Unemployed waiting for a free meal, New York 1931.

False Paradigm:
The Irreconcilable Inconsistencies of Neoclassical Macroeconomics

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Note:

This manuscript is a re-writing of *A Critique of Neoclassical Macroeconomics* (London and New York: Macmillan and St Martin's Press, 1989). The first eleven chapters follow those of *A Critique*… Subsequent chapters on the "open economy" replace the original ones and are in process. The other five chapters are completely new.

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Table of Contents

Preface and Acknowledgements

Introduction

Part I: Methodology of the Neoclassical Macro Model

1. The Demand Side of the Neoclassical Model
    - 1.1 Introduction
    - 1.2 The Circular flow and its Aggregates
    - 1.3 The Income-Expenditure Model (Demand side)

2 The Neoclassical Model with a Supply Side
    - 2.1 Aggregate One Commodity Production
    - 2.2 Constructing the "Real" System
    - 2.3 Equilibrium in the "Real" System
    - 2.4 Clearing Away the Fog

3 Comparative Statics and Equilibrium
    - 3.1 Statics, Dynamics and General Equilibrium
    - 3.2 Confusions of Logical and Chronological Time
    - 3.3 Equilibration of Markets
    - 3.4 The Homogeneity Postulate

4 Money in the Neoclassical Model
    - 4.1 Introduction
    - 4.2 Neoclassical Money
    - 4.3 Money and the Price Level
    - 4.4 "Walras" Law and the Quantity Theory
    - 4.5 The Money Supply Further Considered
    - 4.6 Neoclassical Monetary and the Realism of Models

Part II: Presentation of the Basic Model

5 The Classical False Dichotomy Model
    - 5.1 Introduction
    - 5.2 A False Dichotomy Model
    - 5.3 False Dichotomy General Equilibrium
    - 5.4 The Arbitrariness of the Full Employment Solution

6 Logically Consistent Money-neutral Models
6.1 A Real Balance Effect Model
6.2 Interest-elasticity Money Market Model
6.3 The "Liquidity Trap"

7 The "Complete" Model with a Wealth Effect
7.1 Inside and Outside Money
7.2 Specifying the Wealth Effect
7.3 Mechanics of the Wealth Effect
7.4 Non-neutrality and the Wealth Effect

Annex to Part I: Keynes and Aggregation

Part III: A Critique of self-Adjusting Full Employment

8 Neutrality and Full employment

8.1 Logic of the models summarized
8.2 The significance of Neutrality
8.3 Full Employment Further Investigated
8.4 The "Unemployment of Capital"?

9 Expectations and Full Employment
9.1 Perfect, Static and Adaptive Expectations
9.2 The Rational Expectations Hypothesis
9.3 The New Classical Economics and the REH
9.4 The New Classical Economics and Policy
9.5 Evaluating the New Classical Economics

10 Full Employment and Multi-commodity Production
10.1 Introduction
10.2 Switching Techniques and the Factor Price Frontier
10.3 The Neo-Keynesian Critique
10.4 Full Employment and Reswitching

11 Full Employment and Disequilibrium
11.1 Effective Demand and the Multiplier
11.2 General Disequilibrium
11.3 Leijonhufvud on Disequilibrium Adjustment

Part IV: The "Open" Economy: Presentation and Critique

12 The "Open Economy" Neoclassical Model
12.1 Theoretical Problems with "Open Economies"
12.2 From Theory to Policy
12.3 Fiscal and Monetary Policy in a Closed Economy

Annex to Chapter 12: Open Economy Algebra

13 Open Economy Analysis
13.1 The Standard Open Economy Model
13.2 "Advantages" of Flexible Exchange Rates

14 Reassessing Monetary and Fiscal Policy
14.1 Introduction
14.2 Modeling Policy Effectiveness
14.3 Policy Implications
14.4 Summing up the Open Economy

Part V: Paradigm Regained: Reclaiming Policy

15 Decommissioning Policy Tools
15.1 Introduction
15.2 De-commissioning Fiscal Policy
15.3 De-commissioning Monetary Policy
15.4 Who Decides Policy?
15.5 Capitalism Fit for Human Life

16 The Critique Summarized
16.1 Purpose of this Book Restated
16.2 Self-adjusting Full Employment
16.3 Open Economy Models
16.4 Theory and Ideology

References

Preface and Acknowledgements

It is not unusual for people to reflect on who and what had the most influence on the development of their ideas about and approach to economics. In my case it requires only a moment's thought to identify one person above all, Clarence Ayres (though I am unlikely to be listed along with his famous students, Talcott Parsons and C. Wright Mills). In 1959 as a rather feckless and intellectually confused freshman at the University of Texas I took his introductory course, using his 1952 book, *The Industrial Economy*. I was also in his advanced undergraduate course as a senior four years later. I came to know him personally, in as far as an undergraduate can do so a distinguished professor, and was invited to his home on Shoal Creek Boulevard in Austin.

His great contribution to my intellectual development, and to many, many other students, was to convey the importance of a skeptical mind. From Dr. Ayres (as he was always addressed even in his absence) I learned that very little of what we see, hear or read should be accepted without critical inspection. On a more human level, he conveyed the importance of maintaining a sense of humor even in the most heated arguments. I recall in the senior seminar a far right-wing student launched a scurrilous attack on him, ending by saying, "with communists and their sympathizers, we need to fight fire with fire!" To this Dr. Ayres replied, "I prefer to fight fire with the fire department". This book is an attempt to fight the neoclassical fire with the fire department of rigorous logic.

Several books have strongly influenced by thinking. Chronologically the first among these Karl Polanyi's *The Great Transformation* (1944) assigned by Ayres, which made me realize that labor, land and capital were not commodities, though it would be twenty years before I realized by they were not and what they were. The second major influence was Marx's *Capital*, all three volumes and especially the first. Chapter 25 of volume one, The General Law of Capitalist Accumulation, should be essential reading in every macroeconomics course (which, of course, it is not, quite the contrary). Finally, for reasons explained in Chapter 11, key to this book was Axel Leijonhufvud 's *Keynesian Economics and the Economics of Keynes*.

