUSTING ECONOMIC SYSTEM: A MARSHALLIAN PERSPECTIVE

Four decades have passed since the publication of Keynes' *General Theory of Employment, Interest, and Money*. The subdued polemics on Keynes' economic theory have once again emerged as the subject of renewed interest among economists. This is, in large part, on two accounts: First, there is growing skepticism among economists whether the economic system, currently afflicted by the malaise of inflation and unemployment because of serious cutbacks in aggregate output, is, as Clower and Leijonhufvud recently remarked, capable of self-adjusting (1974). Keynes had first raised the banner of heresy against the well-established classic school of self-adjustment. With a specific example of interest theory in "A Self-Adjusting Economic System?", he argued that our system is not naturally self-adjusting and that, without purposive redirection, the economy may suffer prolonged states of poverty in spite of the potential capacity for plenty.

Keynes stated:

Now the school that believes in self-adjustment is, in fact, assuming that the rate of interest adjusts itself more or less automatically, so as to encourage just the right amount of production of capital goods to keep our incomes at the maximum level that our energies and our organization and our knowledge of how to produce efficiently are capable of providing. This is, however, pure
assumption. There is no theoretical reason for believing it to be true. The system is not self-adjusting and, without purposive direction, it is incapable of translating our actual poverty into our potential plenty (Keynes, 1935:36).

Keynes' antithesis to the self-adjusting school inevitably raises the question whether the existing economic theoretic foundation is an adequate apparatus to analyze our economic system. If our scrutiny shows otherwise, the existing economic scheme may not escape a radical reformulation.

Leijonhufvud advanced a new interpretation of Keynes' economic theory in his On Keynesian Economics and the Economics of Keynes (1968). We are told that Keynes' theory is dynamic yet his model is static. Borrowing from Marshall's comparative static apparatus, Keynes sought to analyze the dynamic processes necessary for adjustment of the system from the viewpoint of macroeconomics that emphasizes monetary phenomena; he discarded that part of the system that postulates the force of self-adjustment—the existence of the auctioneer, the deus ex machina—from his theoretical formulation (Leijonhufvud, 1970a:216 and 1968:48).

The argument as well as the significance of the deus ex machina cannot be stressed enough since the model of classic economic theory is largely founded on the role of the auctioneer who is assumed to provide all the necessary information, at zero costs and without time consumption to all traders, needed for perfect coordination of the system (Leijonhufvud, 1968:48).

In subsequent arguments, Keynes made clear that his all-out assault on the doctrine of classic economics was not to find
logical flaws in it but to point out its lack of generality in its tacit assumptions that are seldom satisfied in the real world (1936:378). Keynes went a step further by arguing that the false rationalization of the possession of foreknowledge, which was based on the hypothesis of a calculable future and which follows the Benthamite calculus, inevitably leads to a faulty interpretation of human behavior and, to an erroneous theoretic construction (1937:222).

By removing from the foundation of classic economics, the role of the deus ex machina that was to assure a perfect coordination of economic activities of traders in the system, Keynes attempted to convert the abstract economic argument of perfect coordination to an argument relevant in the real world.

Many economists, including Keynes, failed to elucidate systematically the implications of the removal of the deus ex machina from the theoretic foundation. It goes without saying that without the deus ex machina one cannot hope to retain the assumption of perfect knowledge, which implies that all the information provided to traders are not only rational, but truthful. The abandonment of the assumption of perfect knowledge, or the removal of the deus ex machina, from the foundation of existing economic theory has a more far-reaching effect than most economists believe.

The Walrasian general equilibrium system is based on the assumption of perfect knowledge, and is conceived as a system of simultaneous equations in the form of a set of conditions to be fulfilled, a timeless stationary state, and the tatonnement
process, which includes the mechanism of fictitious bons. This
system surely cannot survive without explicit recognition of the
role of the auctioneer. As Jaffe pointed out, Walras never
claimed that the theoretic construction of his General Equilib-
rium system was supposed to represent a real economic system with
heterogeneously interwoven markets that are continuously inter-
acting through purposive trial-error processes or that informa-
tion possessed by transactors can never be perfect.

True, the real market system Walras had in
mind was not a replica of the infinitely complex
network of the heterogeneously organized markets
of the real world, but a simplification of that
network idealized in the sense that it was assumed
to operate as a perfectly competitive mechanism
(Jaffe, 1967:11-12).

As Shackle has pointed out, in connection with the
Walrasian General Equilibrium system, theoretic economists are
not concerned with "How could it possible work?" The useful
question is: What does its logical structure imply? (1972:105-
151).

The strength, as well as the survival of the Walrasian
General Equilibrium system, is essentially dependent on the
theoretic incorporation of the role of the auctioneer which is
assumed to provide all the necessary information for perfect
coordination of the system. The repudiation of the deus ex
machina, the auctioneer, from the foundation of the Walrasian
General Equilibrium inevitably destroys the very structure of the
system.

Therefore we are left with Marshall's economic theory.
As Robinson stated, "The tradition of Marshall, though full of
confusion and sophistries, was much richer" (1971:xv). In the perspective of the historic development of economic theories, it can be asserted that while the Walrasian system represents the capstone of the classic conceptual structure, the Marshallian system represents the cornerstone of neoclassic economic theory. It is by no means an exaggeration that the existing modern orthodoxy to a large extent is the mere extension of these two polar theoretic advancements with a distinctly Walrasian twist.

The emergence of Keynesian economics did not change the picture. A reexamination of Marshall's economic theory, I hope, will clear the way for the more urgent discussion of today's problems. It will also illuminate whether Marshall's system could survive without the assumption of perfect knowledge and so serve as analytic apparatus for a system without the characteristics of self-adjustment. Robinson credits Marshall with the dynamic element while she uses Pigou's name to label the static element in Marshallian formulations (Robinson, 1971:9-14 and Kregel, 1973:ix). She credits Marshall with supplying the "dynamic element" and Keynes with having used Marshall's partial static apparatus as the mechanism for expounding dynamic processes; she shows that Marshall's rejection of perfect knowledge as an assumption of structural premises heightened economists' wishful thinking that his partial static equilibrium apparatus can effectively be used to analyze a system in which the deus ex machina no longer provides all the relevant information on the traders and the traders possess only partial imperfect knowledge.
However, we can show that the theoretic foundation worked out by Marshall cannot survive without the recognition of the deus ex machina. Therefore, the existing modern orthodoxy may not be able to escape a radical reformulation, because we know human behavior differs considerably from that postulated in the abstract system. My essay attempts to analyze the underlying true implications of Marshallian economics.

One cannot hope to comprehend Marshall's economic theory without understanding his seemingly conflicting dual objectives. Basically, Marshall's view of the cosmos is the dynamic force of organic growth manifested in a biological rather than mechanical analogy. The central theme of scientific investigation is to analyze the implication of living forces and movements. This contrasts with the methodologic adoption of a partial static equilibrium as the main analytic device of the economic system, which is based on a mechanical analogy.

Marshall states,

"Progress," or "evolution," industrial and social, is not mere increase and decrease. It is organic growth. . .therefore, the later stages of economics, when we are approaching nearly to the conditions of life, biological analogies are to be preferred to mechanical, other things being equal (1966:317).

Though the central theme of economic science must be the investigation of organic growth and its implications, Marshall thought the statical equilibrium method of demand and supply could be used as temporary auxiliary to the dynamic-biologic conception of determining value. This is, of course, part of the
problem of distribution and exchange which has been of major concern to economists since Adam Smith.

Marshall's linkage between static and dynamic requires careful attention because he set a precedent; he used the word "dynamic" for a concept mathematicians call "asymptotic stability." Economists, then, extended the linkage without careful scrutiny of its implication.

Marshall states,

...This volume is concerned with normal conditions, and these are sometimes described as statical. But in the opinion of the present writer the problem of normal value belongs to economic Dynamics: partly because statics is really but a branch of Dynamics and partly because all suggestions as to economic rest, of which the hypothesis of a stationary state is the chief, are merely provisions, used only to illustrate particular steps in the argument and to be thrown aside when that is done (1936:366).1

What Marshall had in mind were not Knightian progressive elements of the society in which uncertainty, risk and profit become a dominate force of social progress, but the mathematical property of the dynamic stability of equilibrium which concerns the forces of movement toward equilibrium. In other words, given sufficient time for adjustment to work itself out, does the system bring quantity Q, or price P to the equilibrium level \( \bar{Q} \) or \( \bar{P} \)? More concisely, does the time path \( Q(t) \) or \( p(t) \) tend to converge to \( \bar{Q} \) or \( \bar{P} \) as \( t \to \infty \)?

1Except where otherwise stated, reference to Marshall's Principles are to the 8th edition.
The analysis of stability equilibrium not only became the heart of economic dynamics but a popular theme centering on the problem of deriving the theorem eventually known as "correspondence principle." Samuelson has shown the problem of stability equilibrium is logically tied up with that theorem (1965:257-283).

Marshall, who attached importance to real elements, took pains to advance a theoretically acceptable and empirically meaningful concept of stability. The counterparts of the stability concept can be found in his carefully wrought concept of "normal."

In the same way every use of the term "normal" implies the predominance of certain tendencies which appear likely to be more or less steadfast and persistent in their action over those which are relatively exceptional and intermittent (1936:34).

When he refers to normal action,

...may be expected in the long run under certain conditions (provided those conditions are persistent) from the members of an industrial group (1936:35).

In *Economics of Industry*, Marshall defined:

That condition of a thing which would be brought about by the undisturbed action of free competition is called its normal condition (1881:66).

In connection with the term "normal," which portrays the predominance of certain tendencies, Marshall thought the laws of social science described the states of social tendency.

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2 For the implication of "correspondence principle," see pp. 105-112.
Thus law of social science or a social law, is statement of social tendency; that is a statement that a certain course of action may be expected under condition from a member of social group (1936:33).

Marshall asserted, the process of biological growth obeys the laws of nature under normal conditions:

Every tree grows according to the laws of nature, but if a tree is planted in such a position that it cannot grow "naturally," that is according to the law of its own nature, its shape is said to be abnormal (1881:66).

We can see how "normal" is used to support the mathematical concept of asymptotic stability needed for the adoption of the static equilibrium apparatus and its meaningful operation.

The remaining task is to show that the equilibrium values—the set of numerical values of the variables that satisfy a system of simultaneous equations—have a theoretically meaningful counterpart in observed behavior of economic entities. Marshall emphasized that whether the subject is a human being, business firm, or botanical species, their biologic goal is to attain equilibrium. I will show that Marshall's concept of equilibrium is fascinating, but that it reveals more of Marshall's cosmic view and moral zeal than observed facts of the real world.

A business firm grows and attains great strength, and afterwards perhaps stagnates and decays; and at the turning point there is a balancing or equilibrium of the forces of life and decay: And as we reach to the higher stages of our work, we shall need ever more and more to think of economic forces as resembling those which make a young man grow in strength, till he reaches his prime; after which he gradually
becomes stiff and inactive, till at last he sinks
to make room for other and more vigorous life
(1936:323).

Marshall's concept of equilibrium--the state of balancing
forces characterized by a static moment--is in direct opposition
to the dynamic concepts by other social scientists, e.g., Marx,
Schumpeter, Knight, and Toynbee.

One may wonder why Marshall advanced the notion of equi-
librium in connection with a static method. The answer lies in
the determination of value, which requires a static element.

Following Adam Smith's explanation of value, Marshall
incorporated the concept into the determination price:

The word value, it is observed, has two
different meanings, and sometimes expresses the
utility of some particular object, and sometimes
the power of purchasing other goods which the
possessions of that object conveys (Smith, 1937:
28).

The utility of a particular object represents its subjec-
tive value, a good or a quantity of goods possess utility for the
well-being of a certain subject (Bohm Bawerk, 1959:121).

The Marshallian concept of value includes the phenomenon
of subjective value; we know that value in the objective sense
alone is less successful in the discourse of economic science
(1936:61).

In a more advanced economy, value is expressed in a
pecuniary sense--in money that denotes value instead of
expressing the prices of commodities in terms of each other
(1936:61).
Nevertheless, the law governing both is identical. As Bohm Bawerk puts it:

The law of price explains how a good really commands a certain price and why it does so. . . . that explanation automatically furnishes the reason why the good in question has the capacity of a certain price. The law of price contains within itself the law of exchange value (1959:124).

Although value in itself has no operational content, economists were now able to move from the metaphysical argument of value to the tangible problems of determining price and exchange value.

In many respects, Marshall's exposition of price determination follows the Smithian logic. He was aware that in order to present a deterministic price theory, the supposition of a stationary state that has a logical connection with a static equilibrium is not only inevitable but necessary. The logic behind this reasoning is based on the belief that as long as moving or disturbing elements are recognized in the system, the price and exchange value cannot be determined in the universal sense. Marshall accepted the logic that in a stationary state, where the growth of population, capital accumulation and technologic innovations are assumed to be constant, and where the cycle of production and distribution repeats itself through standards of tradition from year to year and from generation to generation, the cost of production governs value (1936:367). In such a world, time has no function, it can never affect price and there is no distinction between short period and long period. As Marshall put it, "The demand lists of prices would always be the
same, and so would the supply lists; and normal price would never vary" (1936:368).

Marshall, who disliked imaginary elements, wanted to avoid the adoption of the stationary state as the structural premise. Instead, he worked out a compromise: The stationary state is supposed to emerge after all disturbing elements have worked themselves out and settled at the state of rest--equilibrium. Then the structural foundation does not have to be built on the assumption of the stationary state. Unlike the Walrasian general equilibrium, the assumption of the stationary state is not a necessary premise of Marshall's theoretic foundation. It is assumed to be reached as the consequence of orderly self-adjustment in the long run. The concept of time periods fully reflect this fact.

In fact a theoretically perfect long period must give time enough to enable not only the factors of production of the commodity to be adjusted to demand, but also the factors of production of these factors to be adjusted. . . (1936:416).

To Marshall, all periods are short during which changes in the supply of factors of production cannot exert a direct influence on processing of commodities and all periods are long which exhibit such direct influence (1890:416, 1st ed.)

Marshall's theoretic presentation vindicates the classic doctrine of value--the cost principle advanced by Smith and reelaborated by Ricardo and reincarnated in the modern texts.

This is the real drift of that much quoted, and much misunderstood doctrine of Adam Smith and other economists that the normal, or "natural," value of a commodity is that which economic
forces tend to bring about in the long run. It is the average value which economic forces would bring about if the general conditions of life were stationary for a run of time long enough to enable them all to work out their full effect (1936:347).

So the determination of normal value essentially requires the supposition of stationary state. The stationary state under Marshall's scheme is assumed to be arrived at after sufficiently long periods of adjustment when the factors of production of commodities fully adjust to demand and when supply of factors of production exerts a direct influence on prices of commodities. Such a scheme inevitably yields that the determination of normal value essentially belongs to the long run.

As a logical consequence, the theory of determining normal value in the short run is inconclusive and tentative. In spite of its inconclusive nature of value in the short run, Marshall decided to adopt a static equilibrium method as the main expository device of short-run value. The static method may mathematically yield a fully deterministic solution when the number of independent equations are presented with the matching number of unknowns to be determined. Marshall believed that there are at least three grounds to justify adopting the static method: 1) The static method requires a less violent assumption than the supposition of a stationary state where the conditions of production and consumption are assumed to rest (1935:369). Once the static equilibrium method, which is based on the assumption of "other things being equal," is used, the method can be thrown away so that the initially impounded restriction of
ceteris paribus can either be dropped or relaxed. 2) The evidence of the Victorian era in which Marshall lived shows that the general economic conditions are not sufficiently volatile to disrupt the short-run level of normal price (1936:369). 3) According to Marshall, the real world in its economic aspect is so complex that the economists can only hope to approach economic phenomena through a step-by-step process by breaking it up into one bit at a time. In so doing, the element of time, which is the most difficult element in the investigation of economic science, can be impounded tentatively on the assumption of ceteris paribus--other things being equal. To quote Marshall:

The element of time is a chief cause of those difficulties in economic investigations which make it necessary for man with his limited powers to go step by step. . . . In breaking it up, he segregates those disturbing causes. . . . The existence of other tendencies is not denied, but their disturbing effect is neglected for a time (1936:366).

With the above justification of adopting the static method, Marshall shows how the assumption "other things being equal" is used in the process of determining price.

It is to be assumed that the general circumstances of the market remain unchanged throughout this period: That there is, for instance, no change in fashion or taste, no new substitute which might affect the demand, no new invention to disturb the supply; so that the demand and supply schedules remain unchanged throughout the whole period (1890:402-403).

Justifying and, at the same time, completing the groundwork of static application, Marshall explained the meaning of supply and demand schedules as follows:
...there is a definite demand price...at which each particular amount of the commodity can find purchasers in a unit of time, and in like way there is a definite supply price...which will call forth a supply of each particular amount in a unit of time (1890:402, 1st ed.)

Marshall elaborated "supply price" as the price required to call for the exertion necessary for producing any given amount of a commodity within a given unit of time (1936:338).

Marshall's definition of supply price or supply schedule seems to carry an ex ante notion rather than ex post, and yet, as further analysis will show, under perfect market conditions where all the relevant information is assumed given, the distinction between ex ante and ex post is not only superficial but meaningless.

The theoretical conclusion drawn from the application of static equilibrium apparatus is similar to those conclusions in the modern textbooks under "pricing and output under pure competition in the short run."

Blaug has pointed out, Marshall's "restless quest for realism," his refusal to be bounded by static assumption led him to his invention of the concept of the "representative firm" (1968:396).

To quote Marshall:

...Our representative firm must be one which has had a fairly long life, and fair success, which is managed with normal ability, and which has normal access to the economies, external and internal, which belong to that aggregate volume of production; account being taken of the class of goods produced, the conditions of marketing them and the economic environment generally (1936:317).
It shows how far Marshall was willing to go to reconcile reality with his static assumption.

Judging from the slightly changed statement in *Principles* of the 8th edition where Marshall deletes the term "perfect market" and where he spurns the expression "perfect knowledge," Marshall wanted to convey that his theoretic construct of market demand and supply was not based on the assumption of perfect knowledge. Marshall states that the doctrine of maximum satisfaction may not exactly hold.

For, in an age of rapid change such as this, the equilibrium of normal demand and supply does not thus correspond to any distinct relation of a certain aggregate of pleasure got from the consumption of the commodity and an aggregate of efforts and sacrifices involved in producing it: the correspondence would not be exact, even if normal earnings and interest were exact measures of the efforts and sacrifices for which they are the money payments (1936:347).

Nevertheless, Marshall introduced a horizontal demand curve for an individual firm (1936:517 and 849-50). The explicit introduction of a horizontal demand curve appeared in his 3rd edition in 1895, and from then on Marshall forwarded the same mathematical principle as Cournot did (see Cournot, 1938:90). The theoretic derivation of the uniform horizontal demand curve for an individual firm is the result of applying the concept of the perfect market.

A perfect market is a district, small or large, in which there are many buyers and many sellers all so keenly on the alert and so well acquainted with one another's affairs that the price of a commodity is always practically the same for the whole of the district (Marshall, 1936:112).
However, Marshall's argument, that although an individual transactor acts for himself, the state of knowledge is such that it is sufficient to yield a uniform horizontal demand curve for the individual firm, requires further scrutiny.

So far, I have presented Marshall's economic theory without adding any analytic substance. It may be useful to add a few comments to Marshall's economic scheme from the analytic perspective. My analysis, I hope, will clarify the neglected relationship between the static equilibrium method and the assumption of perfect knowledge. I will include a brief explanation on the historic evolution of the related subjects.

The concept of equilibrium is the most striking and revolutionary advance made by economists during the development of economic science. The concept of equilibrium became the crux of theoretic construction. Nevertheless, the seemingly well-behaving equilibrium, when applied to normal conditions or to an ideal state of the economy--perfect competition--is limiting; it is especially limiting when it is used to analyze a system that lacks the attributes of the ideal state.

In Marshall's scheme, as in that of other modern economists, "equilibrium" connotes "balancing forces" as well as "no inherent tendency to change" (1936:323, 331, 791).

Machlup expressed it more precisely--an equilibrium can be defined as "a constellation of selected interrelated variables so adjusted to one another that no inherent tendency to change prevails in the model which they constitute" (1958:9). In view of Machlup's definition, we can add the following analytic note:
When analysts construct a model, the first step is to select the variables which will be included in the model. Other variables are excluded from the model. Hence, the word "selected" implies that the equilibrium under consideration can only be relevant in the context of a particular set of variables. When the analysts introduce additional variables into the model, the equilibrium pertaining to the initial state obviously no longer applies (Chiang, 1967:38).

Under Marshall's static equilibrium model the chosen variables are: the quantity of good or service q and the price of q. Such a simplifying method is not only widely practiced among economists but also justified on the grounds that the real world from the economic aspect is so complex that to represent it adequately in mathematical form requires drastic simplification, namely an array of rigid assumptions. Yet, Marshall, so concerned with real elements, genuinely feared that economists may neglect essential aspects of reality and so present a grossly distorted picture of actual economic life (Pigou, 1952:115-116).

"Interrelated" implies that equilibrium can be attained if all variables in the model are assumed simultaneously to be in the state of rest. As the usual mathematical procedures require, by solving simultaneously the system of equations, the analysis can find equilibrium values which satisfy the equilibrium, providing the system presented has an equilibrium solution. From the model builder's point of view, this implies that he has to prearrange the system of equations so that the system yields an equilibrium solution. By analogy, the state of rest of each
variable must not only be compatible with that of every other variable in the model but must preclude any change of variable or variables which may trigger new reactions in the model. When this implication is extended to the general system, which encompasses all the markets in the system, this seemingly innocent implication has far-reaching effects.

"Inherent" in an equilibrium means the state of rest is only based on the balancing of internal forces of the model, while external forces are impounded in the ceteris paribus assumption (Chiang, 1967:39). Operationally, it implies that parameters and exogenous variables are treated as constant. Under Marshall's scheme, the variables removed under the ceteris paribus assumption include among others, the Clarkian progressive elements of society, i.e., 1) change of population, 2) accumulation of new capital, 3) progress in technology, 4) improvement in methods of business organization, 5) development of new wants, and 6) the impairment of natural resources or discovery of new natural wealth (J. B. Clark, 1965:Chap. 5; Knight, 1921:144). By removing these progressive elements from the argument, Marshall was able to eliminate the element of uncertainty from his theoretic foundation. Until the emergence of Knight's classic presentation, economists were not able to elucidate systematically this relationship between social progress and uncertainty. At this stage, it may be sufficient to point out that the inclusion of the progressive elements of society inevitably leads to the inclusion of uncertainty.
The lack of uncertainty implies the lack of progressive elements. The lack of progressive elements implies a stationary economy. Further plausible linkage between the state of perfect knowledge and the stationary economy has been shown by Stigler:

Complete, errorless adjustments required full knowledge of all relevant circumstances, which realistically can be possessed only when these circumstances do not change; that is, when the economy is stationary (1957:11-12).

If one wishes to regard "changes" as "progressively equilibrating processes," one must postulate that the economy contemplated is moving toward a stationary state where disequilibrium cannot set in. Knight has shown in "Static and Dynamics" that if changes result from "forces" that move the system toward a condition in which the change will cease, then economic growth will not be maintained by progressive change in the setting itself, instead, disequilibrium reappears as fast as growth removes it (1956:194). Thus it follows, "If progress is a movement toward equilibrium, it must in the nature of the case be a stationary one" (1956:194).

It goes without saying that the inclusion of progressive elements in the theoretic argument leads to the inclusion of uncertainty which inevitably inflicts destructive effects on the very foundation of the static equilibrium model. To support my assertion, I add the following analysis. An equilibrium for a specified model is a situation characterized as a state where forces are balanced and there is a lack of tendency towards change. For this reason the equilibrium analysis is referred to as static. In order to demonstrate that the equilibrium values
obtained from the system indeed possess the attributes of no
tendency to change, one must check the stability condition which
has a logical connection to the dynamic consideration. Marshall
presents an elegant explanation of how an equilibrium shows the
very nature of the lack of tendency to deviate:

When demand and supply are in equilibrium, the amount of the commodity which is being pro-
duced in a unit of time may be called the equilibrium-
amount and the price at which it is being sold may
be called the equilibrium-price.

Such an equilibrium is stable; that is, the
price, if displaced a little from it, will tend to return, as a pendulum oscillates about its lowest point; and it will be found to be a characteristic of stable equilibria that in them the demand price is greater than the supply price for amounts just less than the equilibrium amount, and vice versa. For when the demand price is greater than the supply price, the amount produced, tends to increase. Therefore, if the demand price is greater than the supply price, for amounts just less than an equilibrium amount, then, if the scale of production is temporarily diminished somewhat below that equilibrium amount, it will tend to return; thus the equilibrium is stable for displacements in that direction (1936:345).

In the Walrasian system, the concept of stability condi-
tion is based on price that will adjust in response to excess
demand. More specifically, if at some price quantity demanded
exceeds quantity supplies, price is assumed to rise. Conversely,
if quantity demanded is less than that supplied, price fails. If
the stability condition is satisfied, these rules insure that the
equilibrium will be stable and sustained.

Further discussion on stability condition and its connection with the dynamic consideration will be followed in pp. 106-112.
It is important to recall that this well-accepted scheme is based on the concepts of perfect market and perfect competition. The theoretic concepts of a perfect market and perfect competition are not only based on the assumption of perfect knowledge, but on the assumed property of "reversibility." Reversibility means demand prices or supply prices which causes the forward production movement of a commodity to return to the original level (Marshall, 1936:808). As Machlup pointed out, reversibility can be "regarded as a corollary of the postulate of economic statics, namely, that time is eliminated as a variable and thus time sequences do not affect the results of a process" (1952:187-188). The concept of a demand curve, which, by definition represents the locus of maximum prices obtainable for given quantities (Marshallian) or of maximum quantities saleable at given prices (Walrasian) permits reversible movements along this static curve (Machlup, 1952:188; Blaug, 1968:387-389). Thus, when the factors of improvement in an organization are introduced into the theoretical scheme of static foundation as an essential long-run phenomenon, the principle of reversibility simply

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4 Machlup states the assumption of "reversibility" of all movements along demand curves implies that the net result of an advertising campaign and of a price increase would be the same no matter in what order the two steps were taken. This would be in accord with the postulates of "static analysis" (1952:188). A careful reflection will show that the conventional static equilibrium analysis, based on a perfect market and perfect competition, logically precludes the element of advertisement. A further reflection will show that advertisements which involve not only dynamic consideration, but the existence of imperfect knowledge, simply have no place in a static equilibrium frame of reference.
collapses and so does the essential property of the stability mechanism.

Marshall himself recognizes this fact:

Thus then the list of demand prices which holds for the forward movement of the production of a commodity will seldom hold for the return movement, but will in general require to be raised.

Again, the list of supply prices may have fairly represented the actual fall in the supply price of the thing that takes place when the supply is being increased; but if the demand should fall off, or if for any other reason, the supply should have to be diminished, the supply price would not move back by the course by which it had come, but would take a lower course. The list of supply prices which had held for the forward movement would not hold for the backward movement, but would have to be replaced by a lower schedule. This is true whether the production of the commodity obeys the law of diminishing or increasing return; but it is of special importance in the latter case, because the fact that the production does obey this law, proves that its increase leads to great improvements in organization (1936:807-808).

Moreover, in spite of Marshall's acknowledged contribution to "external economies," the static equilibrium method does not allow any satisfactory treatment of the implications of these "external economies." In Marshall's context, external economies are brought about either by the general development of the industry or the general progress of the industrial environment, that is to say, through the development of auxiliary industries, through the increasing availability of skilled labor, through the development of the means of transportation and communication and through the localization of industry (Blaug, 1968:387). As Blaug pointed out,
This list does not distinguish between ordinary reversible movements along a static curve and historical irreversible shifts in the curves themselves. Technical progress is irreversible and hence is depicted by a shift of the curve, not a movement along it (1968:307-388).