Discussions with many colleagues advanced my thinking, and I should begin by thanking Alemayehu Geda and Alex Izurieta, who on the basis of their reading of my

earlier book, urged me be adapt and re-write it into this one. Discussions with colleagues is essential to any intellectual project, and I thank Anwar Shaikh, Ben Fine, Alfredo Saad Filho and Costas Lapavitsas. As explained in the Introduction, this book represents a re-write of *A Critique of Neoclassical Macroeconomics*, published in 1989, the first eleven chapters substantially re-written and chapters 12-16 new. By chance, the two books have the same number of chapters. Chapters 12-15 in the 1989 book treated inflation, while the new chapters extend the critique to open economy models and economic policy.

Introduction

This book is directed and dedicated to the many economics students who confronted with *prima facie* incredible analytical conclusions carrying reactionary policy implications have thought to themselves, there must be something wrong with this logic. And indeed, there almost always is, an element of faulty logic that invalidates the argument even if all assumptions are accepted.

I can quite clearly remember my first encounter with this conclusion. When at the University of Texas in Austin in the early 1960s, my economics professor, H. H. Liebhofsky (known to all as "Lieb") used partial equilibrium analysis to demonstrate that a minimum wage causes unemployment. Lieb, a political progressive who wrote a quite sensible microeconomics textbook, dismissed the conclusion as logically valid but of no empirical importance. I felt the matter should not be left at that. The logical argument might assert is latent power in a more politically reactionary period, which, of course, it did with vengeful aggression in the 1980s.

The argument, that minimum wages cause unemployment, either in a partial or a general equilibrium framework, is logically wrong. To state the matter stronger and more polemically, it is analytically false, betraying the underlying technical sloppiness and even incompetence of most of neoclassical economic theory. Almost every generalization of neoclassical economics is logically false except under analytical constraints ("assumptions") so restrictive as to be absurd even in the abstract. To list a few, it cannot be demonstrated in logic that:

1. real wages and the aggregate level of employment are negatively related;
2. unregulated markets automatically equilibrate to bring about full utilization of resources ("full employment");
3. the aggregate price level is determined by the supply of money, and inflation is the result of changes in the supply of money; and
4. floating exchange rates equilibrate the balance of payment.

The function of this book is to provide those skeptical and inquiring economics students a demonstration of the fallacy these, the most fundamental parables of neoclassical economics. The presentation parallels the typical mainstream textbook, providing a heterodox antidote to the neoclassical virus of the mind.

The five parts of this book provide a critique of the neoclassical approach to the analysis of aggregate economic activity, "macroeconomic" theory. There are two broad approaches to aggregate economic analysis, that of Marx and that of Keynes. Neoclassical no more accepts the contributions of the latter than those of the former. These two traditions both analyze aggregate economic relations with concepts developed at the aggregate level; i.e., their aggregates are not the summation of behavior at the microeconomic level. Neither tradition is "neoclassical".[1] The primacy of aggregate behavior over the activity of individual economic agents is explicit in Marx. It also is a fundamental characteristic of Keynes's analysis in *The General Theory of Employment, Interest, and Money* (1936). The significance of this distinction, between aggregates that are macro relations and those that are the sum of micro relations, will emerge as the analysis proceeds.

Some of the issues of theory I treat are complex, often restricted to advanced treatments of economic theory (when treated at all). The presentation is designed to be comprehensible to someone who has taken an introductory course in economics. The "income-expenditure" model of Chapter 1 will be quickly recognized by a first year student of economics. One need not be a specialist in economic theory to read this book, only a student of economic theory. The book is intended to be a complement to a standard textbook on undergraduate macroeconomics. Much of the presentation runs parallel to such a text, though the emphasis is different and the reader will find critiques that few undergraduate or graduate students would encounter in their careers. The intention is to make these critiques as understandable and directly applicable to the orthodox model presented at the advanced undergraduate level. Written for students, the book critiques neoclassical macroeconomics as it is taught, and the reader will find many references to standard macroeconomic textbooks past and current.

In the discussion of neoclassical method in Chapters 1-4 the many of the references refer to publications prior to the 1990s. These authors are sighted, for example Frank Hahn and Harry Johnson, because subsequent neoclassicals are much less likely to show concern for method. This lack of concern itself reveals an intellectual arrogance, the confidence that the theory is so generally and uncritically accepted that developing or defending its methodological foundations is unnecessary.

This book is inspired by two convictions. The first is that most textbooks in undergraduate courses have theoretical errors and misrepresentations of considerable significance. These errors and misrepresentations are not wholly accidental, and have strong ideological implications. The second conviction is more fundamental. The strictly "macro" aspects of the theories of both Marx and Keynes have slipped from sight. Each the foremost theorist of his century, both men inspired schools that claim the heritage of the master; but what marks the analysis of economic aggregates in both cases has largely been abandoned. In the course of this book I argue that the loss of what is essentially "macro" in Keynes is the result of a preference for some form of equilibrium analysis. In the case of Marx's work, emphasis upon this theory of exploitation, and from this the tendency to stress class struggle as the immediate cause of capitalism's difficulties, led to an almost complete neglect of his treatment of the aggregate demand and aggregate supply of commodities.[2]

In the case of Keynes, the essentially aggregate character of this "revolution" has not survived the "neoclassical synthesis". The loss of the macroeconomic element is closely related to what Leijonhufvud identifies as the implicit bargain struck between the defenders of pre-Keynesian theory and the Keynesians: that the latter would accept the abstract validity of the automatically-adjusting, general equilibrium view of a capitalist economy if the former would concede its limited applicability in practice (Lejonhufvud 1968, 7-8). This proved a Faustian bargain with the result that after about 1980 Keynesians after being dominant in the profession for three decades could no longer claim the mainstream of economics as theirs.[3]

Macroeconomics can be divided into three areas of inquiry: the analysis of aggregate reproduction, of cycles, and of growth. I deal almost exclusively with the first, which in neoclassical theory is called static equilibrium analysis. Marx and Keynes were not equilibrium theorists. For macroeconomics to include them the more general term "aggregate reproduction" can be used. This refers to the analysis of what determines the level of aggregate economic activity in the absence of certain qualitative changes or disturbances, the most important of these being technological change. Textbooks on neoclassical macroeconomics deal with technical change hardly at all. Because the

purpose of this book is to provide a critique of the internal logic of mainstream theory the effects of technical change is not considered.

Developing a theory of aggregate reproduction does not require equilibrium analysis, though it is a central characteristic of the neoclassical synthesis approach to macroeconomics. Aggregate analysis must incorporate the fundamental empirical generalization that capitalist economies are not for the most part racked by continuous and violent fluctuations. The extreme method to do this is to begin with a model of aggregate reproduction which is not only relatively stable in that it does not tend to extreme values, but absolutely stable, such that it has no tendency to move from a position uniquely determined by certain exogenous factors ("parameters") in the absence of changes in those factors. This is an equilibrium model. When there are a number of variables and relationships which are determined simultaneously, it is a model of general equilibrium.

General equilibrium is the point of departure of the neoclassical macroeconomic model, with the added characteristic that the stable position is also one of full and efficient utilization of all economic resources. Investigation of the neoclassical general equilibrium macroeconomic model is the central theme of this book. Chapter 1 presents the basic model without money, a method of presentation which allows emphasis on the dominance of the pre-Keynesian influence in neoclassical macroeconomic theory. First, I consider the "income-expenditure" framework without a "supply side". From this restricted version of the model I obtain the condition that aggregate economic activity is in equilibrium if "saving equals investment", a condition well known to first year students of economics.

The next step is to fill in a supply side (Chapter 2), which provides the model with a solution for the wage and employment. By giving the income-expenditure model a neoclassical labor market, I can derive the basic conclusions (or "parables" as some call them) about the tendency towards full employment of resources and the impossibility of unemployed resources (especially labor) in unregulated markets. The presentation has two purposes. First, it provides a clear exposition of the neoclassical model, comparable but also complementary to that found in standard textbooks. Second, it emphasizes

certain aspects of the model in anticipation of the critiques by mainstream economists presented in Part II of the book.

Introduction of money into the neoclassical model allows for the distinction between "real" and "nominal" variables, and creates a number of complications. Among these is the process of adjustment, which requires a general equilibrium solution. Chapter 3 develops the concept of market clearing, particularly Walras' Law, which will have a prominent role in subsequent discussion. The "real/nominal" distinction is frequently considered the flaw of the pre-Keynesian economists, known as the "classical dichotomy", though it is also neoclassical. This dichotomy leads to the famous "neutrality" of money argument, which plays a central role in the debate over the uniqueness and stability of the neoclassical general equilibrium model when at full employment. Particularly at issue is the role of Walras Law as the mechanism for automatic self-adjustment of the system, and its compatibility with the quantity theory of money. The concept of money itself comes under close scrutiny in Chapter 4, where the famous quantity theory is introduced.

Chapters 5 to 7 explore in considerable detail variations of the neoclassical model with interactive labor, commodity and money markets. The presentation is analogous to what is in a standard textbook. The purpose is to demonstrate the extremely restrictive assumptions required in order to construct an internally consistent macro model that tends automatically (without state intervention) to full employment. In Chapter 7 the discussion goes beyond that found in most standard textbooks by treating the impact of aggregate wealth on the commodity and money markets.

These seven chapters provide what might be called an "internal" critique of the synthesis model, pointing out contradictions and inconsistencies when all of its assumptions are granted. Because much is covered in these chapters, it is useful to pause and summarize the critique, as well as to extend it along lines only briefly considered during presentation of the models. This is done in four chapters, 8 to 11, each of which considers a particular aspect of the conclusion that capitalist economies tend automatically to full employment. In earlier chapters a particular property of most neoclassical models, the "neutrality" of money, was treated. Chapter 8 explores the relationship between the theory of money and full employment, particularly the

implications of the "neutrality" of money. This property of neoclassical models is as ideologically important as the allegation of automatically-adjusting full employment.

Chapter 9 turns to the neoclassical treatment of the expectations of the future by economic agents. For Keynes and those who followed his lead, expectations represent a source of instability in the economic system. By contrast, the tendency in neoclassical theory is to introduce expectations in a manner that makes models more stable. The extreme form of this, *reducto ad absurdum* one might say, is the use of the rational expectations hypothesis by the new classical economics. All neoclassical treatments of expectations make the impossible assumption that the future is known.

In an unusual excursion for a book on short-run macroeconomic models, Chapter 10 considers the debate over the aggregate production function. The critique of this function calls into question the entire supply side of the synthesis model, with its origin in the work by Joan Robinson in the early 1950s. My interest is in the implications for labor market adjustment in the short-run neoclassical model. From the Capital Controversy I turn in Chapter 11 to the work of the "disequilibrium Keynesians" (primarily Clower and Leijonhufvud), with emphasis upon the methodological and analytical inadequacies of Walras' Law as an equilibrium mechanism. This, in turn, is closely related to a division which the disequilibrium Keynesians reject. A centre-piece of their school is the attack upon the neoclassical formulation of the market for labor services, itself an extension of the critique of the nominal/real distinction. The chapter ends by discussing the more recent contributions of Stiglitz to macroeconomics.

The various critiques are brought together in chapters 8-11, with emphasis on four theoretically unsatisfactory elements in synthesis macroeconomics: (1) treating aggregate reproduction as value added instead of commodities; (2) analyzing production in a one-commodity framework; (3) formulating monetary theory with valueless money; and (4) integrating markets through general equilibrium theory. The simplification to value added categories and one commodity production reflects an attempt to resolve what is perhaps the principal analytical problem of macroeconomics. This is the problem of relating the aggregate value of commodities to the material output of the commodities arising from actual production processes. The solution to this problem defied Keynes and is rendered trivial by the neoclassical one commodity model. Not since Ricardo and

Marx has any major economic theorist seriously attacked the problem of relating values to material production, with the possible exception of Piero Sraffa.