A further difficulty in applying the static equilibrium method arises when we contemplate the theoretical possibility that the factor of external economies may bring about the downward-shifting cost curves of individual firms as the output of an industry expands. This difficulty was recognized by Marshall (1936:805-812). In order to dodge the problem, one must either preclude all dynamic considerations that have no place in a static frame of reference or exclude all dynamic irreversible changes from the theoretical foundation (Blaug, 1968:387-388).

It follows that the elements of improvement in organization inevitably destroy the principle of reversibility which is essential for the existence of the static equilibrium model. Robinson makes a strong statement of how this irreversible supply curve invalidates the very structure of the equilibrium model:

But a long-period supply curve is a very treacherous concept. This, like Marshall's irreversible supply curve, is an example of common sense breaking in and thereby wrecking the logical structure of the equilibrium model (1971:54-55).

Robinson rightly pointed out that the static equilibrium method does not allow any room to take into account the opposite kind of spill-over-effect externality which may arise from consumption of goods:

Economists have not much emphasized the opposite kind of irreversibility--the destruction of resources, the devastation of amenities, and the accumulation of poison in air and water.
Pigou made a great point of "external diseconomies" such as the smoke nuisance but, within the confines of his stationary state, he could not emphasize permanent losses (1971:55).

Therefore, in order to retain the static equilibrium method, we not only have to assume that the economy with which we are dealing is in a stationary state but have to assume that the economy produces only pure private goods which do not create any spill-over effect.

The problem does not end here. If the existing market is known as imperfect and hence shows monopolistic behavior, the concept of a stability condition based on the excess demand function and therefore on the self-adjustment process is inapplicable and inflicts devastating effects on the structure. Hicks states in Value and Capital:

> Yet it has to be recognized that a general abandonment of the assumption of perfect competition, a universal adoption of the assumption of monopoly, must have a very destructive consequence for economic theory under monopoly. The stability conditions become indeterminable and the basis on which economic law can be constructed is therefore shorn away (1957:83-84).

Hick's contention is mainly based on the lack of determinacy in the derivation of monopoly supply function. 5

5 In the short-run model of pure competition, the segment of the marginal cost curve which is above the minimum average variable cost curve is identified as the firm's short-run supply curve. By analytic logic, it follows that, as Figure 1, panel a, indicates, the functional relationships between different prices and the corresponding quantities represent exactly the same relationship which establishes the supply curve. Therefore, from the given information in panel a, the supply curve is derived in panel b.

However, in the short-run model of monopoly, the derivation of monopoly supply involves a tedious process and has a less
Figure 1: Pure (Perfect) Competition
However, the abandonment of the perfectly competitive assumption has a far more serious and devastating impact on the existing microfoundation, whether it is concerned with perfectly competitive or imperfect market structure.

Shackle reached a similar conclusion:

For value theory as an account of the model of allocation of versatile scarce resources in the perfect knowledge economy, is the theory of a perfect competitive economy. The abandonment of the perfectly competitive assumption is part of the abandonment of the perfect knowledge assumption, and its consequences were more far reaching than its authors seem to have dreamed at the outset (1967:10).

precise meaning than the competitive supply curve. First of all, from typical monopoly D, MR and MC curves, which are introduced linearly in Figure 2a, we can establish a relationship between output q and price p using the marginal principle (MR = MC). Now, we obtain a point K which can be used as a source of derivation of supply curve. Before we proceed further, it should be noted, however, that one may be tempted to conclude that the whole segment of P1K is the monopoly supply curve. The temptation of such a conclusion should be rejected because the derivation of supply curve is based on the information of the functional relationship \( P = f(q) \), where a particular value of dependent variable P is uniquely related with a given value of independent variable q.

Unfortunately, under the short-run monopoly, there is no unique relationship between these two variables. The demonstration of such ambiguity follows. As we have done where we drew the competitive supply curve, let us change the demand condition which is represented by shifting the demand curve from \( D_1 \) to \( D_2 \) in Figure 2b). Hence, once using the marginal principle, we obtain another point L. The connection between the two points K and L does not represent a supply curve in that a given quantity is uniquely related with price. Suppose the demand condition changed such that the demand curve had actually moved to \( D_6 \) instead of \( D_2 \), then we could have obtained another point \( L' \) with the given output \( q_2 \). By the same token, we could derive an infinite number of points with the given output \( q_2 \) by shifting demand curves with different slopes and thus the monopoly supply curve has a less precise meaning, if it is not all together meaningless.
Figure 2: Monopoly or Monopolistic Competition
Before we analyze this contention that the stability condition and its working mechanism essentially require the assumption of perfect market and competition, it may be useful to show how the method of static equilibrium ever found its place into the discourse of economic science for the determination of value. We will learn that the originator of the equilibrium model in the modern context is none other than Adam Smith. Using the concept of dynamic stability, Smith expounded elegantly how the actual price converges to the market equilibrium price—the natural price.

In Capital and Interest, Bohm Bawerk suggests that "the market price of freely reproducible goods cannot long be maintained materially higher or materially lower than its cost" (1959:154). He continues, if at any time the price does rise considerably above cost, then the production of the article becomes exceptionally profitable for the entrepreneurs (1959:248). New firms are then attracted into the industry and the market supply curve shifts to the right. The price begins to fall in conformity with the law of supply and demand. When we push this implication further, the theoretical culmination will be the "cost-principle." Bohm Bawerk states this phenomenon as a law: "The market price of goods that are reproducible in any desired quantity tends in the long run to equal the cost of production" (1959:248). The "cost-principle" is revived with added rigor in most modern textbooks under the heading of long-run competition. Ferguson states:
The position of long-run equilibrium is characterized by a "non-profit" situation—the firms have neither a pure profit nor a pure loss, only an accounting profit equal to the rate of return obtainable in other perfectly competitive industries (1972:276).

In spite of the apparent logically sound conclusion of long-run competitive theory, Cassel denounced the "cost-principle" in The Nature and Necessity of Interest as an unattainable illusion:

We know today that what we have called the "cost-principle" can never be realized by Free Competition alone. We know that Free Competition is in many cases impossible and that the classical assumption of free competition throughout the entire economic society is an illusion (1957:76).

Nevertheless, Cassel argues that instead of abandoning the whole scheme as an unattainable illusion, the cost-principle should be regarded as the millennium of the ideal state for every system of prices:

The idea in attaching prices to the factors of production is of course that these prices shall be used in computing the cost of products; and it is implied in what has been said that the prices of the products should be determined by these costs of productions. It is also to be understood that the economy of the society in question is so directed that there is no surplus of unsold articles nor of productive services which cannot find employment. . . . These principles . . . under the name of the "cost principles," are to be regarded in an objective sense, as the ideal for every system of prices (1957:75, emphasis added).

Thereafter, economists simply abandoned the claim that the cost-principle is the logically intact long-run consequence of the real economic system. The cost-principle should be viewed
as a manifestation of economists' moral zeal about how the market system should behave in the ideal state. Cassel suggests:

In an ideal state of things, prices are subject to the following conditions,

(1) Uniformity of prices of commodities,
(2) Equality between these prices and the cost of production,
(3) Uniformity of prices of factors of production, and
(4) Equality between demand and supply.

Now it is concluded that these principles are, generally, sufficient for the complete determination of prices (1957:79).

Before we attempt to answer what conditions are required to insure Cassell's four principles that will guarantee complete determination of prices, we will try to find how the cost-principle developed in economic science.

The answer can be found in Adam Smith's *The Wealth of Nations*. Adam Smith presented the "cost-principle." He defines the meaning of natural price, which is equivalent to the modern long-run equilibrium price:

When the price of any commodity is either more or less than what is sufficient to pay the rent of the land, the wages of the labour, and the profits of the stock employed in raising, preparing, and bringing it to the market, according to their natural rates, the commodity is then sold for what may be called its natural price.

The commodity is then sold precisely for what it is worth... (1937:56).

Smith argues that the actual price at which any commodity is commonly sold could be either above, below, or exactly the same as the natural price (1937:56).
Smith demonstrates how the actual price will converge to the equilibrium-natural price through the continuous processes of competition: "The natural price, therefore, is, as it were, the central price to which the prices of all commodities are continuously gravitating" (1937:58).

It is surprising to find that it was Smith who initiated the concept of stability as the process of continuous gravitation toward the natural-equilibrium price. We readily recognize that Smith's concept of stability belongs to the perfect stability of the first kind. This concept was advanced by Samuelson. We can state an equilibrium position possesses perfect stability of the first kind if from any initial condition all variables approach the limit of their equilibrium values as time becomes infinite, i.e., if:

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6See also Smith's explanation of why the abnormal profit is not likely to be sustained.

When by an increase in the effectual demand, the market price of some particular commodity happens to rise a good deal above the natural price, those who employ their stocks in supplying that market are generally careful to conceal this change. If it was commonly known, their great profit would tempt so many new rivals to employ their stocks in the same way that, the effectual demand being fully supplied, the market price would soon be reduced to the natural price, and perhaps for some time even below it. If the market is at a great distance from the residence of those who supply it, they may sometimes be able to keep the secret for several years together, and may so long enjoy their extraordinary profits without any new rivals. Secrets of this kind, however, it must be acknowledged, can seldom be long kept; and the extraordinary profit can last very little longer than they are kept (1937:60).
$$\lim_{t \to \infty} P_i(t) = P^e_i$$

where $P_i$ represents $n$ variables $(P_1(t), P_2(t), \ldots, P_n(t))$, and $P^e_i$ represents equilibrium values of the variables $(P^e_1, \ldots, P^e_n)$. (Samuelson, 1965:260-262; also Frisch, 1935-1936:100-105).

Alternately, by stability of the first kind, we mean the requirement that the system should return to equilibrium after a small "shock." As we have seen, this concept is equivalent to the mathematical concept of asymptotic stability, i.e., every path starting sufficiently near equilibrium converges to equilibrium as time elapses.

However, Marshall, who had studied molecular physics and mathematics extensively, presents the stability of the first kind and the stability of the second kind as it is found in theoretical physics. Professor Samuelson explained the stability of the second kind:

If one displaces a frictionless pendulum it will oscillate endlessly around the position of stable equilibrium. Its motion is bounded, however, and it never remains on the side of the equilibrium position for more than a finite time interval. Such behavior may be characterized as stability of the second kind or as stability in the second sense (1965:262).

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7 For the stability of the first kind, see my previous quotation on p. 20 or pp. 345-346, in Marshall's Principles (8th ed.); for an account of Marshall's education, read Keynes (1951: Chapter 2 in II, "Alfred Marshall.")
A similar concept on the stability of the second kind appears in Marshall's Principles.

Having then got a compact and definite problem of equilibrium about a center which does indeed move slowly, but the movements of which we have for the time neglected, we next take account of those movements; and thus gradually get a broader view of oscillations about a center which is itself moving and perhaps oscillating in a longer period of time about another center: somewhat as the moon moves around the earth, which itself in a longer period moves round the sun.

But the sun itself is not fixed. It is moving and perhaps with an oscillatory movement about some very distant center. And so while market prices oscillate about a position of market equilibrium which perhaps oscillates about a position of short-period normal equilibrium, that position in its turn may not remain stationary, but may move onwards in one direction, or may oscillate more slowly round a position of long-period normal equilibrium (1890: 418, 1st ed.)

As we have seen from Smith's and Marshall's argument, the problems of stability of equilibrium cannot be discussed without reference to dynamic considerations (Samuelson, 1965:262). For an exposition of the "correspondence principle" advanced by Samuelson in 1947, we may set up a simple static equilibrium model of one commodity for an isolated market along the line of Marshall's paradigm. In Marshall's scheme where the quantity $q$ enters as an independent variable, a distinction must be made, at any given quantity, between demand price $p_d$ and supply price $p_s$.

With the specification of the following assumptions, namely, (1) $p_d$ is a decreasing linear function of $q$, (2) $p_s$ is an increasing linear function of $q$, (3) the market will be in equilibrium if, and only if, excess demand price is zero ($p_d - p_s = 0$), and converting these assumptions into the following three
equations, one equilibrium condition and two behavioral equations, we obtain:

\[ p^d = p^s \]  
**equilibrium condition**

\[ p^d = a - bq \quad (a, b, > 0) \]  
**demand equation** \hspace{1cm} (1.1)

\[ p^s = c + dq \quad (c, d, > 0) \]  
**supply equation**

However, if we equate \( p^d \) and \( p^s \) for the equilibrium condition, we can get \( P = p^d = p^s \), which will enable us to eliminate one variable with one equation and write

\[ P = a - bq \]  
(1.2)

\[ P = c + dq \]

Applying either substitution method or inverse rule for the equilibrium values of quantity \( \bar{q} \) and price \( \bar{p} \) we obtain

\[ \bar{q} = (a - c)/(b + d) \]  
for positive \( \bar{q} \), \( a > c \) \hspace{1cm} (1.3)

\[ \bar{p} = (ad + bc)/(b + d) \]  
(1.4)

Nonetheless, the solutions for equilibrium values from static models do not reveal any information of stability condition since the initial \( q(0) \) and \( p(0) \) are precisely at the equilibrium level of \( \bar{q} \) and \( \bar{p} \). Therefore, for the stability of market, it implies some sort of dynamic consideration. This can be done by imagining a quantity change away from the equilibrium level of \( q \) due to the arbitrary change of one exogenous variable, say, taste (comparative static). It may be useful to remember Samuelson's remark,

*A displacement is equivalent to an arbitrary change in the initial conditions and is possible only if some of our functional equations are momentarily relaxed or if our system is enlarged to include impressed forces or shocks* \( (1965:262) \).
After this change in quantity $q$, if $p^d > p^s$, then the quantity will increase due to the new incentive of net profit. Then, after this change in $q$, if $p^d < p^s$, the quantity will decrease due to profit loss. This is why, if comparative-static analysis is to yield results, we must consider a theory of dynamics (1965:262).

For a dynamic consideration which questions whether the time path $a(t)$ tends to converge to $\bar{q}$ as $t \to \infty$, we could set up a first-order differential equation in $q$. Applying the standard assumption that the rate of change with respect to time at any moment is always directly proportional to the excess demand price $(p^d - p^s)$ prevailing at that moment, we can express as

$$\frac{dq}{dt} = a (p^d - p^s) \quad (a > 0) \quad (1.5)$$

where $a$ represents a constant adjustment coefficient.

In view of the demand price and supply price function in (1.2), we can express as

$$\frac{dq}{dt} = (a - bq - cdq)$$

$$= (a - c) - (b + d)q$$

moreover, since $\bar{q}(b + d) = a - c$

$$\frac{dq}{dt} = a(b + d)\bar{q} - a(b + d)q$$

$$\frac{dq}{dt} + a(b + d)q = a(b + d)\bar{q}$$

which has the solution

$$q(t) = (q(0) - \bar{q})e^{-a(b+d)t} + \bar{q}$$

Since $q(0)$ and $\bar{q}$ are both constant, the key factor will be the exponential expression

$$e^{-a(b+d)t}$$
In consideration of the fact that \( a(b + d) > 0 \) by assumption, that expression does, indeed, tend to zero as \( t \to \infty \), which in turn, will lead the quantity toward equilibrium position. Theoretically, there exist three possibilities:

1. If \( q(0) = \bar{q} \Rightarrow q(t) = \bar{q} \), then the time path of \( \bar{q} \) can be drawn as the vertical line as shown in Figure 3. In this case, dynamic stability consideration is not self-evident since the attainment of equilibrium is immediate.

2. If \( q(0) > \bar{q} \Rightarrow (q(0) - \bar{q}) > 0 \), then the value of \( e^{-a(b + d)t} \) decreases as \( t \to \infty \) and thus the time path will approach the equilibrium level of \( \bar{q} \) from the left as shown in Figure 3.

3. If \( q(0) < \bar{q} \Rightarrow (q(0) - \bar{q}) < 0 \), then the value of \( e^{-a(b + d)t} \) increases as \( t \to \infty \) and thus the time path will approach from the right.

In particular, assume that at time zero, the quantity is \( q(0) \). At this quantity, the excess demand price is \( p^X(0) = (pd(0) - ps(0)) > 0 \); the quantity is therefore increasing, and from the curve \( q(t) \) in the southeast quadrant, we can read that at time 1.

The quantity will have increased to \( q(1) \). At this quantity, the excess demand price is \( p^X(1) = (p^d(1) - p^s(1)) \), which is still positive but in magnitude somewhat smaller than \( p^X(0) \). In this way the quantity will continue to increase until it approaches \( \bar{q} \) which is exactly the equilibrium value of the static model (1.3). As Hansen noted, the stationary solution for the dynamic model thus coincides with the equilibrium solution for
Figure 3: Dynamics of Market Price

static model (1.1). It is in this sense that the dynamic model corresponds to the static model (1.1).

This connection between statics and dynamics, which leads into the "correspondence principle," is essentially based on the laws of physics, and is especially noteworthy because many economists implicitly accepted that the rigorous analysis of stability condition with a given static framework constitutes the heart of economic dynamics. Yet, Knight pointed out the erroneous analogy between the interpretation of economic behavior and the function of machines, namely to equate motive which produces the act with the mechanical force that produces an effect is not warranted. First, the concept of force in mechanics has itself been regarded as metaphysical rather than scientific (1935:241). The crucial difference between human behavior and the function of machines lies in the fact that human behavior has no corresponding effect as accurate as the effect in mechanics is assumed to correspond to the forces that produce it. In other words, "the relation between motive and act," Knight states, "is vitally affected by error absent from mechanical process" (1935:24). This conclusion is based on his incisive observation of the different nature of forces involved in mechanics and human conduct. In mechanics, forces are known and measured by their effect alone. No ambiguity is involved in the information about them (1935:241). Knight contended, in the field of human conduct, motives are not inferred merely from the observation of behavior, but involve a kind of direct knowledge of motivation through the process of social intercommunication (1935:241-242). Thus, the two sources
of knowledge are vitally different. If one attempts to establish an analogy between mechanics and the market structure, perfect competitive theory may fit better than the imperfect market situation where the information contained is not assumed perfect. The theory of perfect competition based on mechanical analogy has serious shortcomings in that it does not allow any meaningful treatment of the role of uncertainty and expectation, the role of entrepreneurs and hence decision theory, the role of money and monetary theory, economic progress, etc. It logically follows that under the given framework of perfect competition, any meaningful treatment of disequilibrium--the state of less than perfect coordination--is impossible.

I will now investigate the broad implications of the assumption of perfect knowledge as an essential requirement of perfect competition and its relationship to the static equilibrium paradigm for the dynamic stability condition.

In order to understand the relationship between perfect knowledge and the static equilibrium model, we need to return to the central theme of economic science, i.e., the determination of value--price.

Schumpeter pointed out, "It is society--and not the individual--which sets a value on things" (1951). Marshall also acknowledged that trading between two transactors in a casual bargain cannot constitute an equilibrium of supply and demand.

In a casual bargain that one person makes with another, as for instance when two backwoodsme
barter a rifle for a canoe, there is seldom anything that can properly be called an equi-
librium of supply and demand (1936:331).
Hence, the determination of value in the numerical sense requires the participation of all individuals. Schumpeter states, "It is evidently true, moreover, that, if value means 'exchange value,' it is, of course, not fixed by any single individual, but only by the action of all" (1951:6). Yet, in order to assure the participation in trade by all transactors in the system, one must guarantee that the prevailing market price is the highest uniform price at which the entire existing stock can be disposed of. In addition, this condition can only be attained if all the conditions for perfect market are rigorously specified (Knight, 1921:84). For the theoretic establishment of a perfect market, perfect knowledge and the lack of uncertainty in the Knightian sense is an essential condition. Without the assumption of perfect knowledge or without incorporating some sort of deus ex machina—the auctioneer—and its role into the argument, the theoretic system cannot prevent the false trading at false prices or withdrawal of transactors from the market which may trigger the cumulative income constrained processes. As examined earlier, Hicks argued that traders at false prices not only create redistributive income effects but produce a certain degree of indeterminateness.\footnote{See a detailed presentation of the argument in Chapter III.}

The significance of trading at false prices and the resulting redistribution of ownership of assets in tatonnement is that a variety of market solutions is possible, rather than a unique solution identical with the mathematical solution. We can
safely conclude that so long as trading at false prices is regarded as essential to real tatonnement in actual markets, whatever equilibrium is arrived at in the competitive market through tatonnement cannot be the same as the equilibrium determined mathematically from a system of equations. Walras and Edgeworth adhered to the view that demand-and-supply analysis ought to be strictly confined to markets that permit "recontract." By "recontract," these authors mean if a transaction was put through at a "false" price, i.e., other than equilibrium price, it should be revised when the equilibrium price is reached. It is strange to see that Hicks rejected the view on an empirical ground: "Since such markets are highly exceptional, their solution of the problem (if it can be called one) was not very convincing" (1957:128).

Clower advanced the more forceful view that it is not false trade at false prices leading to a redistributive income effect which concerns us most, it is the possible withdrawals of traders from the market because of the false price. The theoretic amplification of this phenomenon led to the dynamic cumulative income constraint process (Clower, 1969:270-297; Leijonhufvud, 1968:54-59 and Section II:3). A careful reflection will reveal the static equilibrium model, where dynamic stability has the role of a working mechanism, is based on perfect competition. Once we accept the perfect competitive condition in the Knightian sense, all the disturbing facts will fade away. If the nature of the contemplated market system is such that the competitive condition is not satisfied, the static equilibrium method
is grossly inadequate as the theoretic expository device for the system.

We have seen from Marshall's main theoretic scheme that the static equilibrium is designed to yield a uniform equilibrium price at which the market will clear, and that individual sellers in the market confront a horizontal demand curve.

That price is reached by open-market competition among many buyers and sellers, and is represented by the price at the intersection of the demand supply curves. At that price, there would be no shortages, no surpluses, no queues of waiting buyers or sellers. There would be no sellers' advertisements; no seller would keep inventories awaiting customers (Alchian and Allen, 1972:111).

Such a market is often identified as a "price-takers market" (Scitovsky, 1971:15-16). However, what conditions have to be fulfilled to render the horizontal demand curve for firms? It is often difficult to see the hidden implications in the assumptions of the static setting. Hayek pointed out, "competition is, by its nature, a dynamic process whose essential characteristics are assumed away by the assumptions underlying static analysis" (1948:94).

Scitovsky supplies valuable insights into the implication of static equilibrium analysis. The hidden characteristic of the static setting is that the competition should restrict drastically the scope for bargaining (1971:16). This implies that confronted by a raised price, buyers should be able to withdraw all their customers from the seller. To be able to withdraw from a seller without any inconvenience, there must exist sellers who offer for sale sufficiently large quantities of some homogenous
good. However, if the seller withheld all his supply from the market, it should have no effect on market price, namely, that the seller supplies only insignificantly small quantities of the good. It logically follows that for buyers to be able to remove all their customers from the seller in response to even the smallest price rise, all the buyers would possess complete knowledge of the existence of all their alternative sources. This implication forces us to adopt the assumption of perfect knowledge as the essential structural premise of the perfect market. Knight consolidates the implications for perfect knowledge of uniform prices in a perfect market: "In the basic 'economic law' of uniform price in a market, the assumption is perfect knowledge of conditions on the part of all economic subjects" (Knight, 1956:183). The possession of complete knowledge of all the alternative sources is not sufficient to yield a uniform equilibrium price or quantity. The implication underlying the "price-takers market" is that neither party can influence the price; and both would regard price as given to them (Scitovsky, 1971:15). This implication yields an interesting insight. If both parties are price takers, then, as Arrow pointed out, "there is actually no one left over whose job it is to make a decision on price" (1955:43). In order to retain the structure of a price taker's market--perfect competition--it is logically necessary to introduce a third party into the scheme, some kind of deus ex machina:
We can just as well give up on the idea of achieving a sensible market theory just by arming the demanders and suppliers with, respectively, a demand curve, and a supply curve—and then let them loose on each other. If we nevertheless want to stick to the two curves as a practically feasible description of the behavior of demanders and suppliers, we will evidently need to introduce a third party into the game, some sort of Deus ex machina (Haavelmo, 1974:33).

Therefore, to retain the static equilibrium apparatus of the demand-supply cross as the expository device of competitive market structure, economists have to resort to some sort of deus ex machina. The role vested in the deus ex machina is to inform traders of all the facts needed to establish the perfect coordination of the activities of all traders in the market, and on the basis of these facts, to render a uniquely determinate solution—equilibrium price and quantity. Hayek hypothetically identifies the deus ex machina as a single mind—the observing economist—in his "The Use of Knowledge in Society":

...if they (all the facts) were known to a single mind (as we hypothetically assume them to be given to the observing economist)...(it) would uniquely determine the solution... (1948: 91).

It may suffice here that the static equilibrium method of the demand-supply cross, which yields a uniform price, assumes the role of deus ex machina. It follows that with proper recognition of the deus ex machina all the existing powerful theorems derived from the perfect competitive conditions consequently reinstate the meaning of their existence.

As Hayek lamented, by incorporating the role of the deus ex machina (or a single mind) into the theoretic scheme,
economists assumed away all the important things in the real world and solved nothing:

To assume all the knowledge to be given to a single mind in the same manner in which we assume it to be given to us as the explaining economists is to assume the problem away and to disregard everything that is important and significant in the real world. . . . Any approach, such as that of much of mathematical economics with its simultaneous equation, which in effect start from the assumption that people's knowledge corresponds with the objective facts of the situation, systematically leaves out what is our main task to explain (1948:91).

It will be obvious also that nothing is solved when we assume everybody to know everything and that the real problem is rather how it can be brought about that as much of the available knowledge as possible is used (1948:45).

Not only is nothing solved when we assume everybody to know everything, but theorems derived from assumptions of competitive conditions are simply tautological, i.e., not subject to refutation, not operational. In a close scrutiny of a perfect market, "each commodity will command a definite price, which is the highest uniform price at which the entire existing stock can be disposed of (including taking out of the market by present owners)" (Knight, 1921:84). The statement implies that if trade is carried on at this price, the market will not only be cleared but also prevent any occurrence of false trade. In a perfect market the highest uniform price and its corresponding quantity not only represent equilibrium price and quantity in a universal sense, but aided by the marginal revolution and utility theory (advanced by Menger, Walras and Jevons in the 1870s), signifies the conditions for an optimum allocation of income, i.e., at the
utility-maximizing point each good should yield the same marginal utility per dollar spent on that good.

Everyone has his marginal utility for each commodity; and for everyone, if equilibrium is to be attained, it must be true that for the commodities to which they relate prices must express the ratios between his marginal utilities, and that price must have the same proportion to each other as everyone's marginal utilities for the same commodities (Schumpeter, 1951:17).

The result of individual utility maximization can be obtained from the Lagrangian expression that describes a mathematical condition known as the first order condition of the constrained maximization (Samuelson, 1965:60, 350): The condition obviously has a logical connection to the production sector and to the condition of general equilibrium. 9

9 In a widely practiced classroom exercise, the allocation of resources and the output level under conditions of pure competition in both product and resource markets will be optimum and will maximize welfare. In such a system, the price system will bring about an output combination for any two products X and Y at which

\[ MRT_{xy} = MRS_{xy}. \]

When firms of industry x are using two resources, A and B, the profit will be maximized if the following conditions are met by each firm in this industry:

\[ \frac{MP_{ax}}{p_a} = \frac{MP_{bx}}{p_b} = \frac{1}{MC_x} = \frac{1}{p_x} \]

since \( MP_{ax} \cdot p_x = p_a \), or \( \frac{MP_{ax}}{p_a} = \frac{1}{p_x} \),

and \( \frac{MP_{ax}}{p_a} \) and \( \frac{MP_{bx}}{p_b} \) are the same as \( 1/MC_x \) where \( MC_x = p_x \).
Similarly, for firms in industry y:

\[
\frac{MP_{ay}}{p_a} = \frac{MP_{by}}{p_b} = \frac{1}{MC} = \frac{1}{P_y}
\]

The MRT_{xy} represent the measure of the amount of Y that must be given up by the economy to produce an alternate unit of X which is commonly expressed as Y/X. Since the pure competition assures efficient utilization of resources in the production of both X and Y, the cost of giving up y of Y must equal the cost of adding x of X to the economy's output, that is to say:

\[yMC_y = x \cdot MC_x\]

and

\[\frac{Y}{X} = \frac{MC_x}{MC_y}\]

Since the price system leads to a product output combination at which:

\[MC_y = P_y \text{ and } C_y = P_y\]

and hence MRT_{xy} = Y/X = MU_x/MU_y = P_x/P_y.