Chapter 12 begins the analysis of the neoclassical open economy, a model which carries forward the logical inconsistencies of the closed economy and adds some unique to itself. As for an economy without trade or capital flows, the open version, derived from the Mundell-Fleming model, has only one product, yet pretends to analyze a multi-commodity context. Equally serious, the open economy model applies to less than full capacity, yet uses Walrasian equilibrium adjustment that is valid only at full employment. Chapter 13 ignores these failings in order to present the standard analysis of fiscal and monetary policy with fixed and flexible exchange rates. The standard conclusion is that under fixed exchange rates fiscal policy is effective and monetary policy is not, and the reverse for flexible exchange rates. These analytical conclusions produce the judgment that flexible exchange rates should be preferred to fixed rates.

Chapter 14 demonstrates that the adjustment logic and policy conclusions of the Mundell-Fleming model are incorrect. The model fails to include impact of changes in exchange rates on the domestic price level. As a result, it makes no distinction between nominal and real outcomes for the exchange rate, nor the difference between the nominal and the real money supply. When domestic price effects are included, the appropriate policy conclusion is that the relative effectiveness of monetary and fiscal policy with a flexible exchange rate depends on two key parameters, the marginal propensity to import and the sum of the import and export elasticities with respect to the real exchange rate. The effectiveness of fiscal and monetary policies is an empirical question and no theoretical generalization is possible.

The penultimate chapter stresses again that the underlying message of the neoclassical macro model, that markets are efficient and public sector intervention is unnecessary and counter-productive. This book demonstrates that the analysis supporting this anti-interventionist dogma is unsound. Far from non-intervention, full employment requires active fiscal policy supported by monetary accommodation and exchange rate management. In addition, a humane capitalist system needs a universal basic income to prevent employers using unemployment as a social disciplining instrument, and public

control of the financial sector to prevent economic crises. The final chapter reviews the arguments of the book to show why these policy conclusions are justified.

Before beginning the analysis, a disclaimer is necessary. Practitioners of the synthesis model might maintain that many of the arguments found in this book are based not on the neoclassical macroeconomic model in its most sophisticated form, but on a "straw man", chosen for its simplicity and vulnerability to theoretical attack. Three points can be made in anticipation of such a defense. First, at many points the argument considers the more sophisticated defenses of the model, so I do not restrict myself to simplistic formulations. However, in all economic theory it is the analysis in its simplest form that is most representative, and best encapsulates the basic insights of the discipline. While increasing sophistication enhances the theory, this is frequently at the cost losing the fundamental vision in a wealth of exceptions and special cases. Third, if there are errors in the simple version, which there are, more complex models that build on these errors are no improvement.

The objective reader would do well to refer to any standard textbook on neoclassical macroeconomics, whether at the undergraduate or graduate level. There he or she will find that the version of the closed synthesis model presented in Chapters 5 to 7 and the open version in Chapter 12-14 are true to what is offered as the summarized and synthesized wisdom of the mainstream of the economics profession.

It should be noted that the simple form of the model, on which I spend considerable time, provides the basis for many recommendations for economic policy. To take but one example, it is common for neoclassical economists, and non-economists who hold to neoclassical parables, to argue that lower wages, "other things equal", will result in more employment of labor. This conclusion derives from the neoclassical model in its simplest form. One of the main purposes of this book is to investigate conclusions of this type, almost always deduced from the basic model. Those who make such assertions rarely have more than the simplest theoretical formulations in mind.

I hope that the reader who completes this book will, if nothing else, emerge at the end with sufficient skepticism about the neoclassical model to be open to an alternative vision of aggregate economic theory, and to accept at least in principle that the model which dominates the economics profession is not necessarily the source of all insight.[4]

Part I: Methodology of the Neoclassical Macro Model

Main Points:

Chapter 1: Demand Side

1. In combining and reconciling pre-Keynesian theory and the contributions of Keynes in the "neoclassical synthesis", very little of Keynes survived.
2. The circular flow diagram (income-expenditure model) is an ideologically-laden misrepresentation of market economies.
3. The demand-driven model is internally consistent if prices are constant until near full employment. However, this assumption is inconsistent with the neoclassical model.

Chapter 2: Supply Side

1. An aggregate supply side requires all neoclassical macroeconomic models to be one product systems.
2. The one commodity model produces the assertion that market economies have an automatic tendency to full employment. This is the basis of arguments for the benefits of unregulated markets. More complicated versions of the model re-assert this conclusion without qualification.
3. Equilibrium in the simple model is achieved without consideration of money, a process of one-commodity barter.
4. Automatic full employment derives from the labor market adjustment.

Chapter 3: Equilibrium

1. The neoclassical macroeconomic analysis is comparative statics, comparisons of positions of general equilibrium, in which all variables have stable values.
2. Equilibrium analysis abstracts from chronological time. The terms short run and long run do not refer to time periods, but are timeless abstract categories.
3. The simplest neoclassical model has three markets, for labor, output and money, and these markets must equilibrate simultaneously, not sequentially.
4. If there are disequilibrium trades no automatic adjustment to full employment can occur. The possibility of such trades is eliminated by Walras' Law.
5. Walras' Law implies that no solution to the real values in the model is possible without a general equilibrium of all three markets, labor, money and output.

Chapter 4: Money

1. The assumptions of rationality and full knowledge of markets imply there is no theoretically valid explanation of either the existence or the supply of money.
2. That public sector intervention creates inefficiencies requires that the quantity of money have no impact on the real variables at full employment, the neutrality of money.
3. Invoking Walras' Law and keeping money neutral requires a complicating variable, the real balance effect. The system with money has its own specific adjustment process that requires simultaneous clearing of all three markets in general equilibrium.
4. The hypothesis that increases in the money supply generate proportional increases in prices can be theoretically confirmed.