In turn, in the exchange sector, the price system induces consumers to establish a price ratio for the supplies of any two goods, X and Y, such that for each consumer

\[MRS_{xy} = Y/X = Y/X = MU_x/MU_y = P_x/P_y\]

In turn, these prices will bring about an allocation of resources between the two goods such that

\[MC_x = P_x \text{ and } MC_y = P_y\]

and hence \[MC_x/MC_y = P_x/P_y\]

The ratio MC_x/MC_y is the measure of MRT_{xy}. Therefore the price system leads to general equilibrium outputs of X and Y such that:

\[MRS_{xy} = Y/X = MU_x/MU_y = P_x/P_y = MC_x/MC_y = MP_{ax}/MP_{bx} = MP_{ay}/MP_{by} = MRT_{xy}\]

In short, MRS_{xy} = MRT_{xy}.

This condition for general equilibrium is also the condition for a set of optimum outputs of X and Y.
Most theorems, derived from the competitive market theory, delimit by their nature the tautologic propositions of economic analysis. Because of the methodologic limitation of static equilibrium analysis, the description of competitive equilibrium confines itself to defining the conditions in which their conclusions are implicitly contained in the system; the description does not even attempt to explain how the state of equilibrium was ever brought about (Hayek, 1948:94). A more severe criticism of the competitive equilibrium paradigm in connection with "marginalism" has come from Sweezy in his remarks at MIT in 1969:

I think economics by the time of what may be called the "marginalist revolution" if the 1870s had already practically ceased to be science and become mainly an apologetic ideology. Putting harmony, equilibrium, and graduation at the center of the state was dictated not by the scientific requirement of fidelity to reality, but by the bourgeois need to prettify and justify a system which was anything but harmonious, equilibrated, and gradualistic (1974:21).

Therefore, within the framework of the static equilibrium apparatus, it is impossible to deal systematically with real entities; money, uncertainty, expectation, the role of entrepreneur, social progress, and especially the disequilibrium phenomena.

We may now contend that within the framework of the static equilibrium apparatus, it is impossible to deal systematically with many important concepts of real economic life.

The theory of perfect market is based on the assumption of perfect knowledge with an implicit recognition of the presence of the deus ex machina. The possession of perfect knowledge of
the market situation by every individual transacting in the system is, logically, tantamount to a situation completely lacking uncertainty (Knight, 1921:267).

In such a world, Knight said, "The flow of raw materials and productive services through productive processes to the consumer would be entirely automatic," since there would be "no occasion for anything of the nature of responsible management or control of productive activity." (1921).

There might be managers, superintendents, etc., for the purpose of coordinating the activities of individuals, but, under conditions of perfect knowledge and certainty, such functionaries would be laborers merely performing a routine function of engaging in mechanical operations without responsibility to any sort of level (Knight, 1921:267-268).

Schumpeter expressed a similar view. In the stationary state where methods of production are assumed to reach a state of perfection, entrepreneurs find no role to play: "Capitalism, being essentially an evolutionary process, would become atrophic. There would be nothing left for entrepreneurs to do." (1950:131).

Kirzner makes the contention that...

10 Kirzner makes the contention that

...in equilibrium there is no room for the entrepreneur. When the decision of all market participants dovetails completely, so that each plan correctly assumes the corresponding plans of the other participants and no possibility exists for any alternate plans that would be simultaneously preferred by the relevant participants, there is nothing left for the entrepreneur to do (1973:26).
Knight argues that profits are the exclusive result of dynamic change; hence, without change, there will be no profit (1921:367). If the change takes place uniformly according to the predesignated rule or in accordance with any known mathematical function of time, the future may be foreknown as accurately as if there were no change (1921:315). In other words, if everything moved along in an absolutely uniform way, as Knight put it, the future would be completely foreknown in the present and competition would certainly adjust things to the ideal state where all prices would equal costs; hence profit will have to be zero (1921:37). Change is a necessary condition of one being ignorant of the future, as Knight put it, "that has given rise to the error that change is the cause of profit" (1921:37).

Hence, in particular, changes, if foreseeable, do not disturb the prerequisite of perfect competition for productive services, bringing about exact equivalence between costs and values, with absence of profit (Knight, 1921:148).

In order to yield profit, the system must contain dynamic change; and for the dynamic changes to occur, the individual agents in the system must be lacking foreknowledge of the future. In such a world, not only is future unknown but individual agent's action is subject to fallibility.

The meaning of "fallibility" is only apparent if we consider that each producer or transactor must decide what quantity and quality of output to produce and offer at what price under the state of imperfect knowledge. In such a world, where uncertainty and frictions are present, "it is the product generally anticipated in the market," which may not be the same
as that subsequently realized (Knight, 1921:166-167). Or, as Shackle put it:

Now, when instead of an equilibrium model, we suppose one where each producer must decide what size of output to produce and offer, of his own kind of product, on the basis of his mere conjecture of the demand curve facing him, there is nothing to ensure that the revenue (price times output) resulting from this offer will be, in the event, the amount which his decision assumed (1967:90-91).

Brunner argued, under standard choice theory the individual transactor with given endowment and preference confronts fully known prices and perfect information about the quality of goods and where exchange involves a costless transaction at fully known prices and hence no adjustment problems, money simply has no role to play (1971:7-8). In a strict sense, the classic state contains no real money (Brunner, 1971:20; Shackle, 1967:93). Money, which is a small subset of transaction-dominating assets, Brunner pointed out, "results from the economic agents'" innovational response to the operation of information and adjustment costs. In the absence of such costs, not only will there be no incentive to generate a subset of transaction-dominating assets--money--but exchange can be arranged in random direction at zero costs (1971:20).

Shackle expressed a similar view:

Money, indeed, has no existence in such an equilibrium model as we have defined, for it is only when all the choices embraced by the model are made simultaneously in a unique moment lacking any subsequent history, that each choice can be made in complete knowledge of all the other choices. Money being ultimately valued only because it can be exchanged for something useful
in itself, something wanted for its own sake, would not be acceptable if no further opportunity of exchange were going to be available (1967:93).

Only when we recognize "frictions" and "uncertainty" of market conditions and qualities which arise from imperfect knowledge of individual transactions, does money, which is liquid and a means of deferring decision, have a real meaning. It offers to individual agents a genuine opportunity of choice from a vast array of possible arrangements including the postponement of a transaction with a monetary withdrawal from the market. In this regard, the real meaning of money should be understood in connection with uncertainty and imperfect markets. In an imperfect market where uncertainty is present and information contained is not complete, money in its social sense is a means of communication and thus an individual agent's decision necessarily carries valuable information. By contrast, in a popularized standard "income-expenditure theory with money," i.e., IS and LM, where all the schedules are presented by equilibrium locus and where the final equilibrium is presented by interlocing the IS and LM curves, disequilibrium possibility is not only completely ruled out, but money exists only as a veil. In such a system, the real characteristics of money cannot properly be understood. It may be useful to remember Schmolder's argument that

If indeed, as we hypothesized, money's role is that of a communication symbol, then we must watch its actual performance in its natural environment and not be satisfied with speculations about its maximum performance in an ideal monetary system; we must try to understand how millions of individual decisions cause the figures of our bank statistics to swell or dwindle (1969:203).
It goes without saying that with the rigid adherence to the equilibrium model, not only is the essence of money reduced to a unit of account but the general overproduction-disequilibrium phenomenon, as Myrdal stated, is impossible ex hypothesi, and this presents a serious impediment in dealing with real problems.

The equilibrium theory of relative prices contains, as is well known, the theorem that the supply of every commodity is in itself demand for all other commodities. General overproduction, therefore, is impossible, ex hypothesi. This theorem, which has been taken over from the oldest classics and which is in itself only one part of the isolation premise we have just dealt with, has often caused economic theorists to overlook difficulties which accompany practical problems (1939: 17).

Shackle argued that the cognizance of the presence of money in a real sense implies the presence of uncertainty, and in turn, the inclusion of uncertainty in a theoretic scheme inflicts inevitably a destructive effect on the very foundation of equilibrium analysis. This is because in the imperfect market situation where transmission of information is not complete, one's decision to defer decision undoubtedly will affect future events.

Money's presence, when that presence is part of the theoretical essence of a model, implies the presence also of uncertainty which is expressly alien to the meaning of equilibrium; for money is a means of deferring decision, and decisions which are deferred cannot be known by anyone, yet are going to offset future situations and events. Money's presence destroys Say's Law of the identical equality of total demand and total supply of all current products taken together (Shackle, 1967:43).

In a perfect market situation, transmission of information is virtually automatic and hence the possibility of
communication failure which might arise in an imperfect market situation owing to the decision to defer, is essentially ruled out by the specification of premises. However, when we deal with an imperfect market, there is no universal assurance that one's decision to defer by wielding a means of deferring decision, money, will accurately be known to others and the communication failure is quite possible. Shackle pointed out that decisions which are deferred are, in effect, non-neutral and inflict a deadly blow to the classic mode of thinking--Say's Law. It is consistent to argue that in the perfect theoretic scheme--the general equilibrium system where the elements of uncertainty and frictions are completely absent--one cannot hope to find the real entity of money. In such a world, money can only exist as a unit of account and the system is reduced to a virtual barter economy. One cannot introduce money into a barter economy without destroying the essential condition of equality, if the introduction of money necessitates the recognition of uncertainty.

The essential argument here is that if an imperfect market results from the possession of imperfect knowledge by individual agents in the system, then it necessitates the proper incorporation of uncertainty and money into the theoretic consideration. On the one hand, the presence of uncertainty and money in a theoretic scheme makes it impossible to deal with the problem within the static equilibrium apparatus; on the other, within the confinement of static equilibrium analysis, there is no way to deal properly with most of the important concepts--growth, entrepreneurial decision, money, uncertainty,
disequilibrium, etc. The conflict here is self-revealing and insurmountable. Marshall, who wanted to discuss growth, was too intimidated by the rigid restrictiveness of static equilibrium analysis to deal with growth and had to confess the shortcoming:

In fact we are here verging on the high theme of economic progress; and here therefore it is especially needful to remember that economic problems are imperfectly presented when they are treated as problems of statical equilibrium, and not of organic growth (1936:461).

It might be useful to remember Knight's statement:

"Static conditions include finally static technology and knowledge in general, and this is one of the most treacherous concepts of all as a subject for scientific discourse" (1921:172).

The recent article by Clower and Leijonhufvud raises a similar objection:

The question posed by Keynes remains unanswered simply because of the continued failure of economists to provide a coherent account of the manner in which the production, consumption and trading activities of individual economic agents are coordinated in theoretical economic systems that bear a family resemblance to economies of actual record (1974:1).

Perhaps, the essential question not raised by economists is how can any system, which recognizes the auctioneer who possesses omniscience and provides continuous and costless information to all traders, ever go wrong? It is high time to eliminate altogether the auctioneer and introduce imperfect markets where individual transactors engage in trading on an individual basis. I must warn the readers that elimination of the auctioneer and the competitive assumption of the existing orthodoxy may create an enormous vacuum we need to fill with
proper clarification and modification of concepts such as time, uncertainty, expectations, and information structure.

Only consideration of the relevant concepts allow us to cross the threshold of economic dynamics where uncertainty expectation, entrepreneurial decision, and time play their proper role.
CHAPTER V

PERFECT VS IMPERFECT MARKET

The orthodox concepts of market structure fail to distinguish between the decision-making and information-disseminating processes because for the past two centuries the theory of value, the determination of price in markets, has been the economists' overriding concern. The concept of uniform prices assumes certain premises: perfect information, perfect price flexibility and completely rational behavior by buyers (price searchers) and sellers (price makers). Given these premises, all transactions become passive events. The unrealistic nature of this historic economic model eliminates the role of uncertainty in decision making by transforming the market into a world of equivalent certainty. The theory of monopolistic competition by Chamberlin and Robinson, which supposedly represents the imperfect market situation, leaves the dilemma of the historic model unexplored. Frequent methodologic criticisms of the theory of monopolistic competition shows there are too few variables to make it a realistic theory and that it ignores uncertainty and decision making. The structural premise of the traditional market can never be satisfied by real conditions because it posits the artificial phenomenon of the determination of price in imaginary market situations. It was Keynes who
planted the seed of skepticism by challenging the erroneous orthodox methodologic choice. Most serious modern work regarding the theory of imperfect market is indebted to Keynes.

We will examine the different characteristics of the perfect and imperfect markets. The distinction between these market structures cannot be overemphasized if we want to understand the implications of the actual behavior of the economic system in which we live. In the course of our examination we explore the related concepts of uncertainty and expectations, time element, decision making, dynamics vs statics, and equilibrium.

Leijonhufvud pointed out that Keynes, in his General Theory, has simply removed from the foundation of classic theory the Walrasian auctioneer who was assumed to provide, instantaneously and without charge, all information needed for the perfect coordination of all the traders in the system (1970a:216); not many economists understood its implication. If modern economists had recognized that the foundation of classic economics is based on the ingenious device of automatic adjustment, the recontractation process which is only possible under the explicit recognition of the deus ex machina—the auctioneer—they would not have so easily dismissed its implication.

Hicks confirms the usage of "recontract" by classic writers:

Earlier writers, such as Walras and Edgeworth, had therefore supposed that demand-and-supply analysis ought strictly to be confined to such markets as permitted of "recontract"; i.e., markets
such that if a transaction was put through at a "false" price (we shall find it convenient to have a term to mark prices other than the equilibrium price), it could be revised when the equilibrium price was reached (1957:128).

The Marshallian model still assumes perfect knowledge and adopts excess demand functions as the self-adjusting mechanism for attaining partial equilibrium; its reverse ranking of price and quantity adjustment velocities is not a clear departure from the dominant classic mentality of the automatic adjustment mechanism--recontract tatonnement. ¹

Hick's recognition of "false trading" and hence of "income effect" was a step in the right direction. However, Clower has shown that in a disequilibrium analysis under the imperfect information assumption the "income effect," the result of "false trading" at "false price," is not the significant variable. It is probable withdrawal of individual transactors from the market which may set into motion a cumulative income constraint process (1969:279-284; Leijonhufvud, 1968:55). The orthodox classic system is not only alien to such a disequilibrium analysis but cannot meaningfully explain this important concept. As the subsequent examination will reveal, the restoration of the imperfect market, after removal of the auctioneer--the deus ex machina--from the foundation of classic economics, necessitates the analysis of imperfect market behavior and the reformulation of our analytic apparatus.

¹For a detailed analysis of Marshall's Economics, see Chapter IV.
If we develop a theory of the imperfect market, we need to abandon the postulates of the perfect market. Boulding was the first to distinguish between their information structures (1961:81-96; 1952:35-44). In a perfect market, the only information necessary for economic behavior is the knowledge of the price of the commodity which is assumed to be provided by the auctioneer--the deus ex machina. About the nature of information in the Marshallian economic theory, Cooper makes this observation:

Under the Marshallian and later versions of this theory, the entrepreneur is regarded as operating directly on (more or less) "will-less" factors of production. No method of communication is specified. The "factors" are assumed to know immediately what is expected of them and to adjust themselves. . . the entrepreneur is assumed to know instantly what is being done and how he should respond in the face of market criteria. Misinformation, conflict of information, and lack of information are absent (1951:90).

It follows that in such a competitive market, price is completely known and an individual economic agent can buy or sell as much as he likes of the commodity at the equilibrium price within his financial resources. "The whole range of alternatives open to him in exchange," Boulding points out, "is given by the simple information contained in the price of the commodity and, of course, in his own financial resources" (1961:85). In contrast, the individual economic agent in an imperfect market confronts the market demand curve for his product which is assumed to be negatively sloped by the first fundamental law of demand and thus the information required of the market for economic behavior is an entire schedule, relating the price of the commodity to the amount which can be bought or sold.
(Boulding, 1961:85). Unlike in the perfect market where price is perfectly known, in the imperfect market, the function relating prices and quantity is nowhere to be observed. What can be observed in the imperfect market are the prices and corresponding quantities which have prevailed in exchanges in the past and which are currently prevailing (Boulding, 1961:85). The prices and quantities which prevailed in the past may yield useful information regarding the nature of the price-quantity function, providing the function has remained stable. If stability means the lack of uncertainty, then, the information regarding the nature of price and quantity revealed in the transactions of the past and the present may support the conventional monopolistic competitive theory advanced by Chamberlin and Robinson, providing we are willing to tolerate some heroic assumptions, i.e., the independence between the price and output policies of the firms, diminishing return to scale (or increasing marginal cost function), the lack of external economies, etc.² Under structural premises where the system is assimilated to the stationary state economy, the analyst may be warranted in treating the problems as if the sellers in the market confront completely known demand curves. With this model, through conceptual experiment, we can reduce the theory of the imperfect market to the static

²Even with these assumptions, the Chamberlin-Robinson version of the theory has a serious deficiency since it contains far less realistic variables and it provides no systematic treatment of liquidity problems, cash budget, financial status, and investment program. See K. Boulding (1952 and 1950).
equilibrium analysis where marginalism plays the deterministic role, and yields the familiar theoretic results: uniform price and zero long-run profit. The problem here is that in a dynamic society where the element of uncertainty generates social progress, the function between prices and quantities is rarely stable, and thus, past experience may give misleading information regarding the potentialities of the present (Boulding, 1961:85). From a dynamic perspective, the prices and quantities that have prevailed in past exchanges are the outcome of particular policy actions in the form of price, quantity, quality and advertisement. We should not forget that the individual entrepreneur always has the option of revising his policies if the outcome was not what he expected. The entrepreneur can achieve his objective by adjusting not only price (Walrasian) and quantity (Marshallian) but quality and advertisement. Such decisions and their effect cannot be dealt with by the conventional static framework of equilibrium analysis which allows only passive events but no purposive decision and where marginalism reigns supreme.

As Knight has illustrated in Risk, Uncertainty, and Profit, the neo-classic theory of value which is essentially equilibrium economics is based on eleven meticulously chosen assumptions. However, Knight's core assumptions are nos. 5 and 9

Machlup also presents an excellent analysis of the conditions for the perfect market:

Concept A. A perfect market is one that secures (i) uniformity and (ii) flexibility of price.
Concept B. A perfect market is one that secures prompt attainment of equilibrium of supply and demand, so that effective
which deal with information and knowledge, respectively. He explains the meaning of assumption no. 5:

There must be perfect, continuous, costless intercommunication between all individual members of society. Every potential buyer of a good constantly knows and chooses among the offers of all potential sellers, and conversely (1921:78).

It should be understood that the removal of the auctioneer—the deus ex machina—makes obtaining information not only time consuming (dynamic) but costly (positive transaction cost). Coase states:

In order to carry out a market transaction it is necessary to discover who it is that one wishes to deal with, to inform people that one wishes to deal and on what terms, to conduct negotiations leading up to the bargain, to draw up the contract, to undertake the inspection needed to make sure that the terms of the contract are being observed, and so on. These operations are extremely costly (1960:15).

Supply will be completely cleared and no effective demand will be left unsatisfied.

Concept C. A perfect market is one in which three institutional conditions are fulfilled: (i) knowledge, (ii) accessibility, and (iii) absence of restriction. Expressed in briefest form, (i) all buyers and sellers have complete knowledge of prices and price offers, (ii) every buyer may buy from any seller, and every seller may sell to any buyer as to the prices which they may accept or as to quantities for which they may contract.

Concept D. A perfect market is one in which the three basic requirements are satisfied, and, in addition, no individual seller or buyer is big enough to exert any perceptible influence upon the market, i.e., upon other sellers or buyers.

Concept E. A perfect market is one in which all conditions of Concepts C and D are fulfilled, and, in addition, every individual seller or buyer acts on the assumption that he can sell or buy at the market price any quantity he cares to sell or buy.

In Machlup's sense, imperfect market implies a breakdown of one or all of the above conditions (1952:116-118).
The failure to incorporate transaction costs into the analysis limits microeconomics—whether it deals with pure monopoly, monopolistic competition or oligopoly—to analysis of the highly abstract, functionless phenomena of static equilibrium in terms of price and quantity. In so doing, the economist takes over the role of the Walrasian auctioneer and assumes the universal costless availability of perfect knowledge. Elimination of assumption no. 5 and hence the recognition of positive transaction costs, removes, via a chain reaction, other assumptions such as perfect mobility (no. 4), rationality (no. 2), and especially perfect knowledge (no. 9), which is the prerequisite for perfect competition and a corollary to the assumption of rationality.

Furthermore, for the imperfect market, where knowledge is not assumed to be perfect, the traditional definition of market needs to be reinforced. Lachman defines the meaning of the imperfect market:

"Market," in the true economic sense, means a process of exchange and allocation reflecting the transmission of knowledge (1956:28).

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4 In Thompson's thorough definition of transaction cost, the recognition of these costs inevitably leads to the recognition of "externality" or "spill-over effects" (1973).

5 The reader may compare the new concept of market with the definition of market offered by Marshall:

The central point of a market is the public exchange, mart or auction rooms, where the traders agree to meet and transact business. The traders may be spread over a whole town, or region of country, and yet make a market if they are by means of fairs,
If the concept "market" entails the attributes of transmission of information and knowledge in the process of exchange and allocation, the entity called a firm in such a system has to possess a mechanism by which it can properly receive and process the information generated. Without such a mechanism, it is impossible for firms to make coherent decisions from a proper assessment of information. The proper recognition of the decision-making process is the most important attribute of the imperfect market as distinguished from the perfect market. The recognition of the decision-making process in the imperfect market is only now beginning. The transformation from the concept of perfect to the concept of imperfect market, however, deserves further scrutiny. Below, I will examine the related concepts and to render a better understanding of the nature of heterogeneous market structures--the perfect market versus the imperfect market--and perhaps contribute toward a satisfactory theory of the imperfect market.

Time

The time concept used in classic analysis of the competitive market structure is essentially different from the concept of meeting, publishing price lists, the post office, otherwise in close communication with each other (1936:325).
of real time as used for the imperfect market; a fact that largely escaped the attention of economists. 6

I have discussed in detail the nature of the usage of "time" in modern orthodoxy, including classic economics in Chapter III and IV. However, a summary of the argument about the nature of time in the existing orthodoxy may be in order. Modern economic theories emanated from the application of the static equilibrium apparatus in which marginalism reigns supreme, and in which finding and assessing presumed values of equilibrium became the dominant task of conceptual experiment. The static equilibrium method is based on mechanical analogy, and the justification of applying the static apparatus to economic science rests upon the assumption that human behavior in the real market is more or less identical to the function of a machine, that human behavior essentially obeys the "laws of physics." It follows that the notion of equilibrium used in the economic context has the identical meaning as that used in physics, i.e., balancing forces; Samuelson has shown in Foundation of Economic Analysis that a stable equilibrium system, no matter how rudimentary it may be, requires dynamic consideration because it rests on the ability to return to the equilibrium position after displacement (1965:262). To test the condition of stability of equilibrium

6 Concerning partial knowledge, Knight states: "The essence of the situation is action according to opinion, of greater or less foundation and value, neither entire ignorance nor complete and perfect information, but partial knowledge" (1921:199).
requires a comparative static exercise known as the "correspondence principle" (Samuelson, 1965). 7

Knight rejected the assumed analogies between human behavior and the function of mechanics:

Economic literature includes no treatment of the relations between measured force, resistance, and movement. What it calls dynamics should be called evolutionary or historical economics. Mechanics, conversely, has no place for evolutionary categories; it assumes constancy in its ultimates, believing (until recently) that mass and energy are "really neither created nor destroyed." In any case the general properties of materials are unchanged in mechanical transformation (1956:184-185).

If we attach any meaning to the notion of equilibrium it is necessary to include the element of time. Hayek states:

... Since equilibrium is a relationship between actions, and since the actions of one person must necessarily take place successively in time, it is obvious that the passage of time is essential to give the concept of equilibrium any meaning. This deserves mention, since many economists appear to have been unable to find a place for time in equilibrium analysis and consequently have suggested that equilibrium must be conceived as timeless. This seems to me to be a meaningless statement (1948:36-37). 8

The meaning of dynamic action in connection with equilibrium is less apparent in the economic system in which all agents are assumed to possess universal knowledge about all things. Further scrutiny will show that with the assumption of

7 For a discussion of the correspondence principle, see Chapter IV and especially pp. 106-112.

8 Hayek uses the notion of equilibrium in the context of mutual compatibility of plans and individuals (1941:33-56; 1948).
perfect knowledge, such an economic system can be reduced to the static state. The dynamic element only enters a conceptual experiment, i.e., the explaining analyst sets up the static equilibrium model with preconceived determination of equilibrium value or values and then, through experiment, shows how a displaced value converges toward equilibrium, calling it dynamics.

I am prepared to argue that economists were not only unable to distinguish between the usages of time in physics and psychology but committed to the error of borrowing and applying the time of physics to economic analysis without examining the implications. As a consequence, economists produced totally mechanistic and unrealistic theories. Extensive analysis and documentation of evidence requires considerable space and cannot be done here. However, it may suffice to glance at the implication by the following argument of a few distinguished scientists. Macrae claims that time in Newtonian cosmology is not only symmetrical and reversible, but carries as an essential element the presupposition of knowledge of the past as well as the future (1951:136). In addition, Macrae states:

In the Newtonian world we ought to know the immediate future at least as well as we know the immediate past, from our evidence of the past (1951:136).

For those economists who are suspicious of my argument, further documentation may be useful. Bradley gives a forceful illustration of Mach's philosophy:
In order to validate his system of dynamics Newton requires "absolute, true and mathematical time" flowing "uniformly on, without regard to anything external," together with "absolute space" which "always remains similar and immovable" (1971:96).

Regarding mathematical time, Knight makes this observation: "If the change takes place uniformly, or in accordance with mathematical function of time, the future may be foreknown as accurately as if there were no change" (1921:277). This is a remarkable definition of the relationship between the structural premise of perfect knowledge and the static equilibrium scheme.

Economists who are familiar with the structural foundation of microeconomics may be surprised at the similarity of passages describing the assumptions underlying perfect competition.

In modern texts of microeconomics the characteristics of perfect knowledge are:

In its fullest sense, perfect knowledge requires complete knowledge of the future as well as the present. In the absence of this omniscience, perfect competition cannot prevail (Ferguson, 1972: 252).

and in another textbook:

... perfect competition requires that all of these economic decision-making units have an accurate knowledge of the future together with the past and the present (Mansfield, 1970:244).

Unlike economists, phenomenologists have long been able to describe the difference between the characteristics of "physical" and "psychological" time. Whiteman makes such a distinction:

They exist either as subjective "psychological" reactions of the individual (impressions of duration rate of time flow, attention to the present, memory,
thought of the future, etc.) or else as an abstract mathematically represented background to changing measures, when the measures in some specially provided apparatus change regularly, the "regularity" being tested indirectly by other measurements found by the use of certain other pieces of apparatus and workable theories concerning them. In the first of these cases we have what I shall call the psychological view of time, and in the second, what I shall call the "physical view of time" (1967:291).

In view of the distinction between the behavior of man and the function of a machine, Knight's authoritative view may help consolidate my point of view:

For the behavior of man also expresses his freedom of will--to which there is no counterpart in the physical world. Hence "fully determined" or "perfectly rational" human behavior is no behavior at all: for such behavior is entirely mechanistic, leaving no place for free choice on the part of the individual....We can not transfer the laws of the physical sciences to where human beings are concerned (Patinkin, 1973:790).

Whenever economists confronted the difficulty of dealing with the time element, they dodged it either by eliminating time or adopting the "ceteris paribus" assumption. Readers familiar with the Walrasian "element of pure economics" will recall the passages that deal with the time element. In the fourth edition, Walras states:

There is still another complication. Production, however, requires a certain lapse of time. We shall resolve the second difficulty purely and simply by ignoring the time element at this point (1874-1875: 242, 4th edition).

Marshall deals more subtly with the time element. He acknowledges the importance as well as the difficulty of dealing with the time element in economics: "The first which we have to consider arises from the element of time, the source of many of
the greatest difficulties in economics" (1936:109). Unfortunately, Marshall dodged this difficulty by adopting ceteris paribus assumptions, and hence set the course of economic thinking to move toward statics. Marshall states, "This difficulty of time is resolved by adaptation of the ceteris paribus assumption--other things being equal" (1936:109).

Marshall consolidates his model:

It is assumed that the general circumstances of the market remained unchanged throughout this period, that there is, for instance, no change in fashion or taste, no new substitute which might affect the demand, no new invention to disturb the supply (1936:342).

The methods of treating the "time element" either by eliminating it or by pushing it toward a static and "functionless" analytic context are not universally accepted by economists. Knight has this comment on the static method: "Static conditions include finally static technology and knowledge in general, and this is one of the most treacherous concepts of all as a subject for scientific discourse" (1921:172). Recently Shackle made this analysis in his Epistemics and Economics:

The paradox of rationality is that it must concern itself with choosing amongst things fully known; but in the world of time, that which is fully known is already beyond the reach of choice, having already become actual and thus knowledgeable. Rational choice, it seems, must be confined to timeless matters. But economics seeks to understand conduct by, precisely, deeming it to be rational. Thus, economics is best advised, if it confines itself to logic, to discuss a timeless system (1972:246).

Once we accept the assumption of partial knowledge, the Newtonian time element, which has been a structural entity in the
prevailing microfoundation⁹ is no longer adequate. It is replaced with the Bergsonian or psychological time dimension which does not require the imposition of the conditions of reversibility and perfect knowledge.¹⁰

Uncertainty and Expectation

For the formulation of economic dynamics, an explicit recognition of the importance of knowledge is necessary (Boulding, 1961:97). The foremost epistemologist, Lewis, argues that "if the foreknowledge of such inevitable future fact of reality were the prediction of an inevitable future experience, then there would be no value and no good to be attained in knowing it" (1946:22). From the epistemologic view, our existing microfoundation is based on a futile methodology. We may even find stronger views by Hayek, Shackle and Lachman; Hayek's classic argument asserts that:

To assume all the knowledge to be given to a single mind in the same manner in which we assume it to be given to us as the explaining economists is to assume the problem away, to disregard everything that is important and significant in the real world (1948:91).

Lachman incisively states that "the impossibility of prediction in economics follows from the fact that economic

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⁹For an analysis on the concept of time, see Macrae (1951) and Bradley (1971).

¹⁰For further discussion of the relationship between the conditions of reversibility and static equilibrium analysis in conjunction with the assumption of perfect knowledge, see Chapter IV.
change is linked to change in knowledge, and future knowledge cannot be gained before its time" (1959:71). Therefore, the competitive postulate of omniscience is absurd; by denying the role of uncertainty in economic analysis, it hinders the understanding of real economic problems.

If uncertainty is taken to mean either a nonquantifiable aspect of events or a lack of definite knowledge with respect to an event, duration or continuance of some events, the assumption of omniscience automatically invalidates the existence of uncertainty. Once the structural premises are accepted, one can justify the lack of uncertainty in such a hypothetical market situation. Yet this justification cannot be extended to the imperfect market with its essential attribute being the lack of perfect information, not to mention perfect knowledge. The concept and the role of uncertainty is an essential tenet of the imperfect market. Among economists there has been a great deal of controversy whether the element of uncertainty can be reduced to calculable form. If it is reduced to calculable form, the imperfect market logically goes through a transformation into an equivalent form of perfect competition and a resulting competitive solution. While major attention has been focused on measurability of the element of uncertainty without reaching consensus, it has ignored a more important aspect of uncertainty--the behavioral implication and role of uncertainty in micro- and

11 In this regard, Shackle presents one of the best analytic works in his Epistemics and Economics.
macroeconomics. It was universally accepted among economists that once the entity called a firm or an individual economic agent is afflicted by uncertainty, the firm or the agent without exception prefers liquidity with flexibility of asset structure (Boulding, 1952:41). Yet, the firm's active search to acquire liquidity to overcome uncertainty necessarily affects the overall economic environment. A somewhat detailed account of economic implication relating to the economic agent's search for liquidity to overcome is given in the subsequent chapter. Meanwhile we will discuss the semantics of uncertainty.

There are widely different views of uncertainty. Uncertainty may imply high dispersion of given expectation (Hart, 1951:52-53). It may mean absence of definite expectation or "lack of confidence, that is, the presence of concern with future contingencies of fear and of definite adverse expectation" (Katona, 1946:56). Knight restricted the term "uncertainty" to cases of the nonquantitative type. Knight's argument is:

If risk were exclusively of the nature of a known chance or mathematical probability, there could be no reward of risk-taking; the fact of risk could exert no considerable influence on the distribution of income in any way (1921:46).

It follows that a known degree of uncertainty is practically no uncertainty, because such risks will be borne in groups large enough to reduce the uncertainty to substantially negligible proportions (Knight, 1921:47). It is logically consistent to say that if businessmen know either what actual changes are impending or what is the probability of any particular occurrence, "the only result of such changes," Knight states, "will be a certain
redistribution of productive energy which will take place continuously and without any disturbance or perfect competitive conditions" (1921:47).

This implies that even in the presence of uncertainty, the orthodox value theory can be vindicated providing the element of uncertainty can be reduced to calculable form (1921:148). The truth of the matter is that business decisions generally deal with situations which are elusive of any kind of statistic tabulation to have any value for guidance. The conception of an objectively measurable probability is simply inapplicable (1921:231). This forces us to restrict the term "uncertainty" to unquantifiable cases. The connotation of the non-quantifiable aspect is especially emphasized by Keynes:

By "uncertain" knowledge, let me explain, I do not mean merely to distinguish what is known for certain from what is only probable. The game of roulette is not subject, in this sense, to uncertainty; nor is the prospect of a Victory bond being drawn. Or, again, the expectation of life is only slightly uncertain. Even the weather is only moderately uncertain. The sense in which I am using the term is that in which the prospect of a European war is uncertain, or the price of copper and the rate of interest twenty years hence, or the obsolescence of a new invention, or the position of private wealth owners in the social system in 1970. About these matters there is no scientific basis on which to form any calculable probability whatever. We simply do not know (1937:213-213).

In my thesis, the term "uncertainty" will be used to mean a lack of definite knowledge with respect to the occurrence, duration, and continuance of some event, hence nonquantifiable variable. The definition as given in the Oxford English Dictionary does not conflict with Alchian's definition of uncertainty but has a
broader connotation. Alchian defines uncertainty as "the phenomenon that produces overlapping distributions of potential outcome" (1950:212).

If uncertainty implies a lack of definite knowledge, then cognizance of the existence of uncertainty means that the state of knowledge possessed by an individual economic agent is imperfect. In turn, imperfect knowledge implies that the decisions made by individual agents in their assessment of the prevailing market situation are subject to fallibility. Fallibility is only apparent if the product anticipated in the market is not always the same as the one subsequently realized (Knight, 1921:167-168). Uncertainty in this context has long been considered problematic from the traditional point of the profit maximization rule where the application of the marginal principle is the determining mechanism.

I agree with Alchian and Tintner that "profit maximization" does not make any sense where uncertainty exists and where it is defined as overlapping distribution of potential outcomes in a contemplated action (Alchian, 1950:211-221; Tintner, 1941:298-304). Boulding subscribes to the same view:

Profit maximization is ruled out because there is nothing in the information system of the firm which reveals the marginal inequality which would be indicative of a failure to maximize profit. The information system reveals average costs; it reveals sales, production, inventory, debt, and other figures in the balance sheet and income statements. It does not, however, generally reveal marginal costs and still less does it reveal marginal revenues. If the firm cannot know when it is maximizing
profits, therefore, there is no reason to suppose that it maximizes them (1952:36). 12

In the subsequent chapter, the profit maximization rule under the condition of uncertainty is replaced with the more realistic assumption of "individual goal or expectation fulfilling processes" (trial and error processes). 13 The magnitude and intensity of uncertainty will undoubtedly affect individual goal and any change of goal will affect the economic environment.

The theory of expectation is closely related with the concept of uncertainty. Expectation in a broad sense can be defined as the psychologic state of anticipation or a preconceived idea about what will take place. The concept inevitably conveys an ex ante notion. An entrepreneur, who has to reach a practical decision as to his scale of production, has to

12 Scitovsky expresses a similar view:

Between economic theory and business practice there is a deep and as yet unbridged gulf. The economist evolved a theory of how the rational businessman maximizes his profits; but this theory, however unassailable it may be logically, does not fit the facts of business practice very well. For this shortcoming economists used to lay the blame on the businessman saying either that his behavior was not rational, or that he did not aim at maximizing profits. Only recently has it begun to be realized (since businessmen failed to reform themselves) that the economist may be the one to be blamed: he may have oversimplified his theory, and that he should learn something of the businessman's trade before theorizing about it (1943:72).

13 The theoretic issue is discussed in Chapter VI and Chapter VII.
entertain several hypothetical expectations with varying degrees of profitability and definiteness, and thus the history of a firm or organization in the imperfect market situation necessarily involves an act of choice. It furthers images of the future in the entrepreneurs' minds about their expectation that alternative future sequences of events are controllable or attainable through their act of choice (Boulding, 1970:61). Under the competitive assumption of perfect knowledge, the future sequence of events has to be foreknown and, as a corollary, these images of the future become knowledge. If future events are foreknown, the profit maximization rule can be reinstated but the concept of decision making loses its real meaning. Once again, economic analysis becomes a conceptual experiment alienated from real experience. The failure to develop a theory of expectation is documented by Hicks' classic treatment of expectation within the framework of perfect competition (1957:117-127). In the

14. Kenneth Boulding makes a useful distinction between "image and knowledge." Needless to say, such a distinction can only be made if the market structure contemplated is less than perfect (1961:5-6).

15. By conceptual experiment, I mean Walrasian, Marshallian types of models, popularized by underlying theories. Marshall, in particular, states, "To obtain complete knowledge of demand for anything, we should have to ascertain how much of it he would be willing to purchase at each of the prices at which it is likely to be offered" (1936:36; see also Patinkin, 1965:11-12). Though Marshall did not introduce the auctioneer model with tatonnement process in his book, which was advanced by Walras, the Marshallian methodology assumes the existence of the auctioneer who provides perfect information instantly at zero cost. For further discussion, see Chapter IV.
imperfect market, in which the concept of uncertainty in conjunction with liquidity-seeking behavior plays a crucial role, the concept of expectation has to play an equally significant role. Uncertainty which follows the development of adversity will influence economic agents' expectations regarding future business activities and their consequent liquidity-seeking behavior, in turn, affects the overall economy.

Decision and Purposive Behavior

In spite of the improved understanding of decision theory (Barnard, 1938; Simon, 1951; and Simon, 1959), contemporary economics did not integrate it in the science. Given uncertainty within the imperfect market which offers only incomplete information, we necessarily must understand the transmission and control of messages. Such understanding is crucial for our analysis of human purposive and adaptive behavior.16 Norbert Wiener advanced a new science, cybernetics, which studies messages and analyzes purposive behavior. However, he maintained that human behavior is not only identical to that of a machine but exhibits only "intensive function" in the form of

16 In "Uncertainty, Evolution and Economic Theory" Alchian asserts a similar view. He argues that "the contention is that the precise rule and nature of purposive behavior in the presence of uncertainty and incomplete information has not been clearly understood or analyzed" (1950:221).
servomechanisms such as automatic temperature control devices, missiles, circuit breakers, and so forth (1954:Chapter 1).

The mechanism of intensive function is illustrated by the thermostat which continuously "narrows" the discrepancies between the desired and the actual room temperature until the desired temperature is achieved (Goodwin, 1951; Leijonhufvud, 1970). Therefore, under the intensive function, objects are designed to accomplish their goals by changing their behavior if the environment changes while they generally exhibit only one type of behavior in any given environment (Churchman and Ackoff, 1950:34).

More comprehensive and opposing views of purposive behavior are presented by Churchway and Ackoff and Macrae. Churchman and Ackoff argue that teleologic behavior not only exhibits "intensive" function but demonstrates "extensive" as well as "purpose function." Under "purpose function," humans accomplish their objective by exhibiting different types of behavior, even though the environment remains constant. As exemplified in the cybernetician's chess playing machine, a purposive object in the game always involves choice displaying a selective process in its behavior. Most human activity, including

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17 A few economists applied cybernetics to economics as a supplementary tool. The result is disappointing. See R. M. Goodwin (1951:1-7); A. W. Philips (1950:283-305); A. Leijonhufvud (1970).

18 Extensive function consists of objects such as an ordinary clock, hydraulic presses, and printing presses which accomplish certain objectives by displaying relatively invariant behavior in all environments (Churchman and Ackoff, 1950:34).
corporate decisions, is purposive, i.e., alternatives are displayed and chosen in the same environment. Consequently, a corporation makes many different types of choices even though the environment remains constant. It is my view that economists have made notable progress in developing theories designed to perform either intensive or extensive functions. For its application in economics, however, we cannot claim success. The failure to develop such a theory hinges on the fact that purposive behavior can only be studied relative to periods of time—in contrast to the static equilibrium theories. Since purpose implies action and change (behavior), hence the necessity of a time interval in any scheme, the application of purposive function in economics must evolve from economic dynamics.

I have used Churchman and Ackoff's concept of "purpose function" as an analytic vehicle which I hope will later prove useful in the formulation of dynamic behavior economics.

Statics, Comparative Studies and Economic Dynamics

The dynamic concepts I will introduce differ from the orthodox approach. In orthodox dynamics, the main attention is on whether, given sufficient time, variables will converge to certain equilibrium values. Therefore, the study of the specific time path is central to the orthodox view. While orthodox dynamics emphasizes variables that introduce problems at different times, it ignores the qualitative changes in variables that are the most important attributes of economic dynamics. The classic theory of production reflects this shortcoming. The new
economic dynamics requires emancipation from the classic methodologic choice of static assumptions. The dynamic disequilibrium phenomenon is the result of cumulative qualitative deterioration of the strategically important variables, of successive adverse interactive responses of organizations, during periods of uncertainty. During economic upswing the variables will undergo a positive qualitative transformation and induce favorable interactive responses of organizations during the diminishing uncertainty. This attribute is crucial if we wish to understand the true nature of economic dynamics.

The most confusing interpretation of the static vs. the dynamic tool of economic analysis came from J. R. Hicks. In Chapter IX, "The Method of Analysis," of Value and Capital, Hicks defines economic dynamics and economic statics:

I call Economic Statics those parts of economic theory where we do not trouble about dating; Economic Dynamics are those parts where every quantity must be dated.

Hicks adds:

The distinction between economic statics and economic dynamics has thus not much in common with the distinction between statics and dynamics in the physical science. One's justification for using the terms lies in the fact that they have a fairly well established place in economic terminology; and if they have not acquired precise meanings, they have at least a series of meanings which seem to be converging upon something useful (1957:115).

As Baumol points out, Hicks' interpretation includes too much in the meaning of dynamics (1970:4). In 1948, Harrod gave this interpretation:
In economic Statics we take certain fundamental conditions to be given and known, the size and ability of the population, the amount of land, tastes, etc., and these are deemed to determine the value of certain unknowns, the rates of output per annum of each of the various goods and services, the prices of the factors and of the goods and services. In Dynamics, on the other hand, the fundamental conditions will themselves be changing, and the unknowns in the equations to be solved will not be rates of output per annum but increases or decreases in the rates of output per annum (1948:4).

R. Frisch, in 1935, suggested that

... the essential of dynamics is the analysis of the process of change not the nonstationarity of the system analyzed, and a system constitutes dynamic if values of variables at different points of time are involved in an essential way (1935-1936: 100).

Frisch's interpretation of dynamics drew attention from other economists and received approvals from distinguished economists including Samuelson (Samuelson, 1965:134).

Baumol even presented a working definition: "Economic dynamics is the study of economic phenomena in relation to preceding and succeeding events" (1970:4).

For Hicks, Harrod, Frisch and Baumol the time dimension is the criterion of distinguishing between economic statics and dynamics.

A familiar mathematical interpretation of the comparative static and dynamic analysis says: Comparative statics is concerned with the comparison of different equilibrium states that are associated with different sets of values of parameters and exogeneous variables. In comparative statics, we disregard the process of adjustment of the variables, merely comparing the
initial (prechange) equilibrium state with the final (postchange) equilibrium state. In this context, we preclude the possibility of instability of equilibrium because we assume each new equilibrium to be attainable, just as we did for the old (Chiang, 1967:132-133).

The above statement implies that the study of statics and comparative statics is a limiting case of dynamic analysis. B. Hansen's *A Survey of General Equilibrium Systems* includes a similar interpretation:

A static model can only be used (1) to describe a stationary state, and (2) to analyze the difference between alternative stationary states. The latter sort of analysis is called comparative statics. Dynamic models are much more flexible. They can be used (1) to describe the time paths of economic variables, and (2) to analyze the difference between alternative time paths of variables (1970:2).

A more significant and enlightening interpretation of the two analyses comes from Kenneth Boulding in his article, "General System Theory."

Simple equilibrium systems really fall into the dynamic category, as every equilibrium system must be considered as a limiting case of a dynamic system, and its stability cannot be determined except from the properties of its parental dynamic system (1971:511).

He continues,

In comparative statics we compare two equilibrium positions of the system under different values for the basic parameters. These equilibrium positions are usually expressed as the solution of a set of simultaneous equations. The method of comparative statics is to compare the solutions when the parameters of the equations are changed. Most simple mechanical problems are solved in this way. In true dynamics, on the other hand, we
exhibit the system as a set of difference or differential equations which are then solved in the form of an explicit function of each variable with time. Such a system may reach a position of stationary equilibrium or it may not—there are plenty of examples of explosive dynamic systems, a very simple one being the growth of a sum at compound interest (1971:511).

Boulding's observation conveys three important messages. First, every equilibrium system must be considered as a limiting case of a dynamic system. Second, its stability cannot be determined except from the properties of its parent dynamic system. Third, a dynamic system may reach a position of stationary equilibrium or it may never reach such a position. Boulding's is significant from the standpoint of an analytic context of micro- and macroeconomics. To exhibit an explosive dynamic disequilibrium phenomenon, its parent dynamic system must entail all the necessary properties needed for such an element.

From these three criteria it is obvious that Patinkin tried to construct a parent dynamic system to meet the stability condition based on neoclassic assumptions such as instantaneous adjustment procedures, provision of information at no cost and without time consumption by the auctioneer, four well-behaved market supply and demand curves, and so forth. In a sense, it is a failure because Patinkin who wanted to include in his analysis an explosive dynamic system altered crucial assumptions: 1) that the elasticities of price and interest are insufficient, and 2) that the system responds with quantity adjustment instead of price adjustment. The properties of Patinkin's dynamic system
are those of an equilibrium system which satisfies the conditions of stability. Keynes' dynamic system differs because he uses different assumptions on which he bases an explosive dynamic system. However, Leijonhufvud points out, "we should accept such statement with a caution." Leijonhufvud argues that Keynes' theory is dynamic but that his model is static. Keynes borrowed the method to analyze the dynamic process with a comparative static apparatus from Marshall (Leijonhufvud, 1970a:211). Keynes dealt with dynamic processes by means of a "comparative statics" period analysis. He adopted the method of pseudodynamics which painstakingly explains the nature of macroeconomic adjustment to a disequilibrium disturbance. Keynes analyzed continuous process with the tools of static equilibrium. Leijonhufvud, in turn, attempts to distinguish between long-run comparative macrostatics and the dynamic process:

In the realm of long-run comparative macrostatics, the question of the "effects" of movements in a single price is meaningless (outside of stability analysis). Such comparative static exercises presume that two full equilibrium states are compared. The cause of a change from one such state to another cannot be attributed to endogeneous variables, such as the interest rate; a transformation of system state must be ascribed to a shift in one of the system's parameters. In equilibrium economics, the parameters of a system are conventionally grouped into the classes of preference, physical transformation possibilities, and resource endowment (1968: 263).

By contrast,

In the analysis of dynamic process, things are a little different because of the presence of lagged endogeneous adjustments. A price may change today because of a change in technology or resources which took place in the past, etc. But the methodological
imperative remains the same nonetheless and this is especially clear when the process-analysis borrows the long run comparative static method and proceeds in terms of the type of period analysis. The only difference is that we have more parameters to consider, i.e., the values of those endogenous variables the adjustment speeds of which have been ranked below line (Leijonhufvud, 1968:263).

Beyond semantic differences these interpretations of statics and dynamics fail in one crucial point which Knight summarized:

No science of economic dynamic exists.

In actual usage economic dynamics, or dynamic economics, has become merely a critical and negative term to refer to the limitations of "static" analysis or more exactly to any particular author's objections to any other author's use of the equilibrium concept (1956:180).

Harrod notes that the mere introduction of expectations, or of time-lag or a once-over change in the value of one of the fundamental conditions in a model does not sufficiently warrant removing the model from "statics." But his superficial distinction between dynamics and statics is inadequate and disappointing (1948:4).

The idea that competition should, by its nature, be grasped and approached from the aspect of dynamics was initiated by Hayek (1948) and gained momentum through the effort of J. M. Clark (1961) and recently of Kirzner (1973).

As I have argued in earlier chapters, the difference between statics and dynamics lies in the fact that static analysis essentially calls for a solution of the equilibrium values of system equations with a given datum. Economic dynamics cannot resort to the static method since the study of qualitative
changes of certain variables opposite uncertainty is its central theme.

Thus where the assumption of perfect knowledge breaks down because of incomplete information structure, the Arrow-Hahn and Debreu type of equilibrium analysis is inapplicable for the analysis of dynamic adaptive or purposive behavior of individuals. For the dynamic market behavior theory where the state of the world is characterized by uncertainty, only sequential multiperiod analysis, entailing the qualitative changes of strategic variables, can be the adequate methodologic vehicle, with which such concepts as expectation, real time element, learning behavior, decision making and knowledge structure can be properly integrated. Only with proper integration can we enter the complicated dynamic world where the time element becomes the determining factor and where all other important elements such as information, expectation, uncertainty, and transmission of knowledge can properly be taken into account.

Equilibrium

The concept of equilibrium was important to orthodox value theory and is still used in economic analysis. However, in recent years, equilibrium economics became the subject of severe criticism. Leading economists argue that equilibrium economics is irrelevant and rendered dubious service in the evolution of economic doctrine (Lachman, 1969; Kornai, 1971; Kaldor, 1972). The defenders of equilibrium economics contend that the concept
is still useful because "it serves to make precise the limits of economic analysis" (Hahn, 1973:21).

Because of these conflicting views, we should examine the limits and defects of equilibrium economics.

In orthodox economics equilibrium connotes more than superficial equality between supply of and demand for goods. Supply of and demand for goods may reach a momentary balance at varying levels of price and quantity of production and of employment. In this context, the depression in the 1930s and the recession in 1974-1975 could be seen as a condition of balance. In the classic context, equilibrium implies balance between prices and costs, saving and investment, supply of labor and volume of employment, i.e., the full employment equilibrium with unique prices and zero economic profits. The equilibrium concept is based on the idea of stability, namely, a state tending toward only such movements as can be sustained without violent reversal (J. M. Clark, 1961:129-130). In Chapter IV, we have shown that stability and uniqueness with the determination of value requires many far-reaching schemes. If stability means force of convergence, the force must reach a point of culmination. Since the quantity of commodity sold always is equal to the quantity of commodity acquired, the balance between supply and demand does not constitute a force of convergence. Convergence can be demonstrated only if the movement arises away from a final resting place and tends toward it. This is where the cost-principle entered classic economic analysis. This scheme requires the fulfillment of competitive assumptions and the satisfaction of
static conditions which necessitate the stationary state. Can these conditions, perceived and described by classic economists, be fulfilled? The available information is never perfect if the population, the volume of capital, the per capita product are all changing at different rates; if methods are being antiquated by continuous innovation and new goods are being developed to meet new consumers' tastes. Clark states, "This is not emphatically a static condition" (1961:127). The shortcoming of equilibrium economics lies in that change cannot take place without a recurring balancing effect. According to classical economists, if more is spent on the commodity, there is that much less left to be spent on another. Specifically, if consumption expenditure increases, the demand for bonds has to decline to the same extent. If more is saved and invested, however, that much less is left to be spent on consumption goods. Observed fact shows differently that spending more on one thing induces more spending on other things. The phenomenon is based on two variables, an elastic credit system and the cumulative effect. Our elastic credit system makes it possible to spend more on one thing without having to spend less on another. The past record of economic activities indicates the expansion in real gross national product is always accompanied by an increase of bank loans to business and consumers. Consequently, increased consumption expenditure follows increased gross private domestic investment. Conversely, contractions on real gross national product reduce bank loans to business and consumers by reducing gross private domestic investment. The forces that dictate
economic changes do not equilibrate or balance but initiate a cumulative process.

The cumulative process and its implications in relation to aggregate income is discussed in Chapter VII. Suffice it to point out that increased household income emerging during upward consumption expenditure leads to expansion of effective demand in the product market, putting more people to work with a further favorable cumulative effect on aggregate income. It follows that if more is spent on capital equipment, more will be spent for consumers' goods, not in spite of increased capital outlay but because of it (Clark, p. 139). Conversely, the household income constraint, induced by a curtailment of consumption expenditure leads to a reduction in effective demand in the product market with negative chain reaction on aggregate income. The forces that dictate movement are not equilibrating or balancing forces but "cumulative" ones. The "cumulative process" can be said to be one of the most significant attributes of a dynamic society. However, if we adhere to the equilibrium model, it will not be possible to use this cumulative process concept in economic analysis. Perhaps it is time to abandon the equilibrium model of the competitive system and replace it with cumulative causation so that the dynamic chain effect can effectively be dealt with.
CHAPTER VI

THE BEHAVIORAL IMPLICATION OF THE FIRM
IN A DYNAMIC SETTING

Introduction

I will now examine the dynamic disequilibrium from a microeconomic perspective. I should like to develop a theory of the firm which is consistent with macrodynamics and can serve as an expository framework for overall economic fluctuation. We will analyze self-imposed inquiries, how the firm responds to shock when the system is exposed to the shock, the transformation of the firm's balance sheet, and how the firm's response affects the economic environment.

We will assume that the firm has many goals rather than a singular one as classic economists assumed. We will examine the relationship between the firm's goals and its balance sheet and how changed goals are expressed in liquidity, leverage, activity and profitability ratio. The adaptive changes reflected in the balance sheet are the result of organizational decisions in response to raised interest or pressure from the environment. Therefore we need to understand the organizational decision-making process before we turn to a systematic analysis of the behavioral implication for the firm. We will especially examine
the behavior of firms in the dynamic setting of local vs. global uncertainty.

The classic system calls for the holistic concept of the firm in which a singular universal goal, predetermined rational behavior, and collective action are the structural premises. For deterministic purposes, classic economists and neoclassics adopted a supply and demand model in which the equal number of variables and of equations yields an optimal solution in terms of price and corresponding quantities. The concept of price-takers' market fits this requirement. The rationale of the system rests on the prerequisite that a third party provides all relevant information for the perfect coordination of economic activities. In such a perfect market system, the environment has to be exogeneous and beyond control. As a corollary, given the competitive premises, economic profit cannot be incurred nor can there be economic growth. Marshall rightly proclaimed that the classic setting essentially involves the supposition of a stationary state (1936:416). Contrary to classic description, phenomenal economic growth in most parts of the free world has been a prevalent characteristic and will continue to be so in the coming years. In such a dynamic society, the market cannot generate perfect information, and perfect information cannot be assumed to exist. In the real world, economic agents have to actively search relevant information and make decisions that affect the existing environment. If ever overall coherence emerges, rather than the result of perfect information, which can never be satisfied, it will be the result of information
generated during the firms' search for definite information and their response to it. It is correct to point out that competition in the actual world is essentially a process of opinion making (Hayek, 1948:106).