1. The Demand Side of the Neoclassical Model

1.1 Introduction

Economics is a discipline whose scientific development closely reflected the political temper of the times. One would expect this from a subject intimately involved in the welfare of people and the distribution of wealth. As a separate, clearly-defined field of study, economics emerged in the eighteenth century, and from that point until the late nineteenth century was usually called "political economy". The first great figure in political economy was Adam Smith, and all economists from Smith to J. S. Mill, who wrote about ninety years later, are referred to collectively as the "classical" economists. This group of writers had an important common characteristic that contrasts it to those that succeeded it: all the members used a value or price theory based upon the labor content in commodities.

The classical school dissolved before the analytical onslaught of the "marginalists". This name derives from their theory of value, based upon subjective utility and substitution among what they called "factors of production". By the end of the nineteenth century, the marginalists held the mainstream of economic theory without challenge. Modern microeconomics descends from the marginalists with little fundamental alteration, only elaboration. Keynes took the marginalist school of his time as his straw man, and confused terminology by referring to them as the "classicals".

Keynes adopted the method of his marginalist contemporaries as his point of critical and frequently polemical departure. Basic to his critique of the marginalist school was the argument that a capitalist economy had no automatic tendency towards full employment of resources. Full employment equilibrium had been the hallmark of pre-Keynesian analysis, rejuvenated in the 1970s and so widely accepted in the profession that it needs no distinguishing name.

After the Second World War several prominent economists, especially in the United States (e.g. Paul A. Samuelson) proposed a merger or synthesis of Keynes and his opponents. This reconciliation emerged as the orthodoxy in the profession, and was called the "neoclassical synthesis". "Classical" here comes from Keynes's use of the

term, and "synthesis" refers to the alleged reconciliation of the analysis of *The General Theory* with what that work had sought to replace.

Every little of Keynes survived that synthesis. In 1965 when I began graduate school at the University of Michigan, Ann Arbor, everyone studying economics read at least part of *The General Theory*. In 2010 few economics departments anywhere had anything by Keynes on any course reading list except in history of economic thought. In this chapter we begin the analysis of the macroeconomics after the synthetic exile of Keynes.

1.2 The Circular flow and its Aggregates

The neoclassical analysis of aggregate behavior begins with a specification of the circulation of money and commodities called the circular flow of income. This provides the basis for the subsequent treatment of aggregate variables. By breaking into the circuit at an arbitrary point, one can follow the process of circulation. In the circular flow the emphasis is upon the income rather than on the production of commodities that creates the income flow. The economic system is conceived as incorporating two types of "agents", households which sell services of various types, and businesses which purchase these services. Consumer commodities are destined for households, and investment commodities for business. Businesses derive their revenues from the sale of commodities, then distribute these revenues as payments for services. This interpretation of aggregate circulation is shown in Figure 1.1, which is typical of what one finds in an elementary textbook.

The first and perhaps most fundamental characteristic of the circular flow model is its implicit ideological nature. It presents the social process of production, exchange and distribution as a phenomenon of markets to which the role of government can be added at a later point. A critique of the political philosophy that under-pins such an extreme dichotomy of public and private lies beyond the scope of this book. It should be sufficient to make two points. No private production, exchange or distribution is possible without public intervention, at the minimum to guarantee contracts and private property. Second, in all but a few countries, the single largest provider of economic services is the public sector, the most obvious being the security services of the military

and the police, for which there is as private, marketed counterpart. Representation of economic activity in which the government generate part is an "add-on" is theoretically invalid to the point of absurd.

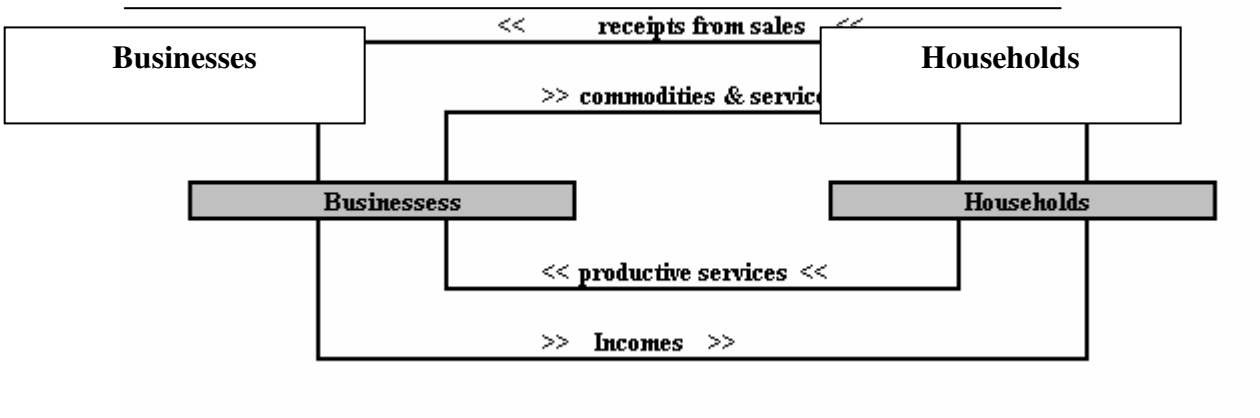
Accepting the absurdity of economic activity without a public sector, we can proceed to Figure 1.1, which is an interpretation or theoretical presentation of the circulation of commodities,[1] not an empirical representation. Nor is it a simplification, if by that term one means the schematic representation of the most important aspects of a real system. The counter-intuitive and counter-empirical character of the circular flow diagram becomes obvious upon closer inspection even if one accepts the absence of the public sector.

In the top loop of the diagram are commodity flows and the payments for commodities, all of which go to and from households. This does not describe an actual economy. Many and perhaps a majority of commodities in terms of money value are bought and sold among businesses, never reaching households. First, there are the commodities which are consumed in the process of producing other commodities, what neoclassical economists call "intermediate" products or commodities.[2] Second, there are the commodities that are used as instruments to produce other commodities, machinery, plant, *etc*. The elimination of the former from the circular flow, and from all analysis in the synthesis model, is justified to avoid "double-counting".[3] Perhaps more surprising than the omission of intermediate commodities is the implicit inclusion of expenditure upon machinery and plant in the flow from businesses to households, for this is a category which the model subsequently analyses in some detail.