Unlike the concept of the firm in the price-takers' market, the individual entrepreneur, the firm or organization, possess the attributes of conscious cooperation where participants can act and react in a variety of communication patterns (Barnard, 1938:65).

The cooperation of individuals in an organization is not from lack of a conflict of interest but the result of a conscious effort by the organization to achieve a singular definite, common purpose (Barnard, 1938:65). Common purpose is the basis of cooperation and unity. It is a prerequisite if the firm wants to survive in a hostile environment. The cooperation of individuals in the modern firm emerged as economic convenience rather than selfishless devotion (Child, 1969:12).

The firm's striving toward a singular definite common purpose does not mean that there is a singular universal organizational goal as prophesied by classic economists. On the contrary, the firm has a multitude of objectives: inventory, liquidity, sales, profit.

These goals are constraints on the organization, the results of bargaining among participants for their sectional interest (Cyert and March, 1965:117).
Profit Goal

In a dynamic setting the information gathering activity of a firm is time consuming and costly. The firm cannot be a perfect decision-making mechanism as classic economists tacitly assumed. In the real market, in which obtaining information is either impossible or prohibitively costly, the organization must make decisions without knowing all the alternative courses of action and their corresponding outcomes. The significance of making decisions under such conditions is that the firm must consciously search for information. Search behavior in decision making becomes an important feature of the theory of the firm. By integrating the theory of choice and the theory of search, economic analysis becomes operationally meaningful and overcomes the shortcomings of the rationalist assumptions like the holistic concept of the firm. Firms that must make decisions in an imperfect market cannot possibly maximize profit. Instead of maximizing profit, they strive for a satisfactory level of profit (Margolis, 1958:187-199; Simon, 1952:99-118). The satisfactory level of profit is the pragmatic goal rather than a motivational and cognitive postulate. It delineates a level of aspiration; of course, the higher the aspiration, the higher the profit. The goals may be affected by stockholders' pressure who share in the distribution of profit while the organization's response to pressure may be a search for capital investment.

The effort to attain the profit goal may not be without conflict. The maintenance of high profits may be desirable to finance future sales, since the larger the net earnings of the
firm, the more readily available are investment funds, either internally from profit or externally by borrowing or issuance of new equity. A high profit may promote the firm's goal in one way but may conflict with its sales and liquidity goal (Baumol, 1959: 47). In a smooth operation, it is desirable to maintain some sort of a balance among these conflicting goals.

**Liquidity Goal**

In recent years the traditional analysis of the firm from the viewpoint of the profit and loss statement has become the subject of severe criticism from some leading economists (Boulding, 1952:35-36). First, the traditional approach contains too few variables to be meaningful. Second, the system does not generate enough information, hence the methodologic apparatus of profit maximization with marginalistic approach is not applicable.

In response, some economists developed a model with more variables to include not only profit-and-loss but balance sheet consideration without binding profit maximization (Cooper, 1949: 1207-1221). These economists focused on the mechanical aspect of equilibrium or oscillation in the trade-off locus between preferred cash and profit positions, instead of emphasizing the behavioral implication of uncertainty in conjunction with liquidity preference (Cooper, 1949:1207-1221). Keynes was not an exception to this faulty approach. In his General Theory, he argues how the element of uncertainty among other things might affect the motives of demand for money (1936:108-109). At the end of his argument, Keynes simply eradicates the dynamic aspect
of uncertainty and replaces it with the long-run static assumption:

We shall, that is to say, take as given the main background of subjective motives to saving and to consumption respectively. In so far as the distribution of wealth is determined by the more or less permanent social structure of the community, this also can be reckoned a factor, subject only to slow change and over a long period, which we can take as given in our present context (1936:199).

So stated, the whole argument of Keynes' theory of liquidity preference loses its dynamic substance. With the static assumption, Keynes expresses the liquidity preference schedule in equational form:

\[ M = M_1 + M_2 = L_1 (Y) + L_2 (r) \]

in which each component of the equation has a familiar meaning, namely, \( M_1 \) and \( M_2 \) represent the amount of cash held to satisfy the transactions and the amount of money held to satisfy precautionary motive, respectively. Consequently, Keynes' theory of liquidity preference was converted into the form of a pure static equilibrium analysis by the hands of post-Keynesian economists. The skeleton still exists in the Hicksian IS-LM model which lingers in most modern textbooks. It is unfortunate that the most important behavioral aspect of the theory of liquidity preference, namely, the element of uncertainty which plays a pivotal role in the cumulative income constraint process, was overlooked. Experience has taught us that the restraint on consumption expenditure in the household sector brings an unexpected reduction of income, and the resulting reduction of income and unemployment created uncertainty. During periods of
uncertainty, the firms, like individuals, prefer liquidity with flexible asset structures to illiquid assets. The attempts to enhance the liquidity position by implementing liquid asset structure intensify the cumulative income constraint process. For a model which depicts and predicts a firm's behavior, we must integrate the element of and the role of uncertainty. The revised equation of liquidity preference may take the following form:

\[
L = M_1 + M_2 = L_1(Y, U(Y)) + L_2(r)
\]

in which \(U\) represents uncertainty and other elements have the usual meaning. It is logically consistent to assume that

\[
\frac{\partial L_1}{\partial U} \cdot \frac{\partial d}{\partial Y} < 0
\]

which implies that the unexpected reduction of income induces uncertainty and in turn, the greater uncertainty increases the \(L_1\) account. It is entirely possible that with the given money supply and the given \(L_2\) account, the absolute magnitude of the change of \(\frac{\partial L_1}{\partial U} \cdot \frac{\partial u}{\partial Y}\) may dominate the opposite change of \(\frac{\partial L_1}{\partial Y}\) such that in spite of the reduction of real income, the demand for money may temporarily increase. Such a behavioral aspect of economic agents and firms is very significant in that the money held by them to consolidate their liquidity position could otherwise enter the spending stream. The acute instabilities which we experience repeatedly during cyclic downturns resulted directly from individuals' and firms' responses, in the form of thrift, to the element of uncertainty.
In our argument, it is assumed that every firm conceives a liquidity goal which reflects the motives of individuals and firms to refrain from spending their income. Keynes called the motives Precaution, Foresight, Calculation, Improvement, Independence, Enterprise, Pride and Avarice (1936:108). In addition, it is assumed that the amount of cash held to satisfy the transaction as well as precautionary motives is a function of income and of uncertainty. Consumers' attempts to refrain from consumption expenditure provokes uncertainty which intensifies consumers' as well as firms' motives to refrain from spending. Paradoxically, all attempts to consolidate liquidity positions invite an acute instability and a repercussionary chain reaction.

Sales Goals

Baumol's revenue maximization hypothesis received keen attention from economists, either for or against it (1959:45-52). Baumol's hypothesis purports two concepts concerning firms' goals. First, business firms tend to maximize their sales revenue. Second, contrary to the popular belief that maximization of profit leads to maximization of sales, the sales maximization goal not only often conflicts with the profit goal but ranks sales volume before profits as the main objective of business firms (Baumol:1959:47-48). It is not our objective here to argue this highly controversial issue. Our concern is to recognize that sales goal is an important objective of business firms and reflects the presence of various coalitions which demand that the firm must meet a certain level of sales.
effectiveness. The sales goal is related to the desire to expand the market share and increase the stability of the organization. Any major marketing setback makes it difficult for the firm to borrow money from banks or the bond market and can bring loss of monopoly and failure to muster an effective competitive counter-strategy when needed.

The term "sales" refers to the total revenue obtained by the firm in business transactions rather than the number of physical units of its products.

Inventory Goal

In the presence of uncertainty from lack of foresight, and in view of the cost of information gathering activities, stocks of goods held in inventory act as buffer stock. The volume of inventory is determined by the costs of holding it and the facilitation of effective demand. The inventory is not a single schedule, but generally manifested in the form of tolerable limits within upper and lower boundaries. Although a large inventory may satisfy a sudden upsurge of effective demand, its maintenance costs can be excessive. The upper limit of inventory will be determined with cost considerations and is a lagged function of sales volume. When sales volume increases, there will be pressures on the upper limit of inventories for a large build-up of inventories. The lower limit of inventory will be affected if the firm retains an unusually low level of inventories, that may not be able to facilitate daily transactions and cause loss of sales and disappointment of customers.
How are the adaptive changes of business goals brought about and how will the changes affect the interrelated goals?

First, since organizational goals represent sectional interest, conflict of interest among people who represent different sections is common. Under certain conditions, a trade-off between goals may be unavoidable. For example, to attain a higher inventory may mean a lower liquid asset and lower liquidity goal. Since a gross imbalance among the goals may jeopardize orderly operation of business activities, it is desirable to maintain some balance among them.

Second, organizational goals represent aspirations which change over time. The adaptive changes of the goals change organizational structure. It is noted that the adaptive changes of goals will take place if a variable which affects the organizational goal changes over time. In general, the present organizational goal can be expressed in the functional equation:

\[ G_t^j = f(G_{t-1}^j, E_{t-1}^j, C_{t-1}^j, G_t^i) \]

where \( G_t^j \) is the present organizational goal, \( t \) and \( j \) represent time period and particular goal respectively, \( G_{t-1}^j \) is organizational experience of the goal with respect to the previous comparable goal, \( C_{t-1}^j \) is organizational experience of comparable organization with respect to the same goal dimension in the previous time, and \( G_t^i \) represents other goals at the present time. It is further maintained that in general, \( G_t^j \) has the following qualitative attributes with respect to other goal dimensions:
The rationale for the generalization of qualitative attributes is based on the fact that any favorable experience in a previous time period in conjunction with a particular goal generally induces an upward adaptive change of $G^j_t$ while the opposite can reverse the trend, causing a downward change of goal. A favorable experience by a comparable organization with respect to the identical goal in the previous time may exert a pressure on decision makers to set a higher goal. In the qualitative attribute of $\frac{G^j_t}{G^j_t} > 0$, under a static condition, as noted earlier, the trade-off between $G^j_t$ and other goals $G^i_t$ may be unavoidable in that the higher the $G^j_t$, the lower are the other interrelated variables. Nonetheless, under a dynamic condition, the direction of the movement of $G^j_t$ and $G^i_t$ can be the same in that both variables undergo either favorable or unfavorable adaptive changes.

The income statement, which shows what actually occurs between two points of time, will reflect the adaptation of a firm's goals. An analysis of the income statement is essential. For a picture of the firm's financial position on a given date, the balance sheet is the pertinent criterion. The information in the firm's income statement and balance sheet can be expressed in ratios. A study of arranged ratios can reveal the firm's
weakness or strength and any transformation the firm is undergoing. We can classify the ratios into four types:

1. The liquidity ratio measures the firm's ability to meet maturing short-term obligations and deal with short-term solvency and flexible asset structure. One of the best methods to measure the liquidity ratio is known as the Quick ratio and can be expressed as:

\[
\text{Quick ratio} = \frac{\text{current assets} - \text{inventories}}{\text{current liabilities}}
\]

in which current assets represent cash type assets, namely, cash, marketable securities and account receivables and current liabilities consisting of accounts payable, short-term notes payable, current maturities of long-term debt, accrued income taxes and other accrued expenses, mainly wages.

2. The leverage ratios measure the percentage of total funds that have been provided by creditors and the extent to which the firm has been financed. A frequently used method is called debt ratio which is expressed as follows:

\[
\text{Debt ratio} = \frac{\text{total debt}}{\text{total assets}}
\]

in which debt includes current liabilities and all bonds. Creditors prefer moderate debt ratios since lower ratios can provide a better cushion against creditors' loss in the event of liquidation. However, the firm may seek a high leverage ratio to expand its earnings, because raising new equity means giving up a degree of control (Weston and Bringham, 1974:47). If the debt
ratio is disproportionately high, there is danger of irresponsibility on the part of the owners in the form of speculation.

Because the debt ratio does not reveal the attributes of debt composition, to measure the percentage of the total funds which consist of long-term and short-term debts, one may use the debt ratio of short-term debt to long-term debt:

\[
\text{Debt ratio of short-term to long-term} = \frac{\text{short-term debt}}{\text{long-term debt}}
\]

in which short-term debt represents maturing short-term obligations of less than a year, whereas long-term debt represents obligations of more than a year.

3. The activity ratio measures the effective use of the firm's resources. The best way to measure the level of activity is to use an inventory turnover ratio:

\[
\text{Inventory turnover ratio} = \frac{\text{sales revenue}}{\text{inventories}}
\]

4. The profitability ratio reflects the management's overall effectiveness in relation to the returns generated on sales investment. The most frequently used criterion is the profit margin which can be expressed as:

\[
\text{Profit Margin} = \frac{\text{net profit after tax}}{\text{sales revenue}}
\]

The main objective of setting up the ratios are: 1) We can examine how these ratios change when the firms are exposed to an external shock; 2) the qualitative changes in these ratios reflect the firm's response to transformation; 3) responses of the firms will be reflected in the economic environment.
Let us examine how the initial shock introduced into the system affects the income and balance sheet accounts and the ratios mentioned above. These ratios are not independent entities; any change in one ratio affects other ratios.

Suppose the magnitude as well as the direction of the initial shock induces an overall decline of consumption expenditures. The decline of consumption in the household sector increases unwanted inventories and reduces sales revenue of business firms. There will be a down pressure of the firm's inventory turnover ratio. The decline of the firm's inventory turnover ratio can be interpreted as unproductive excess of stocks accumulated against the firm's will. As illiquid inventories rise, the inflow of liquid assets declines. Such a change of asset structure affects not only quick ratio but profit margin. The unfavorable quick ratio reduces the firm's ability to pay short-term debts; a decline of profit means failure on the part of management to make effective use of the resources at their command.

As a result, there will be a downward pressure on stock prices. Confronted with overall deterioration of asset structure, the firms will attempt to improve their liquidity position through cost and inventory reduction, reduced distribution of corporate dividends and cancellation of investment spending. These measures will invite unfavorable interactive responses from other segments of the market; to improve the firms' financial position through the issuance of long-term bonds becomes a costly affair in a distressed bond market. Consequently, the firms will
be forced to rely on short-term debt which further deteriorates asset structure by increasing the ratio of short-term to long-term debt. As the economic environment worsens with increased unemployment and business failure, firms will transmit unfavorable information as the degree of uncertainty increases. Pressure will gradually build up in the banking system. Banks will be forced to take losses on individuals and on firms going bankrupt, on marginal accounts where securities failed to cover the loans, and on foreclosed mortgages. To protect themselves from future defaults, banks start to contract commercial credit, recall loans and sell illiquid assets in an effort to obtain liquidity. This also applies to individual economic agents. Yet, the attempt of each economic agent to gain liquid assets reinforces the difficulty of all. This is the essential tenet of the cumulative income constraint process which we will examine in greater detail in Chapter VII.

Organizational Decision Making Process and Feedback Control System

Every day entrepreneurs confront a wide range of problems: how much to produce, what to produce, how much to charge; to predict sales proceeds, to reduce cost, and to assess how much inventory is to be carried, etc. Each question calls for a decision, for rendering judgment. The decision maker chooses from alternative actions. In organizational theory, the term "decision making" carries broad connotations. It encompasses the entire process in which information is assessed, goals
are set, tasks are defined, alternative options are sought, choices are made, and plans are developed. Decision making involves search, and creative, diagnostic and evaluative activities. In a dynamic setting in which the environment undergoes rapid changes that generate complicated and often conflicting information, the organization, in order to survive, must assess the continuous flow of information and make decisions after decoding them.

To meet the need, every modern organization has a feedback control mechanism built into its decision-making apparatus. Modern organizational theorists worked out a basic feedback model with three components: a receptor to receive various stimuli, a controller to interpret the message, and an effector to carry out and take action in response to the stimuli (Figure 4). In turn, the firm monitors its adaptive action for continuous adjustments (Von Bertalanffy, 1968:42-43).

![Figure 4: Feedback Model](image)

The feedback model presented above, based on a mechanical analogy, is simplistic and does not include the behavioral elements of search, learning and uncertainty coping measures which are the important characteristics of decision making. To rectify the deficiency, I will present the following
organizational decision chart in abstract form (see Figure 5). The chart illustrates the sequential flow of the decision-making process and goal formation feedback from the environment. It depicts three different types of situations in which decisions are made. First, the decision maker sets a goal and draws up a plan and eventually carries out the plan. The assessment of the feedback from the environment indicates whether the plan is successful and the goal is achieved. If the initial trial run turns out to be successful, the organization will continue its business activities, either maintaining or upgrading the previous goals. Under such circumstances, the organization may not experience either local or global uncertainty. Second, when a plan is executed but the goal is not achieved, the decision maker assesses the situation and the attribute of the failure. He may find that the failure has an internal source, mismanagement, rather than an unfavorable external environment. The decision maker, therefore, conducts a local search to remove the cause of failure. Once the problem is solved, he adopts new goals and puts a new plan to test. If the problem persists, his efforts may develop local uncertainty which can cause collapse unless he can find a solution. Third, when the plan is executed but the goal is not achieved because of global uncertainty, the decision maker may take only uncertainty-reducing measures. The uncertainty-reducing measures, however, may now draw interactive responses from other organizations and intensify the repercussionary chain reaction. Failing to remedy the situation through
Set the goal and conceive plan

Execute plan

Observe feedback from environment

Is goal achieved?

Is there global uncertainty?

Take uncertainty reducing measure

Search locally

Is the problem resolved?

Is there local uncertainty?

Take uncertainty reducing measure

Maintain or upgrade goals and continue business activities

Yes

No

Adopt new goal and set to test

Figure 5: Organizational Decision Chart in Abstract Form
purposive redirection, the organization will experience acute
global uncertainty and eventually collapse.

The Role of Uncertainty in Macroperspective

In our discussion, in Chapters VI and VII, we focused on
the element of uncertainty and its role. We identified it as the
crucial factor that can initiate acute cyclic instability. The
treatment of uncertainty in our context differs from popular
modern approaches in the form of expected value or game theory in
which the solution calls for finding either the procedures for a
certainty equivalent or the rules to live with uncertainty. The
popular modern approaches focus on the measurement of uncer-
tainty; our attention is mainly directed to the behavioral impli-
cations of uncertainty and its interactive role in the macro-
perspective. Our approach digresses from the classic line in
which the element of uncertainty is assumed to be nonexistent.
That does not mean, however, that classic economists never
contemplated the possibility of a temporary disequilibrium
situation. On the contrary, disequilibrium phenomenon enters
virtually into every classic analysis. But the hypothetical
state of disequilibrium is used solely to test the stability of
the equilibrium state, but not the implications of less than
perfect coordination in the system. According to classics, the
nature of the system is such that any instability induced by an
adverse effect of a single strategic variable is always accom-
panied by a compensating stabilizing effect of either one or more
variables so as to restore instantaneously overall equilibrium in the system.

In our analysis, the attributes of the organization structure are such that the adverse effect on a strategically important variable also affects other variables and the effort to stabilize one variable necessarily invites interactive effects from other variables. It follows that for the system as a whole, the organizations' attempts to stabilize an adverse effect on a strategically important variable (or variables) during global uncertainty inevitably cause internal and external interaction that lead to instability with repercussionary chain reactions as an inevitable consequence.

The essence of our economic system lies somewhere between the two analytic systems; one system does not include the element and role of uncertainty, the other acknowledges uncertainty and assigns its role in the macroperspective.
CHAPTER VII

MACROECONOMICS IN A DYNAMIC PERSPECTIVE: GENERAL THEORY OF ECONOMIC FLUCTUATION

Introduction

As the subsequent analysis of the development of dynamic economics will prove, its main principle is not the classic self-equilibrium process. Keynes' tenet that our economic system is incapable of self-adjustment once cyclic downswing is underway will be vindicated.\(^1\) In fact, once the cyclic downswing is reversed by external intervention, an upswing will occur. But, instead of ascending toward an optimum optimorum and sustaining itself there, the trend will peak, and, once again, a cyclic downswing will begin. The structure and behavior of the

\(^1\)Confined in the framework of the comparative static paradigm as his model is concerned, Keynes thought that downswings were not unlimited. Rather, he maintained that they will be limited at the point where unemployment had risen to an equilibrium level. Nevertheless, upon reflection, it will show that the existence of unemployment in the labor market should exert a downward pressure on wage which may precipitate repercussionary chain reactions in other markets via a reduction of effective demand. Therefore, in the theoretical framework of competitive system, there is no place for the underemployment equilibrium. Nor can one contend its existence in a real dynamic system in which the system is reigned by the real elements such as uncertainty, imperfect information, and wage and price rigidity. For further discussion, see pages 35-37 in Chapter II.
organizational entities of the economic system are responsible for this cyclic pattern.


The same underlying and recurring forces induced and nurtured each recession. Though the forces underlying cyclic fluctuations may differ, the essential feature of the cycle is similar. It is unfortunate that the analytic model currently at our disposal is not equipped to deal properly with this economic phenomenon. The deficiency lies in the fact that the Marshallian, like the Walrasian model, is based on the doctrine of a self-adjusting economic system in line with Adam Smith's cosmic view of the harmony of individual and national interests.

Keynes was convinced that the system in which we live is incapable of self-adjustment. By breaking away from classic economics Keynes found a meaningful answer to the question of cyclic upswings and downswings, and how they got underway.

Post-Keynesian economists erroneously interpreted his scheme as an effort to develop an ex ante static equilibrium exposition of the aggregate income model. The overriding popular classic model and the confounding methodologic choices of static equilibrium and deduction unfortunately helped bury Keynes' theme.
It is my objective to examine systematically, through the eyes of Keynesian tradition, the pattern and forces which dictate cyclic upswing and downswing. We will test the classic hypothesis of whether the system, once exposed to either external or internal shock, is capable of generating enough stabilizing forces to return it to the full employment equilibrium.

The test is based on two experiences: the Great Depression of 1929-1933 and the recession of 1974 to 1976. The choices are intentional and made with these considerations: First, though the experience of 1929-1933 is strikingly different in its severity, cause, and policy pursued from the experience of 1974-1976, the underlying forces which dictate the patterns of downswing and upswing were similar. Second, both experiences offer rich menus compared to five other recessions which we experienced between 1948 and 1970. The 1929-1933 contraction was the worst in history. It caused massive banking failures, deflation, and bankruptcy. During the early 1930s, the value of the GNP declined almost by half. Unemployment rose to twenty-five percent. Investment virtually stood still. The experience shattered the long-held classic belief that the system is capable of self-adjusting. Although the 1974-1976 recession cannot match the Great Depression in its severity, it was severe and offers a richer menu for analysis with its combination of inflation and recession and eight percent unemployment than the five other recessions we experienced since the Great Depression. Third, both experiences, the Great Depression and the 1974 oil crisis recession constitutes, in my opinion, the most important economic
events in the history of mankind. Yet, economists singularly failed to present a systematic exposition of the causes and the dynamic patterns that underlie these contractions.

We will therefore try to analyze the causes and the dynamic pattern of economic contraction. We will examine the Great Depression of 1929-1933 and the 1974-1976 Recession from the viewpoint of:

1. Variations of product and factor input prices as they affect effective demand.
2. The cumulative dynamic income constraint process.
3. The foreign repercussion effect.

We will recapitulate some sources of instability. Relevant policy implications that mitigate the cyclic downswing will be suggested, and we will analyze the cumulative income expansion process. I will then discuss the shortcomings of the classic equilibrium model and the Marxian dialectic economic analysis, and explore the concept of the cumulative development process.

The Great Depression, 1929-1933

Thus far, a fair amount of articles and books have been written on the cause and the development process of the Great Depression. Yet the existing theories singularly fail to offer a systematic and satisfactory explanation of the dynamic process of cumulative contraction during the event. The failure can be

2For a detailed account of the event, see Friedman and Schwartz, 1965; Kindleberger, 1973.
ascribed, in my view, to a rigid adherence to the static or comparative static apparatus. The contractionary movement is essentially a dynamic phenomenon in which the element of uncertainty precipitates a repercussionary dynamic chain reaction in the economic system that cannot be dealt with in the static model. We, therefore, need an alternative exposition of the event. Before we attempt to present our alternative view, a brief review of the literature on the Great Depression may be in order.

The existing tenets that attempt to explain the cause and effect of the great contraction of 1929-1933 can be classified into two groups: One seeks to explain the main cause and the development of the event as a monetary phenomenon, the other ascribes the main cause to the decline of spending.

The proponents of the monetary hypothesis are Friedman and Schwartz and the essence of their argument is: First, the monetary hypothesis recognizes a one-to-one relationship between the change of money stock and the change of income and that money is the prime factor that affects the level of net national income and the overall economic activities (1963a:41, 43, 50). The recognition of the importance of money does not end here. According to Friedman and Schwartz, the stock of money is determined by a variety of forces, mainly its supply and independence of income. Thus the direction of cause must run from money to income, not the other way around (1963b:32-78).

Second, the change of money stock affects the level of national income through a monetary transmission mechanism. The essence of their argument is: Suppose the change of money stock
is brought about by commercial banks making increased open market purchases of securities from financial and nonfinancial sellers. For the commercial banks, the action increases their excess reserves beyond the normal reserves on deposit. For the public, it creates redundant cash reserves. Consequently, the nonbank sellers and the commercial banks will seek to readjust their portfolios.

The probable adjustment of portfolio and its effect may take the following directions: 1) Both sellers may attempt to purchase various categories of securities, including some comparable to those they have sold in terms of fixed-interest coupons and risk obligations. As a result, the prices of financial assets will be bid up making them more expensive than non-financial assets. The decline of the relative prices of non-financial assets compared to financial assets increases the acquisition of productive services, causing an upward shift in the investment schedule. 2) Now, with their excess reserve, commercial banks will increase loans while the nonbank sellers, namely the public, increase their purchase of real properties and goods, thereby increasing consumption expenditure. Consequently, the increase of money stock contributes to an increase of consumption and investment expenditure. This in essence is the monetary transmission mechanism (Friedman and Schwartz, 1963b:60-61; Friedman and Miselman, 1963:217-222). The mechanism also holds for contraction where it creates the opposite effect. From these considerations, the proponents of the monetary hypothesis set up
the following scenario of the cause and effect of the Great Depression. Regarding bank failure, Friedman and Schwartz state,

An initial mild decline in the money stock from 1929 to 1930, accompanying a decline in Federal Reserve Credit outstanding, was converted into a sharp decline by a wave of bank failures beginning in late 1930.\(^3\)

Friedman and Schwartz assign special importance to the bank failures and the resulting decline of the stock of money in explaining the great contraction.

If the bank failures deserve special attention, it is clear because they were the mechanism through which the drastic decline in the stock of money was produced, and because the stock of money plays an important role in economic development (1965:56).

The bank failures contributed to the contractionary processes in two ways. First, the bank owners and the depositors incurred a massive capital loss totaling about 2.5 billion. This affected stockholders, depositors and other creditors of the more than 9,000 banks that suspended operation between 1930 and 1933. Second, this massive capital loss precipitated a drastic decline of the stock of money. From 1929 to 1933, the total stock of money fell by more than one-third (Friedman and Schwartz, 1965:56). Consequently, the decline in available money caused the level of income to fall via this mechanism. However, banking failures alone could not have brought such an unprecedented contraction of income. Friedman and Schwartz find an additional

\(^3\) In addition to a decline in Federal Reserve credit outstanding, Friedman and Schwartz point out two additional causes of bank failures: crop failures and poor loans and investment (1963a:308-309, 355).
cause of the severe contractions of income in the stock market crash, widely known as the Black Thursday of October 24, 1929.

Friedman and Schwartz note,

Partly, no doubt, the stock market crash was a symptom of the underlying forces making for a severe contraction in economic activity. But partly also, its occurrence must have helped to deepen the contraction. . . . If so, the stock market crash made the decline in income sharper than it otherwise would have been. Certainly, the coincidence in timing of the stock market crash and of the change in severity of the contraction supports that view (1965:10-11).

The stock market crash helped foster the contractionary movement in two ways. First, via the decline of stock market prices, it induced a negative wealth effect which contributed to a reduction of consumption expenditure. Second, the crash injected uncertainty in the business environment and, consequently, reduced the willingness of both consumers and business enterprises to spend on goods and services, exerting an upward pressure on their desired cash balance (Friedman and Schwartz, 1965:11).

Thus, according to Friedman and Schwartz, the Great Depression was the direct result of massive bank failures and the stock market crash which led to a drastic decline of available money and to a reduction of the level of income via the monetary transmission mechanism. In connection with the decline of available money, Friedman's contention that available money declined because of mismanagement by the Federal Reserve System requires special attention. Friedman states,
The quantity of money in the United States fell by one-third in the course of the contraction. And it fell not because there were no willing borrowers—not because the horse would not drink. It fell because the Federal Reserve System forced or permitted a sharp reduction in the monetary base, because it failed to exercise the responsibilities as assigned to it in the Federal Reserve Act to provide liquidity to the banking system (1968:3).

On reflection, Friedman's statement reveals that he has failed to understand the most important behavioral aspect of uncertainty which led to the decline in the demand for money and so to a decline in the quantity of money. This aspect is described by Galbraith:

It was that the supply of money could not be increased. The largest part of the supply of money, by now will be adequately understood, is deposits in banks. These come into existence as people and firms borrow money. If business is sufficiently bad, profit prospects sufficiently dim, gloom sufficiently deep, businessmen may not borrow money. Then no deposits are created, no money comes to existence. (1975:209).

Thus, by not understanding this important behavioral aspect we failed to develop a systematic dynamic theory of economic contraction in which the element of uncertainty fostered by a decline of income and ensuing unemployment precipitate a cumulative income constraint process via the diminished demand for money. The empirical findings support neither the cause nor the theoretical aspects of the great contraction as described by Friedman and Schwartz. While the monetary hypothesis set forth by Friedman and Schwartz contends that investment and hence the level of income was affected by the banking panic, and the resulting fall in the supply of money and the quantity of money,
the authors have not demonstrated any empirical testing of their assumptions. The exposition by Friedman and Schwartz regarding the major cause of the Great Depression is not satisfactory. There is not a shred of evidence that the monetary stringency of 1929 was severe enough to cause and direct the entire event.

Temin states:

We must conclude that the money hypothesis has failed its most important test. There is no reason to think that the monetary stringency in 1929-1930 was more severe than in other interwar depressions and no evidence that the bank failures in 1930 created such a stringency. The money hypothesis, therefore, gives no reason why the downturn following 1929 differed from the other interwar downturns (1976:126).

The theoretical tenet of the monetary transmission mechanism specifically suggests that the decline of money supply will follow the increase of the rate of interest. Yet three short-term interest rates for 1919-1939 show there is no evidence that the monetary stringency that precipitated the increase in the interest rate caused the Great Depression (see Figures 6a and 6b) (Temin, 1976:126).

In conclusion, the monetary hypothesis of Friedman and Schwartz does not provide satisfactory explanation for the cause and effect of the great contraction of 1929-1933, nor does it provide empirical tests to support their theoretical finding.

Before we attempt to examine the alternative hypothesis--spending hypothesis--an additional note on the equilibrating forces in connection with the real balance effect, and favorable factor substitution may be warranted.
Figure 6a. Three Short-Term Interest Rates. Monthly, 1919-1939.
Figure 6b. Two Short-Term Interest Rates. Monthly, 1919-1939.

Source: Banking and Monetary Statistics, pp. 460, 463-64.
Most macroeconomic models contain a built-in mechanism, which, once a system is exposed to a disequilibrating shock, returns it to equilibrium. As a device of counterdeviating equilibrium forces, these models incorporate two separate elements: the positive real-balance effect and the favorable factor substitution. The traditional explanation of the positive real-balance effect asserts that as prices fall, the real quantity of money will rise and thereby increase the demand for commodities which will return the system to full-employment equilibrium. The favorable factor substitution of labor presumably operates through a decline of wages and a resulting increase of productivity over capital goods and thereby leads to increased employment.

In spite of the theoretical prescriptions, the counterdeviating equilibrium forces failed to materialize during the contractionary process.

First of all, the positive real-balance effect is based on an increase of the real quantity of money through falling prices while the nominal quantity remains constant. Yet the nominal stock of money did not remain constant because of the pervasive uncertainty and the economic agents' response to the uncertainty which called for an increase in cash balance. As Table I indicates, there is no evidence that the falling prices induced a notable positive real-balance. In fact, the nominal money supply, as Temin noted, decreased at about the same rate as prices in the early 1930s (1976:141). Consequently, the system failed to produce any significant positive real-balance which
## TABLE I. ESTIMATES OF THE REAL MONEY SUPPLY, 1925-1934

<table>
<thead>
<tr>
<th></th>
<th>$M_1$/WPI*</th>
<th>$M_1$/CPI**</th>
<th>$M_2$/WPI</th>
<th>$M_2$/CPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1925</td>
<td>88.8</td>
<td>94.3</td>
<td>83.3</td>
<td>88.5</td>
</tr>
<tr>
<td>1926</td>
<td>93.4</td>
<td>95.1</td>
<td>89.3</td>
<td>90.9</td>
</tr>
<tr>
<td>1927</td>
<td>97.8</td>
<td>96.7</td>
<td>96.0</td>
<td>95.0</td>
</tr>
<tr>
<td>1928</td>
<td>97.5</td>
<td>99.1</td>
<td>98.2</td>
<td>99.8</td>
</tr>
<tr>
<td>1929</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>1930</td>
<td>106.2</td>
<td>98.8</td>
<td>107.9</td>
<td>100.4</td>
</tr>
<tr>
<td>1931</td>
<td>116.8</td>
<td>100.9</td>
<td>117.8</td>
<td>101.8</td>
</tr>
<tr>
<td>1932</td>
<td>114.8</td>
<td>98.0</td>
<td>110.8</td>
<td>94.6</td>
</tr>
<tr>
<td>1933</td>
<td>106.5</td>
<td>97.3</td>
<td>96.2</td>
<td>88.2</td>
</tr>
<tr>
<td>1934</td>
<td>103.3</td>
<td>104.2</td>
<td>91.7</td>
<td>92.5</td>
</tr>
</tbody>
</table>

*WPI = Wholesale Price Index  
**CPI = Consumer Price Index  

could have arrested the contractionary movement. One might suggest that had prices declined sufficiently, the decline could have induced a positive real-balance effect strong enough to arrest the disequilibrium process. However, the argument does not hold because a further decline of prices would have wreaked havoc on corporate real earnings and would have contributed to a further decline of investment expenditure. Therefore, any stabilization produced by falling prices and the resulting positive real-balance effect would have been offset by the destabilizing force, namely, the decline of investment expenditure.

Second, according to classic economists, once the price and wage flexibility is insured in the system, any temporary disequilibrium in the labor market will correct itself by a fall of the relative price, the real wage. But the following data on real earning, 1925-34, indicate that none of the self-correcting forces were present (see Table II).

The hourly wage which is appropriate for the evaluation of labor as a factor of production rose in the early 1930s as the first index shows. As Temin rightly pointed out, the evaluation of the rise of real hourly wage is consistent with the classic theory of factor substitution whereby a decline of the level of employment follows an increase of labor productivity (1976:139). But the rise of the real hourly wage is offset by the decline of the real weekly wage which reflects the fall of purchasing power and leads to a decline of effective demand. In short, the contractionary process evolved without accompanying noticeable equilibrating forces.
<table>
<thead>
<tr>
<th></th>
<th>All Manufacturing</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average Earnings/WPI*</td>
<td>Average Earnings/CPI**</td>
<td>Hourly</td>
<td>Weekly</td>
<td>Hourly</td>
</tr>
<tr>
<td>1925</td>
<td>88.9</td>
<td>89.5</td>
<td>94.4</td>
<td>95.1</td>
<td></td>
</tr>
<tr>
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<td>93.0</td>
<td>93.8</td>
<td>93.9</td>
<td>95.5</td>
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</tr>
<tr>
<td>1927</td>
<td>97.0</td>
<td>98.7</td>
<td>96.0</td>
<td>97.6</td>
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</tr>
<tr>
<td>1928</td>
<td>97.7</td>
<td>98.2</td>
<td>99.4</td>
<td>99.8</td>
<td></td>
</tr>
<tr>
<td>1929</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>1930</td>
<td>107.7</td>
<td>102.5</td>
<td>100.1</td>
<td>95.3</td>
<td></td>
</tr>
<tr>
<td>1931</td>
<td>118.8</td>
<td>108.9</td>
<td>102.6</td>
<td>94.0</td>
<td></td>
</tr>
<tr>
<td>1932</td>
<td>115.9</td>
<td>100.1</td>
<td>99.0</td>
<td>85.5</td>
<td></td>
</tr>
<tr>
<td>1933</td>
<td>113.0</td>
<td>96.7</td>
<td>103.5</td>
<td>88.6</td>
<td></td>
</tr>
<tr>
<td>1934</td>
<td>119.5</td>
<td>93.4</td>
<td>120.5</td>
<td>94.2</td>
<td></td>
</tr>
</tbody>
</table>

*WPI = Wholesale Price Index

**CPI = Consumer Price Index

After the examination of the validity of monetary hypothesis as an explanation of the cause and effect of the Great Depression, we now turn to the spending hypothesis.

The essential tenet of the spending hypothesis regarding the cause and effect of the Great Depression has the following features: Persuaded by Keynes' argument that the boom of 1928-1929 and the slump of 1929-1930 in the United States can be attributed, respectively, to an excess and to a deficiency of investment, the proponents of the spending hypothesis sought the cause of the Great Depression in the decline of the autonomous spending, namely, investment and consumption expenditure (Keynes, 1971:174). The investment expenditure declined because construction, which is a substantial portion of the investment, fell. There was surplus housing stock and the system failed to generate sufficient effective demand to absorb the additional housing stock (Table IIIa and IIIb). The decline of consumption expenditure is attributed to the stock-market crash and the resulting widespread uncertainty which led to an encouragement of saving. Keynes states,

Thus I attribute the slump of 1930 primarily to the deterrent effects on investment of the long period of dear money which preceded the stock-market collapse, and only secondarily to the collapse itself. But the collapse having occurred, it greatly aggravated matters, especially in the United States, by causing a disinvestment in working capital. Moreover, it promoted the development of a profit deflation in two other ways--both by discouraging investment and by encouraging saving (1971:176).

Moreover, once the autonomous spending-consumption and investment expenditure declined, it induced a fall in real income
TABLE IIIa. REAL GNP AND SELECTED COMPONENTS, 1919-1939
(Billions of 1929 Dollars)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Consumption Expenditures</th>
<th>Gross Investment</th>
<th>Construction</th>
<th>Gross National Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>1919</td>
<td>50.2</td>
<td>10.7</td>
<td>4.8</td>
<td>74.2</td>
</tr>
<tr>
<td>1920</td>
<td>52.7</td>
<td>12.8</td>
<td>5.0</td>
<td>73.3</td>
</tr>
<tr>
<td>1921</td>
<td>56.1</td>
<td>7.4</td>
<td>4.9</td>
<td>71.6</td>
</tr>
<tr>
<td>1922</td>
<td>58.1</td>
<td>10.6</td>
<td>7.1</td>
<td>75.8</td>
</tr>
<tr>
<td>1923</td>
<td>63.4</td>
<td>15.6</td>
<td>8.2</td>
<td>85.8</td>
</tr>
<tr>
<td>1924</td>
<td>68.1</td>
<td>12.4</td>
<td>9.0</td>
<td>88.4</td>
</tr>
<tr>
<td>1925</td>
<td>66.1</td>
<td>16.4</td>
<td>10.0</td>
<td>90.5</td>
</tr>
<tr>
<td>1926</td>
<td>71.5</td>
<td>17.1</td>
<td>10.7</td>
<td>96.4</td>
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<td>1927</td>
<td>73.2</td>
<td>15.6</td>
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<td>74.8</td>
<td>14.5</td>
<td>9.8</td>
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<td>10.5</td>
<td>6.4</td>
<td>95.1</td>
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<tr>
<td>1931</td>
<td>72.2</td>
<td>6.8</td>
<td>4.5</td>
<td>89.5</td>
</tr>
<tr>
<td>1932</td>
<td>66.0</td>
<td>.8</td>
<td>2.4</td>
<td>76.4</td>
</tr>
<tr>
<td>1933</td>
<td>64.6</td>
<td>1.3</td>
<td>1.9</td>
<td>74.2</td>
</tr>
<tr>
<td>1934</td>
<td>68.0</td>
<td>1.8</td>
<td>2.0</td>
<td>80.8</td>
</tr>
<tr>
<td>1935</td>
<td>72.3</td>
<td>8.8</td>
<td>2.8</td>
<td>91.4</td>
</tr>
<tr>
<td>1936</td>
<td>79.7</td>
<td>9.3</td>
<td>3.9</td>
<td>100.9</td>
</tr>
<tr>
<td>1937</td>
<td>82.6</td>
<td>14.6</td>
<td>4.6</td>
<td>109.1</td>
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<tr>
<td>1938</td>
<td>81.3</td>
<td>6.8</td>
<td>4.1</td>
<td>103.2</td>
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<tr>
<td>1939</td>
<td>85.9</td>
<td>9.9</td>
<td>4.9</td>
<td>111.0</td>
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</table>

TABLE IIIb. CHANGES IN REAL MACROECONOMIC VARIABLES IN THREE PERIODS (Percentage Changes)

<table>
<thead>
<tr>
<th></th>
<th>1920-21</th>
<th>1929-30</th>
<th>1937-38</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNP</td>
<td>-2.4</td>
<td>-8.9</td>
<td>-5.4</td>
</tr>
<tr>
<td>Consumption</td>
<td>+6.4</td>
<td>-5.4</td>
<td>-1.6</td>
</tr>
<tr>
<td>Investment</td>
<td>-41.7</td>
<td>-35.6</td>
<td>-53.1</td>
</tr>
<tr>
<td>Exports</td>
<td>-14.2</td>
<td>-19.1</td>
<td>+1.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>1919-21</th>
<th>1928-30</th>
<th>1936-38</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNP</td>
<td>-3.5</td>
<td>-3.4</td>
<td>+2.3</td>
</tr>
<tr>
<td>Consumption</td>
<td>+11.6</td>
<td>-0.2</td>
<td>+2.1</td>
</tr>
<tr>
<td>Investment</td>
<td>-30.7</td>
<td>-27.8</td>
<td>-26.4</td>
</tr>
<tr>
<td>Exports</td>
<td>-19.7</td>
<td>-15.7</td>
<td>+29.8</td>
</tr>
</tbody>
</table>

NOTE: All variables are in 1929 prices, Investment and Exports refer to Gross Private Domestic Investment and Merchandise Exports.

via the multiplier effect. This is the essence of the spending hypothesis. In light of this important development which owes a great deal to Keynes, the leading post-World War II economists mostly supported and developed a theory along the idea forwarded by Keynes, especially in his *General Theory*. The Keynesian expenditure model, IS-LM, including Patinkin's system, was the direct result of such efforts. In spite of their wide acceptance, these models do not explain the underlying dynamic pattern of the Great Depression, nor do the econometric models succeed in that aim to support the validity of the spending hypothesis. The main cause of the failure to develop a systematic theory on the contractionary process can be found in the following account.

The cumulative income constraint process is essentially a dynamic process in which economic agents' adaptive response to the element of uncertainty precipitates repercussionary cumulative chain reactions. Once the repercussionary chain reaction is activated, it not only affects the commodity market but the remaining markets, namely, the bond, labor and money markets. The dynamic cumulative income constraint process is discussed in detail at the end of this chapter. Suffice it to point out that the effect does not limit itself to one particular market as many economists tacitly assume, nor does it limit itself to the domestic market. Therefore, the proper understanding of this important process necessitates development of economic dynamics

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4 For a detailed account of the analysis of econometric models on the spending hypothesis, see Temin, 1976:31-53.
which we sorely need. With this understanding, we now turn to the task of analyzing the implications of the 1974-1976 recession.

1974-1976 Recession

Variations of Product and Factor Input Prices as They Affect Effective Demand

The 1974 recession was spurred on by the oil price hike and the Arab oil embargo of December 1973. These events created a shortage of oil supplies and increased the price of oil. The sudden rise of the oil price had an impact upon the economies of the oil importing countries.

The impact of the increased oil price can in part be explained by examining the Hicksian theory of value. This classic theory treats income and substitution effects and the complementary-substitution relationship of commodities in an equilibrium framework.

Initially, we need to examine the substitution relations, assuming X and Y single physical commodities. The Hicksian theory of value states that when the price of product X increases over the price of all other physical commodities, Y, consumers will substitute Y commodities to replace X commodities previously consumed. The law holds in reverse. The deduction is based on the vital premise that Y is a substitute of X.

The substitution effect can be applied to the factor input market. Suppose a firm produced a fixed output of commodity X by employing three factors of production, A, B, and C. Suppose further that the price of A increases while the B and
C prices remain constant. The demand for A must necessarily contract, and the demand for B and C, which can be treated as a single factor of production, will expand at the expense of A. The occurrence is a result of the entrepreneur's substitution of factors B and C for the factor input A.

A complementary relationship prevails if the demand for one product, X, is closely related to or contingent on the price for a commodity, Y. If the increase of the price of Y calls for a reduced demand for X, we call it a complementary relationship. A rise in the demand for X because of the price increase of Y established a substitution relationship.

When the substitution and complementary effects operate simultaneously, an increase in the factor price of A may induce any one of these three events.

Given a firm produces product X employing two factor inputs, A and B:

a. The supply of product X may contract and the demand for the factor B may expand. (No complementary relationship present.)

b. The supply of X may be contracted and the demand for B may contract as well. (Here factors A and B are complementary.)

c. The demand for the factor B may increase and the supply of product X may expand.

The Hicksian logic is based on an inverted complementary relationship between factor and product. If factor A and product X are regressive, a substitution of B for A will increase the
marginal product of A in terms of X and subsequently result in an expansion of the supply of X (at given prices of B and X).

A price change of a commodity is always accompanied by the combined substitution and income effect. When the price of an item increases, consumers turn toward relatively lower price substitutes. The price rise lowers the consumer's real income, causing him to reduce purchase of all other normal commodities.

Even a large negative income effect may be outweighed by the substitution effect. Therefore, the demand curve for the commodity will slope downward. By the same analogy, an upward-sloped supply function can be derived. Hick's analysis of stability condition in relation to supply and demand is well known and widely accepted. The essence of the stability condition is that a rise in the price of X over Y will make the supply of X greater than the demand for X and thus increase the negative excess demand.

Hicks' analysis is based on supply and demand which generate income and substitution effects. Since, in equilibrium, supply equals demand with zero excess, the initial effect of an increase in price will make consumers worse off and the sellers better off by an equal amount. It follows that if the favorable income effect on the supplier's side is as strong as the unfavorable income effect on the demand side, the effect on negative excess demand will cancel out, leaving only substitution. In that case the excess demand curve slopes downward and equilibrium is stable (1957:64).
Unfortunately, Hicks' analysis of variation of prices in factor and product markets has only a limited usefulness as an analytic tool to estimate effective demand because he limited the analysis to the competitive equilibrium model, his main interest.

However, our pressing concern is not the stability condition of equilibrium but rather the derived effect on effective demand which may destabilize the overall economy.

By modifying and relaxing the competitive premises, a new analysis can be developed:

1. An increase in the price of product X (in this case gasoline) will make consumers worse off, and the sellers of product X better off. There will be income effects on both sides. In other words, the rise in the price of product X will increase the sellers' income while it lowers the consumers' real income, causing the consumers to reduce purchases of all normal goods.

If a reduction of real income (effective demand) of consumers is matched exactly by increased real income (effective demand) of producers, the attendant redistribution of income will have a neutral effect on the system. How is it possible that income effects will cancel each other and become neutral in the real world? To account for the situation we need to assess the degree of concentration of the industry (e.g., gasoline producers, car manufacturers, etc.) and the time factor.

If there is a disparity in the number of buyers and sellers, then the gain in real income for a few persons will not offset the loss in real income for many persons. In this case the effective demand will not be balanced (or neutral). The oil
industry is highly concentrated and the huge increase in income and profits generated by the increased retail price of gasoline depressed the economy by reducing effective demand.

Offsetting forces might have been activated if the increased income and profits had been plowed back into the system in the form of increased investment, wages, and distributed dividends. However, the offsetting force, which we might call a symmetrical condition, cannot be satisfied if there is a time lag between the generation of income, including profit and its distribution, or a great difference in the number of buyers and sellers who are likely to have different marginal propensities to consume.

Owing to the high degree of concentration in the oil industry, and the time lag between the generation of income and profit and the distribution of dividends to the stockholders whose marginal propensities to consume are different from those of the oil consumers, the effect will not be neutral and the economy will be adversely affected.

Moreover, when the product involved is an imported commodity such as oil (currently the U. S. imports more than 40 percent of its total demand for oil from OPEC countries), the adverse effect of an oil price rise on the economy is more devastating. The economic impact of the oil price escalation can be summarized:

The higher income from oil sales makes the OPEC countries better off by increasing their revenue while it makes the oil-importing countries pay higher prices, and, therefore, worse off.
The escalation of the oil price generated higher product prices in oil-importing countries. But the price rise of oil and its subsequent positive income effect on the OPEC nations was dampened in the long run because these countries had to pay higher prices for their imports. In the short run, however, the effect was not neutral and the additional payment to meet the higher cost of oil imports reduced effective demand in oil-importing nations.

Since the demand for oil is highly inelastic, the total payment by oil-importing nations for their import will go up even if the volume of oil imports declines. The reduced importation of oil will retard the overall economic activity, depressing the level of net national product. Oil price hikes increase the international balance of payment deficit of already financially burdened oil-importing countries, depleting foreign exchange reserves that could be used to buy capital goods and raw material. The international trade among the non-OPEC countries will be adversely affected. The increased oil price means a higher energy bill and higher cost of production. The higher cost of production is transmitted to an increased price of products and causes inflation. In turn, inflation reduces consumers' purchasing power and real balance. Subsequently, in light of the reduction of real balance, economic units will attempt to improve the real balance by cutting consumption expenditure which triggers the cumulative income constraint process, depresses effective demand and activates the deviation-amplifying mechanism...
through the multiplier effect. The cumulative income constraint process will be reinforced by the foreign repercussionary effect among the non-oil countries.

2. The variation of prices and their income effect can be applied to the factor market. The analytic argument is similar to that of the product market. The increased price of factor input makes the supplier of the factor better off, the entrepreneurs worse off. Since the factor input owners and employees are a different sort of people, it is likely that they will react differently to a change in income, creating a net income effect that may lead in a dangerous direction.

3. The most serious source of repercussions of effective demand, in conjunction with the variations of product prices, is found in complementary and substitution relationships and their induced effects on income and on effective demand.

A complementary relationship prevails if the demand for one product, $X$, is closely related to and contingent on the price for a commodity, $Y$. If the increase of the price of $Y$ calls for a reduced demand of $X$, we call it a complementary relationship, while a rise in the demand for $X$ because of the price increase of $Y$ establishes a substitution relationship. In the absence of substitutable goods, and an overwhelming presence of complementary relations, the increase of the price of $Y$ (oil), has, in the short run, far-reaching economic consequences on effective demand and the overall economy.

The increased price of oil reduced demand for cars, especially large cars, which are the main source of profit. This
partly accounts for the effect of the oil price increase and its repercussions on effective demand. The cumulative repercussionary effect on effective demand follows if the product, oil, has secondary tertiary supplementary relations with other commodities. The reduced demand for automobiles necessitates a decline in the demand for intermediate goods used in automobile production, and so depresses subsidiary industries. Because one out of ten jobs in the United States is related to the auto industry, the situation is grave. The oil price hike, and its effective demand, does not end here. The serious repercussionary effect will come from unfavorable aggregate income changes, namely, the mass withdrawal of transactions following higher oil prices and the ensuing cumulative income constraint process. The analysis of repercussionary effects in conjunction with the increased oil prices requires careful attention, and will be discussed. Suffice it to point out here that if the sudden increase of the oil price can induce global uncertainty, it can set into motion a dynamic cumulative income constraint process, i.e., a dynamic disequilibrium process, in which the initial reduction of effective demand brings about the cumulative decline of aggregate income with an increase in unemployment through the deviation-amplifying feedback loop. In fact, the 1973 oil crisis brought the largest recession since the depression of the 1930s.
Cumulative Dynamic Income Constraint Process

The initial setback in consumption expenditure in response to the oil price hike induced a worldwide recession and eroded overall business activities that can in part be explained through the dynamic cumulative income constraint process.

The tenet of the dynamic cumulative income constraint is somewhat primitive and incomplete, but it is central in explaining the vital process of recession.

Before a more complete theoretic concept is developed, a chronological exposition of it may be in order. It is ironic that Hicks' discussion of "false trading" at "false prices" and the subsequent effect on distribution led to the new theory of a cumulative income constraint which causes dynamic disequilibrium. Although "false trading" at "false price" generated a disequilibrium which he calls the distribution effect, he saw that the process did not invalidate the classic equilibrium analysis. He thought the distribution effect--the result of transactions at false trading and the subsequent income effect--would be offset by other forces acting on each other, since gains to the buyers mean losses to the sellers and vice versa (1957:129).

The challenge to Hicks' argument came from Clower and Leijonhufvud. Clower maintained that the crucial aspect of "false prices" is not the distribution effect which is the result of transactions at "false prices," but is an aggregative income effect when there are no transactions (Clower, 1969; Leijonhufvud, 1968:55-56).
Acknowledging Clower's contribution, Leijonhufvud maintained that if traders are not able to sell all they want at the prevailing "false prices," the initial shock, in the form of a reduction of sales, acts on effective demand and so depresses the economy. A cumulative income constraint is set in motion and amplified by feedback in which the multiplier effect plays a significant role (1968:56). Leijonhufvud, like Clower, acknowledges that the Keynesian consumption function includes the dependence of aggregate demand on realized household income.

Leijonhufvud observes that although an instantaneous across-the-board wage cut would restore the overall equilibrium of the system, once the deviation-amplifying feedback elements of the system are activated, the deviating-counteracting price adjustments become ineffective (1968:57).

The two most crucial aspects of the dynamic disequilibrium are left unexplained, namely, the dynamic factor and the role of uncertainty.

Uncertainty and the time element are not accounted for by classic theorists because the classic equilibrium is based on a static state. In the belief that the system is essentially capable of self-adjustment, classic theorists emphasized the equilibrium aspect and postulated the deviating-counteracting feedback mechanism. Keynes' General Theory, however, is dynamic and based on his conviction that the system is incapable of self-adjusting; the existence of uncertainty is not ruled out.

Uncertainty means the lack of knowledge about the occurrence and duration of some events, a situation where business
firms are not able to sell all they want at the prevailing prices. The cumulative income constraint process is the direct result of an organization's or economic agent's efforts in response to uncertainty.

When business firms are not able to sell all they want at the prevailing price, unwanted inventories accrue. The classic remedy in this situation calls for reduction of price so as to clear the market. This solution does not take into account the profit aspect. Reduction of price means firms incur some economic loss because the output is the result of factor inputs and other marginal input costs that enter into production. In other words, if time is taken into account, we need to differentiate the production of output, including cost of marginal inputs, from the sales proceeds of the end-product outputs. The production costs are always incurred before sales proceeds materialize. When expected sales fail to materialize, the firm finds itself with illiquid inventories and must reassess their future action. Any response to uncertainty with price reduction means the firm has incurred an economic loss.

The widespread practice of full-cost price setting reflects that price is a function of cost rather than of the quantity demanded in the market. For this reason firms generally are reluctant to make price adjustments.