Treating investment in this way can be understood by looking at the flow of services and incomes. At the top, "services" include activities such as haircuts, banking, and other outputs of production, while in the bottom loop bottom, "services" refer to factors of production: the renting of land, selling of laboring activity, lending of money, and holding of equities in businesses. These result in the payment of rent, wages and salaries, interest, and profits, which together constitute incomes (lowest line). In the standard circular flow all of these categories of income are regarded as payments to people. By definition these payments are in return for something those people sell. The

circular flow diagram is the first signal the student receives that the concept of classes had been expelled in favor of the category "households" and is familiar, "consumers".

Figure 1.1: The neoclassical circular flow of income



The diagram can and in some textbooks is expanded to take account of the exchange of investment commodities within the business sector, as done by Stiglitz and Walsh (2006, 142, 158). It is never expanded to include the exchange of material inputs to production which would enable the diagram to describe how production occurs. However, our purpose at this point is to understand the synthesis model, not actual economies. The very simple version of the circular flow shown in Figure 1.1 is a true representation of the formal synthesis model, as will be seen in the next section.

How is one to rationalize a schema in which all sales of commodities are from businesses to households, and all income payments accrue directly to households? The first and most fundamental step is to eliminate all sales involving material inputs into production. When this is done, the money flow at the top of the diagram is no longer sales receipts, but income payments, wages, profits, interest, and rent (value added). As mentioned, this is justified by what is called the double-counting argument.

In order to eliminate material inputs from consideration, we shall assume than the commodities produced in the model do not require them, only workers and machinery. While one might think this is an absurd assumption (and it is), we shall see that is true to

the supply side of the synthesis model, which involves what is called an aggregate production function. Alternatively, we could assume that commodities represent a stock at the beginning of the period, and the only economic activity which engages capital and labor is their distribution. This also may seem a strange assumption: that commodities appear magically at the outset in fixed supply. It will prove consistent with the manner in which markets equilibrate in the neoclassical general equilibrium model (Walras' Law).

Justifying the inclusion of expenditure upon plant and machinery in the exchange between businesses and households requires a more involved and subtle set of assumptions. The argument begins at the bottom of the diagram, where it is assumed that all business receipts accrue to households. This implies that there are no retained profits by businesses. In effect business enterprises are treated as conduits, the passive intermediaries between sales receipts and income payments. People receive income payments as a result of their property relations, or to use the neoclassical term, their endowments.

For reasons incidental to the model, some people own land, some hold corporate assets, or lend money, while others obtain the vast majority, if not all, of their incomes by working for employers. Each group is treated in the model as providing a service: landlords supply the services of land, stockholders offer the services of plant and machinery (capital); lenders sell the service of postponing consumption; and employees deliver their laboring capacity. The assumption of no retained corporate profits now presents itself as logical. Since profits are the payment for a service rendered, they can be treated analytically as accruing to households even if they never leave corporate balance sheets, because this merely reflects the manner in which households chose to hold them.

This view of income as payment for services clarifies the treatment of investment expenditure in the diagram. When all income accrues to households, businesses do not make decisions to purchase anything. What appeared as common sense and obvious (businesses buy machines), is rejected in the model in favor of an esoteric relation (households buy machines) which is implied by the passive role played by business enterprises in neoclassical theory. The exchange relationships are the following: some households are net savers, and these receive interest payments; others, are net borrowers,

making investment purchases for which they receive profits in return for the sale of the services of capital. As contrary to common sense as this may be, few indeed are the economists, conservative, liberal or radical, who have expressed any doubts about the descriptive validity of the circular flow on income model.[4]

1.3 The Income-Expenditure Model (Demand side)

The circular flow takes a particular view of the way in which commodity exchange occurs. This is formalized and made explicit in the income-expenditure model. At this point we consider the demand side only, introducing the supply side in the next chapter. Consideration of aggregate demand first is not just a convenience of exposition. It corresponds to the emphasis of a school of macroeconomics, usually called "Keynesians".

The basis of the demand side of the model is certain aggregates, which must be defined and clarified prior to developing the mechanics of the model. The method of aggregation, the abstract constructs and their relationship to reality, is central to theory.[5] If we assume no role for government and no foreign trade, the model has the following aggregates: income, consumption, investment and savings. The aggregate demand for commodities is by definition consumption plus investment, and the income of households is divided between consumption and saving.

Consumption refers to the expenditure of households on commodities which are not used to produce other commodities, though their usefulness need not be exhausted within the period that the expenditure is made. Commodities whose useful life coincides with the expenditure period are "non-durables" and those with a longer life are referred to as "durables". White this distinction is of considerable importance in empirical work, it plays no role in the basic model. Expenditure on commodities which go to produce other commodities is called investment. It is necessary however, to define investment in such a way that materials used up in production are excluded. This is not as straight forward as it may seem. Since over time the value of machinery is passed on to the produced commodity, it could be argued that machines represent an intermediate cost no less than more short-lived inputs such as electricity and iron ore.

Formally, this ambiguity could be avoided by the assumption mentioned in the previous section that commodities are not produced, but only distributed with no material inputs except machinery. While this eliminates the problem of distinguishing between different types of inputs, it does not explain why plant and machinery are not treated as intermediate. The basic justification is one of aggregate consistency rather than high theory. If investment were treated as intermediate expenditure, then aggregate demand is reduced to consumption only and would not be equal to income unless saving were arbitrarily excluded. The equality of aggregate demand with income (value added) is the equilibrium condition for the commodities market (see below). Investment is defined as expenditure upon means of production which last longer than one time period.

Consumption and investment together are by definition expenditure on "final commodities". The validity of this last category is taken as given and further discussion of it can be found in the annex on Keynes that follows Chapter 7. In equilibrium, aggregate demand (C + I) equals aggregate income (Y), which represents the total receipts of businesses from the sale of final commodities. This income is completely disbursed to households, becoming disposable income in the absence of any taxes, and household disposable income is either spent upon consumption commodities or saved, so Y = C + S. Before going any further, it can be noted that all final commodities produced in any period will be sold if C + I = C + S, assuming that business have no desire to accumulate inventories. Since the model has only one period, this condition reduces to I = S, the well-known statement that the commodity market is in equilibrium, sales and production tending neither to expand nor to contract, when household savings equals expenditure on investment commodities.

At this early stage in the presentation, it only remains to specify two further relationships. Investment expenditure is taken to be independent of the current level of income, though perhaps a function of levels in the past and levels expected in the future. To use a word common in the literature, investment is "exogenous" with regard to the other variables in the model. Following Keynes, consumption expenditure is specified as a function of the level of current income itself, which we can write as C = C(Y). The rate of change of consumption expenditure with respect to household income (dC/dY) is the marginal propensity to consume (MPC), presumed greater than zero but less than one. In

the simplest case, the MPC is assumed constant over the relevant range of income levels in the short run. What is not spent on consumption is saved, so, $Y = C(Y) + S(Y)$, and the sum of the marginal propensity to consume and marginal propensity to save is unity. Then the equilibrium condition becomes the following.

$$Y = C(Y) + I$$

or

$$S(Y) = I$$

The mechanics of this simple model are easily seen. A given level of investment expenditure generates a level of income such that the associated level of savings is brought into equality with the exogenous investment. Assuming no other exogenous elements of aggregate demand, the equilibrium level of income associated with a given investment expenditure is determined by the size of the parameter relating consumption to income (or saving to income). This ratio at the margin (dY/dI) is called the investment multiplier, or "the multiplier" without modifier in this simple case. If the MPC is constant, the multiplier is easily derived by simple algebra to be [1/(1-MPC)] (or 1/MPS).

Since the simple model with which we are dealing has no time dimension, its consideration out of equilibrium is meaningless. For disequilibrium considerations to be relevant, we would need to incorporate some explicit adjustment behavior that corresponds to situations in which saving and investment are not equal. As is common in standard textbooks, let us suspend the restrictions of equilibrium analysis to follow a stylized version of how investment generates income.

Assume that from an initial position of equilibrium, investment rises. As a result, aggregate demand exceeds income (value added). Since income equals the value of final commodities, there is excess demand for commodities. This excess demand calls forth a greater value of sales, to which there to corresponds an increase in income payments. Part of this increase in income payments is saved, dropping out of the circular flow. The other part, consumption expenditure, adds a further increment to aggregates demand, which calls forth more sales and generates further income payments. This process continues until the newly-generated income is sufficient to create an increase in savings equal to the initial increase in investment.

There is one obvious difficulty with this argument: an increase in aggregate demand may result either in increased prices or an increased volume of commodities in circulation. In some manner the model must be specified to enable one to distinguish price changes and quantity changes. This is done by distinguishing between the "real" and "nominal" values of the variables so far treated. It should be noted that Keynes rejected this dichotomy, arguing that the concept of "real" variables has no scientific content (see the annex on Keynes).

The problem would seem to have a simple solution: to measure the variables in terms of constant prices drawn from some reference period. This is done in all empirical work, for the simple reason that there is no alternative. However, it is not a measure of something anyone can directly observe. While commodities exist and their prices exist, commodities at constant prices aggregated over time do not exist. Neoclassical theory has devoted considerable attention to this problem, under the rubric of the "index number problem". The problem in question is that neoclassical consumer theory requires that households change their consumption patterns in response to changes in relative prices. It cannot be assumed that a general increase in prices, inflation, will leave relative prices unchanged. On the other hand, the aggregation procedure for the income-expenditure model is internally consistent only if the weights used to combine the commodities into an aggregate do not change.

Theoretically, one is at an impasse: consumer theory and aggregation theory are in conflict. In empirical work the inconsistency may be of little practical importance, for one seeks specific results whose reliability has internal and external statistical checks. For purposes of theorizing, the aggregation problem is quite important, for theory reaches for general conclusions based upon logic, not on the basis of *ad hoc* adjustments. When faced with the intractable index number problem, more than one economist must have shared Hamlet's famous lament, "O cursed spite/ That I was ever born to set it right" (*Hamlet*, Act I, scene 2).

The difficulty can be demonstrated by reference to the income expenditure model in the simple form presented above. Assume an increase in investment. The initial consequence will be an increase in the demand for investment commodities relatively to consumption commodities. The microeconomic theory of market behavior predicts that

in such a case the price of investment commodities should rise relatively to the price of consumer commodities, which is the signal for resources to shift. In other words, within the model a change is required which contradicts the basis upon which the real variables are constructed: the model is specified in terms of constant relative prices, but changes in the level of aggregate demand result in relative price shifts.

Keynesian neoclassicals argue that this contradiction arises only when the model is very close to full employment of resources. When there is unemployed labor and under-utilized plant, they argue, supply of all commodities can be treated as forthcoming at constant prices. Whether this is correct or not is an empirical question, and it is a useful working hypothesis. On the basis of this hypothesis, one can reformulate the multiplier process as described above.

If the model is initially at less than full employment with no scarcities of complementary inputs, an increase in investment expenditure will result in falling inventories of investment commodities or a rise in production for order, inducing businesses to increase capacity utilization and hire more workers. As a result, payments of wages and profits will increase, raising household incomes. Part of the increase will be spent by households on consumer commodities, inducing greater capacity utilization and employment in the consumption commodities sector. The feedback process continues until new saving is generated equal to the initial increase in investment spending.

The above parable is the essence of the Keynesian view of aggregate circulation, in which autonomous expenditure determines the level of income subject to certain key parameters, such as the marginal propensity to consume. From such an argument flows the policy prescriptions associated with Keynesian analysis, which were once characterized by their emphasis upon fiscal policy (government expenditure and taxation). If government expenditure is treated as exogenous, then its role is analogous to that of investment in determining aggregate demand, and increases in government expenditure call forth increases in income. If taxes are specified in the model as in part induced by income, then the multiplier is no longer the simple expression, [1/(1- MPC)], but the principle is the same. Should the model be at a position in which resources are

not fully utilized with no production or distribution bottlenecks, it can reach the full employment level by appropriate selection of an expenditure and tax package.