Keynes' view, derived from Marshall, that firms will react to unexpected increase of inventories primarily with quantity adjustment measures, is vindicated. Even if firms respond with price adjustment—since Keynes' marginal efficiency
of capital is not only a function of the interest rate but of the future prospect of profit—the reduced prospect of future profit logically calls for reassessment of their capital spending program. This undoubtedly generates a depressing effect on aggregative income. Another point often raised by classic economists is that restraint on consumption spending implies a corresponding increase of savings and thus pressure on the interest rate. Whether the unexpected inflow of savings into banks will exert significant pressure on the interest rate to induce investment spending as a countervailing force is an academic question. Classical economists assume that with decreased demand for commodities followed by financing of an increased demand for bonds, given the demand for bonds is sufficiently sensitive to market forces, the full-employment equilibrium can be restored. If we accept Keynes' theme that firms confronted with unwanted inventories will respond with quantity adjustment, the initial setback of sales volume and proceeds can trigger the dynamic cumulative income constraint process by activating the deviation-amplifying mechanism. The impetus of this process is not dictated by impersonal physical or mechanical laws or inertia but by organizational and individual behavior.

In the business world, any accumulations of unwanted inventories generally accompany a reduction of the firm's realized cash revenue, which affects cash balances. To improve cash balances, the firms will react with quantity adjustment, i.e., they lower their inventories by reducing or canceling new orders and decreasing their rate of production.
The decline of sales proceeds necessitates cost reducing measures, especially reduction of payroll. It is correct to say that the firms not being able to sell "all they want means they cannot employ all they want," the neglected obverse side of unemployment (Patinkin, 1965:332).

Unemployment means loss of income by unemployed laborers and thus a reduction of effective demand in product markets, which in turn has further repercussions on aggregated income through the multiplier effect.

Confronted with adverse development of business activities combined with unemployment, the firms step up their information gathering activities in an effort to cope with the new situation. The increased inflow of adverse information makes decisions more time consuming and difficult. As uncertainty increases because of lowered expectations, the firms as well as individual economic agents take various measures to increase their liquidity and reduce uncertainty: a) liquidation of inventories, b) reduction of costs, c) cancellation of or reduction in the distribution of corporate dividends, d) reduction in capital spending, and e) improvement of liquidity position with the implementation of a more flexible asset structure.

Liquidation of Inventories. During uncertainty, because we lack foresight, and because of the cost of information gathering activities, stocks of goods held in inventory act as buffer stock. Firms determine the size of inventories by their storing cost and effective demand. The inventory is not determined by a single schedule but by upper and lower limits. A
large inventory may satisfy a sudden upsurge of effective demand; it nevertheless involves excessive costs. Thus the upper limit of inventory is a lagged function of sales volume.

With decreasing sales proceeds and rising inventories, the firms start unwanted inventory liquidation which is essential if the firms hope to improve return on assets employed and cash balances. The following is an example of what happened during the last contractionary period.

Automakers in Detroit initiated sharp cutbacks in the production of cars. The cutback is reflected in the automakers' October 1975 production plan which shows a contrast to the 1974 output.

<table>
<thead>
<tr>
<th></th>
<th>1975 plan</th>
<th>1974 plan</th>
<th>% of reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM</td>
<td>440,000</td>
<td>472,343</td>
<td>-6.8</td>
</tr>
<tr>
<td>Ford</td>
<td>200,000</td>
<td>224,752</td>
<td>-11.0</td>
</tr>
<tr>
<td>Chrysler</td>
<td>82,000</td>
<td>114,916</td>
<td>-28.6</td>
</tr>
<tr>
<td>AMC</td>
<td>37,000</td>
<td>33,762</td>
<td>+11.7</td>
</tr>
<tr>
<td>Total</td>
<td>759,000</td>
<td>845,773</td>
<td>-10.2</td>
</tr>
</tbody>
</table>


Only American Motor Company's production plan emphasized the small cars and their increase reflects the substitution effect from large to small cars.

As consumption expenditures dwindled, the inventory level rose to reach its highest point in January 1975, bringing inventory-sales ratio unprecedentedly high (see Figure 7).

Since 1975, the firms intensified liquidation of inventories, bringing them to their lowest level in May 1975, which
Figure 7. Inventories

Source: Monthly Chart Book, 1976, p. 42
was followed by an increase of unfilled orders and a subsequent time lag in production.

As the business recovery got underway, industry once again built up stocks. In August 1975, according to the Commerce Department, total business inventories rose to $1.29 billion, bringing the highest level since May 1975. Businessmen were voluntarily accumulating, because of the increase in inventories that happened while final sales were rising during the quarter of 1975. Retail sales accelerated to $50 billion, a 4.1 percent increase, compared to the second quarter with a 3.5 percent increase, as well as the first quarter with a 2.7 percent increase in the year (Commerce Department, August/September, 1975). The inventory build-up continued as the expansionary movement gained momentum. Inventory rebuilding was a major factor contributing to the first quarter of 1975 of economic expansion in the United States economy. Once inventory rebuilding was accomplished, the firms showed further accumulation. Whirlpool drastically slashed inventories in 1975 in response to the sharp drop in appliance sales. During the first quarter of 1976, "we did some inventory building to be able to handle demand as business improved," an official of Whirlpool indicated, "now stocks are in good shape." Though the company is optimistic about the outlook for the remainder of the year, "we aren't going to go out and build inventories further" the official added (Wall Street Journal, June 24, 1976). 

Reduction of Costs. When businessmen cannot sell all they want, they cannot employ all they want. Unemployment is the
direct result of the reduction of labor and material costs in the presence of declining sales volume and increasing inventories. The cost-cutting measures are not limited to the reduction of labor and material input costs. The implementation of innovative cost-cutting measures is essential if the firm expects to stay in business in the face of an adverse economic situation. The example of Emerson Electric Company gives an insight into the nature of cost-cutting measures.

During the economic recession in 1974, Emerson Electric wanted to trim manufacturing costs. After an intensive research and development program, the company developed a new motor using 10 percent less wire and 11 percent less electricity but delivering the same amount of power (Wall Street Journal, June 4, 1975). The implications of such adaptive behavior in the face of adversity are encouraging.

Adverse economic situations and efforts to cope with them induce innovation and invention, the by-products of production, by trying new technologic approaches or opening new sources of materials (Schumpeter, 1950:132).

When the economy is booming, firms are less likely to pursue cost-saving measures; it tends to increase organizational slack. Conversely, in an adverse situation, the firms are pressured to adapt. The organizational slack diminishes.

It is worthwhile to examine how the organizational slack may exert a stabilizing effect upon the system during the periods of cyclic upturns and downturns. The existence of organizational
slack generally tends to slow the adjustment of aspirations and to reduce the speed of adjustment (Cyert and March, 1965:38).

In other words, when the environment is less favorable, by providing a pool of extra resources, it allows aspirations to be maintained and thus tends to delay downward adjustment of aspirations.

Conversely, when the environment is favorable, by absorbing excess reserve in slack, it tends to delay upward adjustment of aspirations (Cyert and March, 1965:38).

Reduction in Distribution of Corporate Dividends. When sales fail to materialize, the firms find their liquid funds tied up in illiquid inventories. The reduction of sales proceeds accompanies the fall in net earnings. As net earnings diminish, the firms are pressured to conserve cash reserve to provide a better liquidity cushion against further depletion of liquid assets. To conserve cash, the firms will take the form of a partial or total omission of the distribution of corporate dividends in addition to the other measures described above. This is what happened during the contractionary period of the 1974 recession. In the first four months of 1974, 205 firms including General Motors, American Motors, DuPont and Libby-Owens-Ford cut or omitted dividends, compared to 74 firms taking such action during the same periods in 1973 (Wall Street Journal, May 16, 1976). As the contractionary movement progressed, there were altogether 314 cuts and omissions, more than double the total of 151 cuts in 1973. Such corporate behavior in the distribution of corporate dividends in time of adversity precipitates downward
pressures on effective demand and stock prices. The downward pressure on stock prices exerts an upward pressure on the interest rate, resulting in a reduction of investment demand. As the contractionary movement gained momentum in the beginning of 1975, the index of Dow Jones averages plunged below the 800 level whereas the interest rate remained high (see Table IV) and investment spending was low.

**Reduction of Capital Spending.** Keynes' insistence that entrepreneurs' decisions to acquire capital equipment should be considered in relation to a series of prospective returns opened a new dimension in economic thinking; the role of expectations (1936:135). According to Keynes, expectations are the means by which the changing future influences the present (1936:145). The role of expectations in economic analysis, especially in static equilibrium analysis, has long been considered problematical. Expectation deals with businessmen's beliefs about future economic events. Any change in long-term expectations regarding the future economic activities affects the amount of capital spending by altering entrepreneurs' investment decisions. The importance of long-term expectations in relation to capital spending can be found in the attributes of capital yields. Because capital is durable and yields value to its user over a long period of time, any foreseeable fluctuation in expected income will inevitably revise the investment decisions of the entrepreneurs. The current levels of output, sales and costs have a significant bearing on the expectation of profitability, and affect investment decisions. Although temporary low profit
<table>
<thead>
<tr>
<th>Date</th>
<th>Price</th>
<th>Bank rates on business loans*</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 30, 1970</td>
<td>760.8</td>
<td>8.48</td>
</tr>
<tr>
<td>September 30, 1971</td>
<td>887.19</td>
<td>6.32</td>
</tr>
<tr>
<td>September 29, 1972</td>
<td>953.27</td>
<td>5.82</td>
</tr>
<tr>
<td>September 28, 1973</td>
<td>947.10</td>
<td>8.30</td>
</tr>
<tr>
<td>September 30, 1974</td>
<td>607.87</td>
<td>11.28</td>
</tr>
<tr>
<td>September 30, 1975</td>
<td>793.88</td>
<td>8.65</td>
</tr>
<tr>
<td>September 30, 1976</td>
<td>990.19</td>
<td>7.57</td>
</tr>
</tbody>
</table>

*Average for year for 35 centers.

margins do not mean entrepreneurs will suspend investment in equipment which may reduce the operating costs, it has been shown that low profit margins during contractionary movement bring the drastic reduction of investment expenditures (see Figures 8a and 8b). The magnitude of the reduction depends on the degree of the uncertainty and the existing level of idle production capacity.

As we witnessed in 1974, as soon as the contractionary movement gained momentum, companies delayed or canceled capital spending programs. According to McGraw-Hill Publishing Company, major corporations had planned a 5 percent rise in plant and equipment outlays for 1975, a significantly smaller increase than the 12 percent forecast during fall of 1974 (Wall Street Journal, May 21, 1975). According to the Conference Board, a New York research organization, the nation's 1,000 largest manufacturers plan to spend $45.3 billion on plant and equipment in 1976, down from $46.1 billion, 21 percent below the $56.9 billion in 1974. As a result of this caution, suppliers of capital goods have seen incoming orders plunge. According to the Wall Street Journal, producers of machine tools experienced a 61 percent decline in orders during the first nine months of 1975. Companies making other capital goods ranging from heavy trucks to textile machinery also noted sharp declines in orders (Wall Street Journal, November 10, 1975). Such cutbacks in capital spending were inevitable because of cash shortages which followed the business slump. When the economy is sluggish, firms press for increasing returns on investment, generally by minimizing capital outlays and making existing capital work harder. Ford Motor
Seasonally Adjusted Annual Rates, Quarterly

Figure 8a. Corporate Profits

Figure 8b. Plant and Equipment Spending

Company cut 1975 spending below initial projection by deferring or eliminating some $700 million, from the $800 million projected in January and the $832 million actually invested in 1974 (Wall Street Journal, November 10, 1975).

In the last quarter of 1975, with many factories running far below capacity, interest rates remaining high, and the economic outlook cloudy, companies were spending budgeted 1976 capital cautiously. Coming after a recession, companies like to wait until they are sure of a solid recovery before they boost capital spending again. As the National Bureau of Economics Research states, business spending on plant and equipment continues to be a lagging economic indicator (Wall Street Journal, May 21, 1975).

**Improvement of Liquidity Position with the Implementation of More Flexible Asset Structure.** The reduction of output with ensuing unemployment and inflation created global uncertainty. The efforts of economic agents to improve their liquidity position took two forms: a) a cumulative postponement or cancellation of plans to purchase durable goods such as automobiles, homes and heavy appliances, and b) a cumulative reduction in the amount of outstanding debt, the result of consumers' paying off their aging financial commitments.

Facing sudden price increases and resulting decline in his purchasing power, the consumer feels insecure and has low confidence in his economic future. As a means of coping with this uncertainty and in an effort to consolidate his financial position, the consumer cuts back his spending, especially durable
goods (see Figure 9). This cutback reduces new credit installment spending because the consumer is reluctant to engage in long-term financial commitments (see Figure 10).

In an effort to strengthen his financial position, the consumer reduces his previous contractual obligations by decreasing the amount of his outstanding debts. This was demonstrated in March 1975, when consumers trimmed their debt by $462 million. The reduction marked the fourth such consecutive decline in five months. It was also the third largest drop on record, exceeding only the $877 million contraction in December 1974, and $583 million in January 1975. The consumer's efforts to consolidate his liquidity position by conserving his liquid financial assets or by reducing the amount of his previous debts induced the curtailment of effective demand. This curtailment, combined with the entrepreneurs' responses, exerted a depressing effect on the economy, further accelerating the contractionary movement.

In view of the economic effect induced by the consumer's cautious behavior, we are able to reinforce the legitimacy of Keynes' cliche, "the paradox of thrift." He asserts that an individual's effort to save more to enhance his own financial stability, a virtue from his point of view, may foster economic difficulties for the nation. Applying the Keynesian concept to the contemporary economic situation, we must consider the amount of the installment debt obligation carry-over from the previous years as a "predetermined forced saving." Essentially, the consumer is forced to honor previously committed contractual
Seasonally Adjusted, Monthly

NEW ORDERS

TOTAL

DURABLE GOODS

CAPITAL GOODS:

NONDEFENSE

DEFENSE

SHIPMENTS

TOTAL

DURABLE GOODS

UNFILLED ORDERS

DURABLE GOODS

END OF MONTH

Figure 9. Manufacturers' Orders and Shipments

Figure 10. Consumer Installment Credit

Source: Monthly Chart Book, 1976, p. 49
obligations, regardless of his income. The money that could have otherwise entered the spending stream must be used to meet the accumulated debts. An acceleration in the accumulation of predetermined debt obligations, which may arise during prosperity, carries the seed of danger because it acts as a depressant in the cumulative income constraint process. As a result, the savings rate will be rising even though the income level is falling (see Figure 11).

We can demonstrate a similar, but inverse, relationship between the rate of savings and the rate of income change during recovery. As the economy stabilizes and the income level rises, the consumer's confidence in the economy naturally improves. The consumer begins to purchase the durable commodities in which he was reluctant to invest during the recession. As he increases his rate of consumption, his savings rate declines because he incurs greater debt and simultaneously becomes committed to more predetermined savings of the future. This increased consumption of durable goods can only continue to the point where consumer demand will be satiated. During the recovery period, the savings rate declines as the income rises to the net depletion level of predetermined savings incurred during the previous recession. This startling new finding does not support the Keynesian hypothesis or Duesenbery's secular consumption function, which purports a positive and linear relationship between income and savings during secular fluctuations.

The popularized Keynesian consumption function is based on the a priori assumption that with falling real income, both
Figure 11. Personal Income, Consumption, and Saving

Source: Monthly Chart Book, 1976, p. 18
savings and consumption would decline. The assumption does not hold if falling real income accompanies uncertainty and economic agents respond to uncertainty by consolidating their liquidity position, either increasing liquid assets or installment credit payments. Under this behavioral assumption, saving either stays the same or even momentarily rises while real personal income decreases.

Table V, Quarterly Real Income, Savings, Total Outstanding Credit and Repaid Credit, 1970-1976, strongly supports our contention. As the quarterly real income declines in 1975, the total amount of quarterly personal savings increases by an average of $72.7 billion in 1974 to $83.97 billion in 1975 which represents a 16 percent increase over the previous year (see Table V).

During the same period, the quarterly total net change of credit declined sharply from $5021 million in 1973 to $1102 million in 1975, on the average. It is significant to note that such a sharp decline reflects consumers' efforts to improve their liquidity positions by stepping up the amount of credit repaid while reducing the total amount of credit extended.

As the recovery movement set in during 1976, the level of personal savings tended to decline while there was a moderate increase in the volume of total outstanding credit. Consequently, real consumption expenditure could drop as much as income or more, savings either fully offsetting or declining because of the increased debt payment.

<table>
<thead>
<tr>
<th>Year</th>
<th>Quarter</th>
<th>Y (Billion)</th>
<th>S (Billion)</th>
<th>C1 (Million)*</th>
<th>C2 (Million)</th>
<th>C3 (Million)</th>
<th>N (Million)</th>
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Continued...
**TABLE V: Continued.**

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<thead>
<tr>
<th></th>
<th>Y (Billion)</th>
<th>S (Billion)</th>
<th>C1 (Million)*</th>
<th>C2 (Million)</th>
<th>C3 (Million)</th>
<th>N (Million)</th>
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<td>1975</td>
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<td>43709</td>
<td>41283</td>
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<td>45004</td>
<td>42745</td>
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<td>1976</td>
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<td></td>
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<td>79.5</td>
<td>195205</td>
<td>48347</td>
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<td>3976</td>
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<td>II</td>
<td>805.1</td>
<td>82.9</td>
<td>199446</td>
<td>46408</td>
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<td>4242</td>
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<td>72.9</td>
<td>208255</td>
<td>48520</td>
<td>43890</td>
<td>4630</td>
</tr>
</tbody>
</table>

*The IV Quarter of 1975 and the four quarters of 1976, the total credit was obtained by adding net change to the previous quarter total credit.*


**Notes:**

#1 - To calculate the constant dollar figures, the Consumer Price indexes have been taken from Monthly Labor Review, U.S. Department of Labor, January 1953 to March 1977.

#3 - Total credit figures were compiled by adding up the individual reporting figures for a given month by quarterly increments and then dividing the sum by 3.

Continued...
TABLE V: Continued.

Notes: Continued.

<table>
<thead>
<tr>
<th>Year</th>
<th>Credit Extended</th>
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</thead>
<tbody>
<tr>
<td>1970 Jan</td>
<td>121074</td>
</tr>
<tr>
<td></td>
<td>120077</td>
</tr>
<tr>
<td></td>
<td>119698</td>
</tr>
<tr>
<td></td>
<td>360849</td>
</tr>
</tbody>
</table>

360849 divided by 3 = 120283

#4 - Credit extended is the total amount extensions referring to commercial banks, finance companies, other financial lenders, retail outlets. Taken from Federal Reserve. This figure is created by adding up the total of the given quarter, e.g.,

<table>
<thead>
<tr>
<th>Year</th>
<th>Credit Repaid</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970 Jan</td>
<td>8521</td>
</tr>
<tr>
<td></td>
<td>8625</td>
</tr>
<tr>
<td></td>
<td>8392</td>
</tr>
<tr>
<td></td>
<td>25538</td>
</tr>
</tbody>
</table>

#5 - Credit repaid is the total amount of repaid credit from the same sources as represented in Credit extended. Calculation is similar.

#6 - Total net change in credit is the calculation of credit extended from credit repaid.

Notes: The total credit figure is the gross amount of all credit. The figures for credit extended, credit repaid and total net change are subtotal of this category. Numbers 3, 4, 5, 6, taken from Federal Reserve Tables. Because of the reporting format change which was instituted by the Federal Reserve, some of the figures and total will not match exactly. However, all the figures are available from the tables through routine calculations.
We can show the extent of the necessary reduction in income will depend on the extent to which the reduction is allocated between savings and consumption. Table VI illustrates the levels of total saving, $S_T$, and consumption, $C$ at the various levels of income, $Y$, under this new assumption.

### TABLE VI. HYPOTHETICAL REAL INCOME, CONSUMPTION AND SAVING

<table>
<thead>
<tr>
<th>$Y$</th>
<th>$C$</th>
<th>$S_T$</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>85</td>
<td>15</td>
</tr>
<tr>
<td>95</td>
<td>78</td>
<td>17</td>
</tr>
<tr>
<td>90</td>
<td>72</td>
<td>18</td>
</tr>
<tr>
<td>85</td>
<td>67</td>
<td>18</td>
</tr>
<tr>
<td>80</td>
<td>63</td>
<td>17</td>
</tr>
</tbody>
</table>

The numerical example above can be stated algebraically:

$$S_T = -0.02(Y^2) + 3.5Y - 135$$

Where $S_T$ and $Y$ represent total saving and real income, respectively.

Thus,

$$15 = -0.02(100)^2 + 3.5(100) - 135$$

$$17 = -0.02(95)^2 + 3.5(95) - 135$$

$$18 = -0.02(90)^2 + 3.5(90) - 135$$

\[ \vdots \]

$$17 = -0.02(80)^2 + 3.5(80) - 135$$
As the real income level declines, the savings level momentarily increases, then begins to decline after reaching the peak income levels of 90 and 85. The behavioral aspect of the total saving schedule can be explained with the functional equation:

\[ S_T, S(Y) + L [U(Y), V] \]

Where \( S_T \) is "total saving," \( S \) is saving, \( Y \) is real income, \( L \) is the volume of installment credit payment, \( U \) is uncertainty and \( V \) is the volume of outstanding loans. The total saving schedule will be characterized by these functions: a) saving is an increasing function of real income \( Y \) and thus \( \frac{dS}{dY} > 0 \); and b) the volume of installment credit payment is a function of uncertainty which, in turn, is a function of real income \( Y \) and the qualitative property of the cross partial derivative, \( \frac{dL}{dU} \frac{dU}{dY} < 0 \), meaning the fall of real income increases uncertainty and the increased uncertainty raises the volume of installment credit payments. It follows that if a reduction in real income and saving is more than offset by the increased volume of installment credit payments, the total saving schedule must rise. The relationship between real income and total saving \( S_T = S + L \) are illustrated in Table VII.

As the table shows, the decline of savings is more than offset until the reduction of real income reaches 85; consequently, the total savings steadily rise to that point and then start to decline.
TABLE VII. THE RELATIONSHIP BETWEEN SAVING AND THE VOLUME OF INSTALLMENT CREDIT PAYMENTS AT VARIOUS LEVELS OF REAL INCOME

<table>
<thead>
<tr>
<th>Y</th>
<th>S</th>
<th>L</th>
<th>S_T</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>10</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>95</td>
<td>9</td>
<td>8</td>
<td>17</td>
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<tr>
<td>90</td>
<td>8</td>
<td>10</td>
<td>18</td>
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<tr>
<td>85</td>
<td>7</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>80</td>
<td>6</td>
<td>11</td>
<td>17</td>
</tr>
</tbody>
</table>

We can show a similar function by extrapolating consumption rather than savings:

\[ C = 0.02 Y^2 - 2.5Y + 135 \]

\[ 85 = 0.02(100)^2 - 2.5(100) + 135 \]

\[ 78 = 0.02(95)^2 - 2.5(95) + 135 \]

\[ 72 = 0.02(90)^2 - 2.5(90) + 135 \]

\[ \vdots \]

\[ 63 = 0.02(80)^2 - 2.5(80) + 135 \]

The relationship between total saving and consumption is shown in Figure 12.

At the initial level of national income \( OY \), the corresponding consumption and savings levels are represented by \( C_1Y_1 \) and \( S_1Y_1 \), respectively. As contraction sets in, the level of income drops from \( OY_1 \) to \( OY_2 \). The consumption expenditure decreases from \( C_1Y_1 \) to \( C_2Y_2 \), whereas total savings increase from \( S_1Y_1 \) to \( S_2Y_2 \). The cumulative reduction of consumption
Figure 12: Dynamic Consumption and Saving Function
expenditure and increase of total savings may continue until it reaches OY₃, and any further decline of income will accompany not only the reduction of consumption expenditure but increase the level of saving. With the given volume of outstanding loans, the greater the uncertainty, the less the consumption expenditure and the more an increase of total savings.

The economic implications of such behavioral characteristics of consumption and savings schedules are evident. If increased savings fail to match increased investment expenditures, there will be further reduction of aggregate income. The installment debt obligation which an individual carries from previous years, a "predetermined forced saving," and accelerated payoff may act as a depressant during the downswing and precipitate cumulative income constraint process.

Another pertinent question often raised by classic economists is whether the unexpected inflow of savings into financial institutions will exert significant pressure on the interest rate. If so, will the lower interest rate induce enough investment to reduce the contractionary downward movement?

The situation after the 1974 recession was contrary to that of classic theory. The volume of loans did not increase during the recession as supposed by the classic economists. The reasons are twofold: a) The commercial banks charged a relatively high interest rate and consequently the volume of loan demands contracted. The high interest rate is mainly ascribed to two accounts. First the recession instigated a large default rate which increased the cost of lending. Second, the high
inflation that emanated from oil price hikes and the ensuing expectation of inflation in the future forces the banks to raise their lending rates so as to offset the probable decline of real rate of interest. b) The recession slackened the demand for loans because consumers and businessmen inflicted with uncertainty were reluctant to increase long-term debt. Nevertheless, the inflow of savings remained high, and subsequently the banks were left with large sums of (available) funds. In their search for safe investment opportunities, the banks decided to increase their purchases of United States government securities (see Figures 13a and 13b).

Table VIII traces the growth of commercial bank loans, security investments, and demand deposits as well as the growth of the GNP from 1951 to 1975. Table VIII clearly depicts the close relationship between the banks' loan and investment activities and the overall condition of the economy. We can see that the growth of bank loans slackened in the recession years—1953-1954, 1957-1958, 1960-1961, and 1974-1975 with the exception of 1970. 5

Simultaneously, the GNP remained sluggish in 1953-1954, 1957-1958, and 1974-1975, and it increased slowly during the recession of 1960-1961. Contrastingly, the banks' growth of bank loans increased in 1970 as a result of the expansionary monetary policy of the Federal Reserve. It allowed banks to increase loans and, in addition, step up their investments in U. S. government securities. During 1970, money supply increased by 5 percent which reserve requirements on time deposits in excess of $5 million were reduced.
Figure 13a: Gross National Product (GNP) and GNP in 1972 Dollars

Figure 13b: Bank Loans, Investments

<table>
<thead>
<tr>
<th>Year</th>
<th>Commercial Bank Loans</th>
<th>U.S. Gov't Securities</th>
<th>Other Securities</th>
<th>Demand Deposit</th>
<th>GNP</th>
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<td>50.4</td>
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<td>79.4</td>
<td>144.8</td>
<td>112.1</td>
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<td>1976</td>
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<td>91.4</td>
<td>145.9</td>
<td>115.5</td>
<td>1691.3</td>
</tr>
</tbody>
</table>

investments in government securities increased substantially in each of these years.

For example, during the recessionary period, 1974-1975, the volume of U.S. government securities held by commercial banks rose from $50.4 billion in 1974 to $79.4 billion in 1975 which marks more than a 57 percent increase from the 1974 level. Contrastingly, during the prosperity period, 1972-1973, the volume of government securities held by commercial banks declined from $61.9 billion in 1972 to $52.8 billion in 1973. Such striking behavior of commercial banking institutions during economic fluctuations simply contradicts the old classical theme that the increase of loanable funds will be directly channeled into the investment spending via a lower interest rate.

A summary cumulative income constraint process follows. Suppose consumption expenditure declines in the household sector. This restraint will be instantaneously transmitted to the business sector in the form of a reduction of sales volume for goods. As the curtailment of sales volume and sales proceeds follows with the accumulation of illiquid assets, the business firms' balance sheet will undergo various unfavorable transformations, showing adversely affecting ratios, namely, current ratio, debt ratio and activity ratio. Because of adverse development on the balance sheet, the firms are pressured into taking correcting action through their decision-making processes. At the initial stage of business downturn, the firms' attempts to improve their liquidity positions will mainly appear in two forms. First, in retail business firms, precious assets are tied up in illiquid
inventories; they will attempt to reduce their inventories by placing either a smaller quantity of new orders or by cancelling all new orders. The cancellation of new orders adversely affects manufacturing firms and as a result they are forced to cut the volume of production by lowering the rate of production. Second, since precious assets are being tied up in illiquid inventories and sales proceeds are declining, the firms will not be able to retain the current level of employment. A reduction of the level of employment by firms is inevitable. This means increased unemployment. The business firms' decision to reduce the level of employment not only adds new uncertainty in the household sector, but reduces effective demand because of declining realized household income as well. The reduction of realized household income curtails consumption expenditure for goods. The reduced consumption expenditure and effective demand reverberates to the business sector, bringing a further increase of unwanted inventories. As time elapses, the income constraint process will be revived and amplified via the multiplier effect. With the increase of adverse information transmitted, the degree of uncertainty increases in both sectors. The adverse trend deepens; there are increased pressures on firms and consumers to take further corrective measures.

In the household sector, consumers will reduce the total amount of outstanding loans. Since the loan payment can only be made at the sacrifice of consumption expenditure, it can be considered a predesignated saving. If the household sector accumulated a large volume of outstanding loans during the initial
stage of the income constraint process, the volume of savings may increase although the level of realized aggregate income is declining. During uncertainty with reduced employment and household income, consumers reduce purchases of durable commodities which require long-term commitments. The consumers' decisions to reduce their purchases of durable commodities affects a handful of large firms in heavily concentrated industries, and any depressing effects on them is quickly transmitted to subsidiary firms which supply parts for durable goods. The adverse supplementary effect and the resulting reduction of effective demand will reduce the subsidiary firms' production. The business concerns will be pressured to curtail the distribution of corporate dividends as their liquidity positions deteriorate with lower sales proceeds and lower profits. This measure is inevitable if the firms expect to retain more cash at hand. The cancellation of corporate dividends not only reduces the household realized income but also depresses the bond market. Because of the cumulative reduction of sales volume, firms will attempt to liquidate the remaining inventories, bringing further reduction of production and employment. As uncertainty deepens, firms will either sharply reduce the amount of capital spending on new equipment and plants or completely suspend them. The curtailment as well as the suspension of capital spending is the direct result of the following considerations: First, as business activities are in a slump with the decline of net profit, the long-term expectation, which affects the current demand for investment, is beclouded and becomes less attractive. Second,
with the development of idle productive capacities, which followed from the curtailment of the volume and the rate of production, any incentive to add new capital equipment no longer exists. Third, as business activities slacken with the reduced inflow of sales proceeds and profit, the business firms' attempts to secure the funds needed for new capital equipment become increasingly more difficult. The difficulty to secure necessary capital funds is reinforced by an increase in the financing cost through the bond market and the reluctance of commercial banking institutions to grant loans. To begin with, the slackened business activities and lower sales revenue and profit inevitably exert adverse effects on bond prices. With lowered bond prices, the provision for capital funds via the bond market becomes a costly affair. Second, with business failures rising, the risk of their defaulting on bank loans increases. The banks are reluctant to lend since they, like business firms and consumers, prefer a more flexible asset structure to improve their liquidity position. The banks seek safer alternative sources of investment. Only government bonds can satisfy the conditions—flexibility of assets with improved liquidity and safety of investment. The banks naturally purchase more government bonds. The funds which flow into banks during the contractionary downturn fail to be rechanneled into the business sector through loans and also fail to reverse the downtrend. As the default rate increases, the banks increase the interest rate charged to business and consumers even though the loanable funds have increased in the banks. Therefore, the popular classic tenet that a large inflow
of loanable funds into the banks will exert downward pressure on the prevailing interest rate and the lower interest rate will stabilize the aggregate income by increasing investment is not only untenable but is not an observed fact. The portrayal of the banks' behavior vindicated Keynes' tenet that the capital market does not contain an automatic self-adjusting mechanism which through the interest rate insures equality between planned savings and realized investment at the level of full employment. As the system fails to generate self-correcting forces, the dynamic cumulative income constraint process will be sustained and precipitated by activating the deviation-amplifying feedback mechanism via the multiplier effect. Without purposive redirection by the government, the economy cannot avoid the prolonging misery of unemployment and reduced aggregate income in spite of potential plenty.

The Foreign Repercussion Effect

The domestic economic activities and their fluctuations directly affect foreign economics via international trade. The phenomenon of a business cycle's development in one country transmitted to another through international trade is called the foreign repercussion effect. This effect is essentially dynamic and its significance has long been neglected in static equilibrium analysis.

Suppose the United States economy is undergoing a cumulative income constraint process after either an uncompensated downward shift of consumption demand or a reduction of investment
demand. The United States economy will experience a cumulative reduction of income and employment level and, in turn, will reduce imports from abroad. The reduced imports into the United States and the consequent fall of exports from other countries into the United States will exert downward pressures on the levels of income and employment in these countries. The curtailment of income in these countries will force them to cut their volume of imports from the United States. The initial impact of lowered income in the United States economy has caused further income drops. The dynamic sequence of the foreign repercussions may continue because lower imports from the United States by other countries will further depress our economy and once more reverberate into other nations. The repercussion effect can be applied to an upward movement in which its impact is reversed.

The degree of the foreign repercussion effect will largely depend on the size of the foreign trade multiplier. The smaller the marginal propensities to save, and the smaller the net tax and import cost in the domestic economy, the larger the repercussion effect.

When marginal propensities are small, the multiplier is large. The effect on the domestic level of any given change in exports is considerable. In the foreign country, a high marginal propensity to import will, ceteris paribus, create a greater repercussion effect on its domestic economy. The importance of the dynamic linkage of foreign transactions on the level of income and employment in various countries was well demonstrated during the 1974 worldwide recession.
I will now recapitulate some of the sources of instabilities in our system.

The well-being of our economic system heavily relies on the performance of a handful of concentrated industries which produce strategic inputs, oil and steel, and products, automobiles and housing. If there is any disruption of production or adverse change of prices of these commodities, it depresses not only the industry involved but the overall economy. The high degree of concentration in these industries was a result of vertical integrations which yielded cost advantages. The lack of free entry and of substitutable goods in these industries fails to generate a counteracting income effect. If a strategically important produce has secondary and tertiary supplementary relations with subsidiary firms, any disruptive effect on the demand for the product is automatically transmitted to the subsidiaries and depresses their output.

Recent experience has taught us that the price increase of oil induced overall price rises in commodities because of higher energy bills and resultant inflation. Inflation means decline of real balance and reduction of purchasing power. Consumers attempt to consolidate their financial position by increasing liquidity. Consumers' efforts to improve their liquidity by reducing consumption expenditures exerts a downward pressure on effective demand. Therefore, if the performance of the system is dependent on strategic input materials that can only come from foreign countries, the system is instability prone, since any change in price of supply of these products will
have a repercussion, either inflation or bottleneck. Oil is the example par excellence.

The increasing volume of international trade among industrial countries brought about a close economic linkage. Any fluctuation of one nation's economy, especially of a wealthy nation, with a change in aggregate income and imports directly transmits its effect on the other nations by triggering a chain reaction and inducing a decline of aggregate income and employment.

Another source of instability lies in consumer debt management. The installment debt obligation which an individual carries from previous years works as a "predetermined forced saving," and an acceleration in the accumulation of predetermined debt obligation during upswing may act as a depressant, precipitating the cumulative income constraint process during downswing.

Unlike the classic behavioral hypothesis, financial institutions as a profit organization reinforce the impetus of instability by precipitating the cyclic movements rather than operating as a deviation-counteracting element. During downswing, confronted with the large influx of savings and uncertainty, banks seek a safe source of investment and find it in government securities. As a consequence, the downswing accompanies the curtailment of bank loans and further precipitates depressing effective demand.

Another cause of instability is the time lag between the generation of corporate earning and its distribution and the
unequal number of buyers and sellers who have different marginal propensities to consume.

Finally, according to classics, the nature of the system is such that any instability induced by an adverse effect of a single strategic variable always accompanies a compensating stabilizing effect of either one or more variables so as to restore overall equilibrium in the system.

In our analysis, the attributes of organization structure generate adverse effects on strategically important variables which affect other variables. The effort to stabilize one or more variables necessitates interactive effect from yet other variables. It follows that an organization's attempts to stabilize an adverse effect of a strategically important variable in view of global uncertainty inevitably cause interactive effects within and without other organizations in the system. These, then, take similar actions so that cyclic instability with repercussionary chain reactions is the inevitable consequence.

Therefore, the analytic essence of our economic system lies between the two different theoretic systems; one does not contain the element of uncertainty; the other acknowledges uncertainty and designates its role within a macroeconomic perspective. Under which conditions, we now should ask, do an organization's attempts to stabilize interact with other organizations and precipitate repercussionary chain reactions? The answer can be found in the attributes of global uncertainty. By global uncertainty, we mean that all organizational units, including individual economic agents, to a varying degree adhere to the opinion
that the adversity in which they find themselves, fails to
generate definite information regarding its nature and duration.
Such opinion may not necessarily be pronounced, but may be
exhibited in liquidity seeking behavior for a flexible asset
structure. Once the system is afflicted by a global uncertainty,
all organizational units seek to reduce the impact of uncertainty
by improving their liquidity position with the implementation of
a more flexible asset structure. As organization's concerted
efforts to improve its liquidity position inevitably draw inter-
active responses from other organizations and so accelerate the
time rate of change for all organizations in the system, this
expedites the repercussionary chain reactions and cyclic down-
swing. The time rate of change for one organization may be
different from that of another. Yet, if the environments are
changing, organizations' behavior will have to reflect these
changes if they expect to survive adversity. Every firm's
decision-making mechanism has a built-in feedback control system
to respond to adversity in the environment. The organizations'
concerted actions for adaptive adjustments during adversity
accelerate the time rate of change and increase cyclic insta-

bility by amplifying uncertainty. This is the neglected "paradox
of liquidity," a parallel to the "paradox of thrift."

In balance, the forces of instability, once activated, so
far outweigh those of stability, namely, reduced prices and wages,
that a momentum of instability dominates the system and moves it
toward global jeopardy.
We should now turn to the question of policy measures. Obviously, the policy maker must find a way to contain uncertainty and to release corrective forces in order to remove structural instabilities.

Since the well-being of our economy relies heavily on the performance of a few concentrated industries, it is imperative that policy measures remove the sources of instability and insure adequate performance of these industries. Suppose adversity in one of these industries was the result of a reduction of effective demand for a durable commodity, the automobile. The government's effort to revive effective demand may call for a tax relief measure. Because the commodity will mainly be purchased by the middle income group, the tax relief measure should be directed toward that group in the form of a tax rebate rather than a tax reduction. However, if adversity is the result of an undue increase in price, governmental price regulation could stabilize the economy and abort potential structural inflation.

If a depression in one critical industry was the result of a labor-management dispute and stopped production, the government should resolve the dispute and insure continuous production.

As long as the well-being of the United States economy is dependent on a strategic raw material, oil, most of which is imported, it cannot avoid instability. To insure a sustained stability of the economy, the United States must find or develop a substitute for oil or find a domestic source of it. By improving fuel conservation measures and diversifying transportation by developing mass transit systems, the economy can avoid
dependence on the performance of the auto industry and its subsidiary industries. Nonetheless, as a short-run measure, the following policy and its implementation may be helpful in reducing the impact of an abrupt increase in oil price or a disruption of oil supply. By an effective economic alliance, the major oil-importing nations must exercise their countervailing power against the OPEC cartel and prevent further undue increases of the price of oil. As a supplementary policy, the government must stockpile a large reserve of oil and use it to stabilize oil price when OPEC demands an immoderate increase. For close international economic linkage, the world financial organizations—IMF and World Bank—must play more significant roles for world economic stability. By attracting OPEC revenues and strengthening their financial assets, IMF and the World Bank should make easy credit available to nations that seek financial assistance during worldwide cyclic downswings.

New government regulations are needed to prevent undue increase of the volume of the debt during an upswing. With such a regulation, the economy, to a degree, can control violent cyclic fluctuation.

The seeking of safe liquid assets by financial institutions during downswings generally reinforces the impetus of chain reactions and fails to act as a deviation-counteracting element. The federal reserve system should, therefore, create a deviation-counteracting agent by federally guaranteeing loans to individuals.
To mitigate the adverse effect of the market imperfection, these remedies are suggested:

Congressional legislation that will expedite the distribution of corporate dividends is a suggestion.

A federal tax measure that is directed toward more equal income distribution is another suggestion. Since an oil price increase benefits the gasoline producing industry while it worsens the lot of consumers, the tax measure should include imposition of a corporate profit tax for the industry and a tax rebate for the consumer.

With each oil price increase, a large volume of foreign exchange reserve flows into the OPEC countries. The United States can create investment opportunities to lure potential investors of OPEC countries so that part of the oil revenue is plowed back into our domestic economy.

The success of an economic policy will depend on whether its implementation can abort the cumulative income constraint process by reducing uncertainty and reinstating consumer/entrepreneur confidence. The policy measure favors the fiscal side over the monetary side. The monetary policy apparatus, which is assumed to operate via the rate of interest and investment during cyclic downswing, generally proved to be ineffective as a deviation-counteracting agent. Its ineffectiveness follows from two conflicting aspects, namely, the lack of effective demand and inflation. Effective demand is remedied by a boost of the money supply by the Federal Reserve System, while inflation necessitates restraint on money supply. Consequently, the degree of
freedom which can be exercised by the monetary authority is somewhat reduced. Because the cumulative income constraint process is accompanied by increased idle productive capacity, any attempt to stimulate investment activities via variation of the money supply and interest rate without first absorbing the existing idle capacity will increase inflation. As a corollary, the restraint on inflation by the imposition of available monetary policy must be preceded by the implementation of a stimulative fiscal policy.

Once the cyclic downswing is reversed by external intervention, upswing will soon peak, and instead of settling at an optimum optimorum, a cyclic downswing will once again take over. A brief note of this intricate behavior may be in order.

Assuming that purposive government action has converted the trend of a cyclic downswing into an upswing, a favorable movement of one of the strategically important variables precipitates the movement of other interrelated variables, and thus induces a global prosperity. One may question whether the pattern of a cyclic downswing and that of a cyclic upswing is symmetrical and whether the trend of an upswing will continue forever. The subsequent analysis indicates that the trend of an upswing is not likely to continue and will not settle at the optimum optimorum owing to the intricate nature of investment and consumer behavior.

As business activities expand, so does the demand for loans by consumers and business firms to facilitate an increased volume of transactions. Banks are generally eager to meet the
loan demands to boost their earnings which were sagging during the recessionary period. Therefore, with the increasingly large injection of bank loans, the dynamic consumption function grows at an increasing rate while the level of savings decreases at an accelerating rate. In turn, business firms will attempt to meet the upsurge of effective demand by rehiring workers previously laid off and reactivating the productive capacity which was previously idle. When sales volume continues to increase, the firms will attempt to increase the stock of inventories either by placing larger quantities of orders or by increasing the rate of production. As sales pull permanently ahead of the existing capacity, the firms, in order to hold costs down, will increase their investment by either borrowing or issuing new bonds. If the economy is already at full utilization, the expansion of output may never be materialized, because resources are already being used to the fullest possible extent. By bidding resources away from other companies and using borrowed funds, all the business firms can do is exert upward pressure upon prices of resources and of final goods and services, including the rate of interest. The ensuing inflation will either force the firms to step up their loan demand to meet increased costs or simply to stockpile inventories of raw materials for future sale at higher prices. On the consumers' side, the sudden upsurge of the general price level will lower their real balance, erode their confidence in future business activities and induce a sharp reduction of consumption demand. This is the beginning of a new spiral of contractionary movement which explains why inflation is
so abhorrent. Even if the expansionary movement does not cause inflation, it may lead to a cyclic downswing. The reason for this rests in the acceleration principle which emphasizes a special relationship between the demand for a final product and the demand for the capital equipment necessary to produce the final product. As examined earlier, the initial increase of consumption demand can be met from the untapped capacity. Yet, a continuously rising level of output calls for full utilization of the existing productive capacity. When sales start to pull ahead of existing capacity, some plants may attempt to push temporarily the operating rate over 100 percent by overloading equipment, working overtime or bringing obsolete stand-by machinery into use. Nevertheless, when sales pull permanently ahead of existing capacity and the high cost of the overload continues, it is profitable for the firms to invest in additional productive capacity to hold costs down.

In addition to the time lag caused by untapped existing productive capacity, there is an additional time lag because of a delay between the time when the need for additional capacity is first recognized and actual outlay of money for construction of plants and equipment.

Added new investment will induce additional consumption spending by increased flow of income via the multiplier effect. Nevertheless, the investment activity cannot be maintained unless the firms continue to experience higher sales. When many previously deferred wants are satisfied by installment plans or credit, consumers will be forced to slow their consumption spending and
to increase the rate of saving to pay off the large amount of predetermined debts. Although the new investment spending will induce additional income and consumption spending via the multiplier effect, the additional consumption expenditure will become smaller and smaller in each successive round of spending and re-spending. When final demand has slackened, the spirit induced by investment activities will abruptly end, and a dynamic cumulative income constraint process will be reinstated by reversing the multiplier effect.

A Critical Analysis of Ideologies Regarding the Theories of Social and Economic Dynamics

My theory represents an antithesis to the classic equilibrium process in which gradualism and harmony without conflicting interest dictate its movement toward a predesignated equilibrium.

The familiar logic of the classic equilibrium process is iterated here: The decreased demand for commodities is followed by an increased demand for bonds; an excess demand is created in the bond market, which forces the interest rate down. This, in turn, reacts on the commodity market and tends to push up the aggregate demand curve to establish the full employment equilibrium (Patinkin, 1965:318).

It follows that in the classic analytic framework, a disequilibrium in one market affects the other market in such a way that the other market generates enough corrective forces to reestablish the overall equilibrium. Our findings do not support
the classic equilibrium process; nor do they represent the Marxian dialectic process in which conflict and contradiction become the impetus for discontinuous revolutionary movement through the threefold succession in time: thesis-antithesis-synthesis. The Marxian ideology based on the myth of revolution and contradiction, and its self-proclaimed superiority as a method of interpreting the development of social and economic dynamics, has no place in modern economics. The Soviet Union, which has adhered to the Marxian development ideology since the 1917 Revolution, has not surpassed any highly industrialized Western European country in its per capita GNP (see Table XI).

TABLE IX. PER CAPITA GNP OF INDUSTRIAL EUROPEAN COUNTRIES AND THE USSR

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>3,510</td>
<td>4,050</td>
</tr>
<tr>
<td>Belgium</td>
<td>4,560</td>
<td>5,210</td>
</tr>
<tr>
<td>Denmark</td>
<td>5,210</td>
<td>5,820</td>
</tr>
<tr>
<td>France</td>
<td>4,540</td>
<td>5,190</td>
</tr>
<tr>
<td>Germany (Fed. Rep.)</td>
<td>5,320</td>
<td>5,890</td>
</tr>
<tr>
<td>Italy</td>
<td>2,450</td>
<td>2,770</td>
</tr>
<tr>
<td>Netherlands</td>
<td>4,330</td>
<td>4,880</td>
</tr>
<tr>
<td>Norway</td>
<td>4,660</td>
<td>5,280</td>
</tr>
<tr>
<td>Sweden</td>
<td>5,910</td>
<td>6,720</td>
</tr>
<tr>
<td>Switzerland</td>
<td>6,100</td>
<td>6,650</td>
</tr>
<tr>
<td>USSR</td>
<td>2,030</td>
<td>2,300</td>
</tr>
</tbody>
</table>

Source: International Monetary Fund, 1975:29.
Soviet steel production, often used as an indicator of development during the Stalin years increased only slightly more than in pre-World War I Russia and then increased at about the same rate as steel production in Japan during that country's industrialization (Berger, 1976:84). The development of the USSR agricultural sector has been even more disappointing. The after-effect of collectivization still lingers, and the lack of progress in agricultural productivity calls for massive grain imports from the United States. Moreover, a number of Soviet-oriented countries in Eastern Europe, notably East Germany, Czechoslovakia, and Hungary have made great economic strides; however, they were not underdeveloped when they came under the socialist system (see Table X).

### TABLE X. PER CAPITA GNP OF EUROPEAN COMMUNIST COUNTRIES

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Poland</td>
<td>2,090</td>
<td>2,450</td>
</tr>
<tr>
<td>Yugoslavia</td>
<td>1,010</td>
<td>1,200</td>
</tr>
<tr>
<td>Rumania</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>German Dem. Rep.</td>
<td>3,000</td>
<td>3,430</td>
</tr>
<tr>
<td>Czechoslovakia</td>
<td>2,870</td>
<td>3,220</td>
</tr>
<tr>
<td>Hungary</td>
<td>1,850</td>
<td>2,140</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>1,590</td>
<td>1,770</td>
</tr>
<tr>
<td>Albania</td>
<td>460</td>
<td>530</td>
</tr>
</tbody>
</table>

Source: International Monetary Fund, 1975:29.
Note: Estimates of GNP per capita are tentative.
China is no exception. Its performance is stagnant and often erratic (Bang, 1970), nor do other socialist models in the Third World provide better evidence of achievement.

On all accounts, the Marxian ideology has been a socialist utopian illusion. But neither does the classic ideology of laissez-faire which views society as a congruous whole without internal conflict of interest represent the Western development process.

What we have witnessed above can best be described as evolutionary processes in which human beings, as individuals or in organizations, respond to the everchanging environment in order to survive. In such a world, cycles of conflict and challenge occur continuously; they are part of the forces of evolution. We can show that Asian countries not within the Marxist socialist sphere achieved greater economic growth than those under Communist Chinese influence; most can show steady and sustained growth.

In nondialectic development, the economic impetus is dictated by adaptive human responses to the changing environment. In the past, cumulative growth was brought about by ingenious, often heroic, challenges to societies; the failure often invited stagnation, sometimes the end of a civilization. My research shows that capitalist-oriented Asian nations, resource-poor nations such as Japan, Korea, and Taiwan, achieved higher economic growth rates than relatively resource-rich countries like Malasia, Indonesia and Thailand (Wu in collaboration with Bang, 1976) (see Table XIa and XIb). This once again confirms the hypothesis that
TABLE XIa: PER CAPITA GROSS NATIONAL PRODUCT

<table>
<thead>
<tr>
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</thead>
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<td>1</td>
<td>Australia</td>
<td>2820</td>
<td>1</td>
<td>Australia</td>
<td>4760</td>
</tr>
<tr>
<td>2</td>
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<td>2720</td>
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<td>4100</td>
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<tr>
<td>3</td>
<td>Japan</td>
<td>1920</td>
<td>3</td>
<td>Japan</td>
<td>3880</td>
</tr>
<tr>
<td>4</td>
<td>Hong Kong</td>
<td>970</td>
<td>4</td>
<td>Singapore</td>
<td>2120</td>
</tr>
<tr>
<td>5</td>
<td>Singapore</td>
<td>920</td>
<td>5</td>
<td>Hong Kong</td>
<td>1540</td>
</tr>
<tr>
<td>6</td>
<td>ROC</td>
<td>390</td>
<td>6</td>
<td>ROC</td>
<td>720</td>
</tr>
<tr>
<td>7</td>
<td>Malaysia</td>
<td>380</td>
<td>7</td>
<td>Malaysia</td>
<td>660</td>
</tr>
<tr>
<td>8</td>
<td>North Korea</td>
<td>330</td>
<td>8</td>
<td>ROK</td>
<td>470</td>
</tr>
<tr>
<td>9</td>
<td>ROK</td>
<td>250</td>
<td>9</td>
<td>North Korea</td>
<td>390</td>
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<tr>
<td>10</td>
<td>PRC**</td>
<td>210</td>
<td>10</td>
<td>Philippines</td>
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<td>11</td>
<td>Thailand</td>
<td>300</td>
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<tr>
<td>12</td>
<td>Thailand</td>
<td>200</td>
<td>12</td>
<td>PRC*</td>
<td>240</td>
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<tr>
<td>13</td>
<td>South Vietnam</td>
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<td>South Vietnam</td>
<td>170</td>
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<tr>
<td>14</td>
<td>Cambodia</td>
<td>130</td>
<td>14</td>
<td>Indonesia</td>
<td>150</td>
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<tr>
<td>15</td>
<td>Laos</td>
<td>120</td>
<td>15</td>
<td>North Vietnam</td>
<td>130</td>
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<tr>
<td>16</td>
<td>Indonesia</td>
<td>80</td>
<td>16</td>
<td>Cambodia</td>
<td>70P</td>
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<tr>
<td>17</td>
<td>***</td>
<td>80</td>
<td>17</td>
<td>Laos</td>
<td>70P</td>
</tr>
</tbody>
</table>

*At market price.


***No estimate available for North Vietnam in 1970.

P = Provisional

Source: For all countries except the PRC: 1970, IMF and the World Bank Group; 1974, IBRD.
TABLE XIb:  AVERAGE ANNUAL PERCENT GROWTH OF GROSS DOMESTIC PRODUCT (IN REAL TERMS)*

<table>
<thead>
<tr>
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</thead>
<tbody>
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<td>10.5</td>
<td>Singapore</td>
<td>12.4</td>
<td>Singapore</td>
<td>10.4</td>
</tr>
<tr>
<td>2</td>
<td>Singapore</td>
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<td>ROC</td>
<td>11.8</td>
<td>ROC</td>
<td>9.7</td>
</tr>
<tr>
<td>3</td>
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<td>ROK</td>
<td>11.3</td>
<td>Japan</td>
<td>9.6</td>
</tr>
<tr>
<td>4</td>
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*All data are at 1970 prices except: Japan, 1965; Hong Kong, 1966; the PRC, 1973. All the time periods begin in 1960 except: Japan, 1961; Singapore, 1963; Hong Kong, 1961. The final year is 1973 except for Australia, which is 1972.

it is not the rich endowment of natural resources which brings rapid and sustained economic growth but human effort.

However, the classic apparatus of economic analysis, whether it concerns macro- or microeconomics, cannot shed much light on the process of non-dialectic development.

The defect of the classic system lies in the classic cosmology which represents moral zeal rather than observed facts of the real world. The effort to create a theoretic framework consistent with the classics' moral conviction gave us the holistic concept of the firm that behaves in a predetermined rational way and pursues a clear-cut goal; the classic analysis emphasizes collective action instead of action by individual agents within the collective. The framework achieved two objectives, i.e., to show how the value of a commodity is uniquely determined (Marshallian partial equilibrium) in a market and how the overall system can be enmeshed with the given condition of endowment (Walrasian General Equilibrium). To achieve these objectives, classic economists adopted a deductive method, in which reasoning proceeds from an assumed hypothesis, and the cost principle, in which the equilibrium concept yields a unique determination of price. Classic economists achieved their preconceived objectives, namely, the determination of value in microeconomics and a perfect coordination in macroeconomics. We must concede all the powerful theorems in the classic system followed the adoption of this methodologic apparatus. Yet the use of the methodology was not without fault. The theorems and laws derived by the classics are tautological; they do not
possess operational attributes. The defenders of the classic system argue that imaginary elements in premises do not matter; what matters is the predictive power. In other words, they claim that the validity of an abstract principle lies solely with the correct use of logic in deducing the consequence from a given set of assumptions. However, the prediction derived for such a system is already preconceived in the premises and the conclusions do not represent economic consequences of the real world.

Unfortunately the late development of the so-called Keynesian expenditure model does not remedy the deficiency of the classic model. That model is based on a misconception of Keynes' General Theory. Its deficiencies reflect Keynes' negligence and impatience with the proper exposition of micro-behavior consistent with his General Theory. Confounded by Keynes' conflicting arguments that the system failed to advance the theory of aggregate supply and demand, Keynes' followers advanced an expenditure model of the commodity market in which all the income components are summed up in the concept of aggregate demand and which is then used to yield a partial equilibrium solution through the hypothetic supply function. In the process of aggregation, all the significant elements of the discourse Keynes proposes in his General Theory were lost or left unexplored. The Keynesian expenditure model lacks synthesis with the remaining markets. Hicks responded by advancing the now popular textbook version of the IS-LM model which bears the mark of an even more classic orthodoxy than classics intended.
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