It is useful at this point to present the simple model in algebraic form, with variables measured in current prices.

Y = national income

C = consumption expenditure

I = investment expenditure

S = income not spent

G = government expenditure

T = tax revenue of government

Identities:[6]

$Y = C + I + G$ (aggregate demand)

$Y = C + S + T$ (aggregate supply)

The only new element in the model is the description of (C + S + T) as "aggregate supply", which means that this income flow is taken to be equal to the total value of final commodities (consumer commodities plus investment commodities). It should be noted that this treatment of the income paid out by businesses skips the step in which it appears as the functional distribution among classes, wages, profits, rent and interest. This is consistent with treating all income payments as going to an undifferentiated household sector. This omission is formally rectified when the supply side of the model is introduced. The demand-side model is completed by specifying what are called the behavioral relationships.

$C = C + aY_d$,

where $Y_d = Y - T$

$T = hY$

$I = I^*$ and $G = G^*$

The stars indicate that the variables are exogenous, of given values. Through substitution, one gets the following.

$Y = C + a[Y - hY] + I^* + G^*$

$Y[1- a(1 + h)] = C^* + I^* + G^*$

The multiplier, which we designate as μ, is the inverse of $[1- a(1 + h)]$. Therefore,

$$Y = \mu[C^* + I^* + G^*]$$

Increases in government expenditure result in an increase in the equilibrium level of income *via* the feedback of induced consumption. The multiplier is less than in the previous case because of the dampening effect of induced taxes. As noted, only equilibrium values of the variables are consistent with the model's logical. An excess of aggregate demand over aggregate supply involves a logical contradiction. It implies that the sales of commodities exceed the supply of commodities. This in turn implies that the value added in these commodities (Y) is less than what is required to generate the consumption which is part of the aggregate demand with which one began.

In describing the feedback mechanism of the multiplier we implicitly introduced time (adjustments were not instantaneous). The simplest way to formalize this is to specify time lags. For example, one can make consumption in the current period a function of income in a previous period or periods. One possibility is $C = C(Y_{t-1})$. Similarly, one can introduce a lag between aggregate demand and the level of production; e.g., businesses set their output level in the current period equal to sales in the previous period.[7] The first type of lag has been called the Robertsonian lag and the second the Lundbergian lag, though these terms have fallen out of use.[8] A unique equilibrium solution remains once lags are introduced, but the values of the variables are no longer defined for equilibrium positions alone. In the past it was common to specify econometric models in terms of simple time lags.

Discussion of lags indicates a fundamental feature of the synthesis model as a whole and the demand side of it in particular: there is no treatment of production. A third potential lag in this simple system is that between the moment when inputs are gathered in readiness for production and the subsequent moment when the completed commodities flow off the assembly line. So little is this possible lag treated that unlike the other two it has no specific name. In almost every textbook treatment of macroeconomics it is asserted that sales receipts from final commodities and value added are equal by definition, so a lag is impossible. Keynes explicitly rejected this view (see annex on Keynes), and for Marx this lag contained the seed of economic crises (Weeks, forthcoming, Chapters IX-XI).

The demand driven model has been rendered into an analysis in terms of quantity changes by assuming unemployed resources. This assumed allows increases in the demand for consumption and investment commodities to be met by expansion of production at constant prices. The view that changes in demand are accommodated by quantity adjustment rather than price adjustments is the central characteristic of the demand side model. It is based implicitly or explicitly upon the assumption that businesses set their prices by a given mark-up over unit costs which are constant up to the region of full employment.[9] In the context of a model with no material inputs, constant unit cost implies a given money wage and constant marginal productivity of labor services.

In the full neoclassical synthesis model the fixed price assumption is rejected in favor of the opposite extreme: that prices adjust instantaneously to clear markets (Walrasian general equilibrium). In the 1950s and 1960s the quantity-adjustment view was tolerated as a first approximation for empirical work. Neoclassicals such as Milton Friedman never showed any tolerance for this approach, arguing that the perfectly-flexible-price model is suited to reality. Toward the end of the twentieth century his intolerance became the theoretical and policy orthodoxy. In the next chapter we introduce the supply side of the synthesis model, which provides the rational for the belief that capitalist economies tend automatically to adjust to a position of full employment stability.

2 The Neoclassical Model with a Supply Side

2.1 Aggregate One Commodity Production

To create a supply side the synthesis model introduces n aggregate relationship between inputs and output. For those who believe that *The General Theory* achieved its claim of generality by focusing analysis upon a capitalist economy under conditions of less than full employment of resources, this function, "the aggregate production function" is an anathema, rather like a virulent computer virus that infects and degrades entire model and undermines Keynes's insights. The full implications of the aggregate production function will be explored in Chapter 10. In this chapter I show that it is the keystone of the model, establishing the equilibrium solution to the system.

If we accept the analytical fiction that the value of final commodities equals the value added generated in production (see appendix on Keynes), then the aggregate supply of final commodities is simultaneously income to households. Ignoring any material inputs, production (income) is a function of currently expended labor and the means of production used by that labor, with these means referred to as "capital". The output of this labor and capital must be measured in units which are unaffected by absolute or relative changes in prices. Labor and capital produce commodities, not the market value of commodities. The expedient used in the previous section, assuming constant costs at less than full employment, will not serve. To make this explicit, we change our notation, now using lower-case letters to indicate "real" variables. In its most general form, the aggregate production function is written as follows.

$$y = y(k, n), \qquad y'(n) \text{ and } y'(k) > 0$$
$$y''(n) \text{ and } y''(k) < 0$$

The functions noted with a single prime are the marginal products of labor (n) and capital (k), and are constrained to be greater than zero (more of either input results in more output/income). The functions with double primes are the second derivatives of income with respect to labor and capital, respectively. That they are less than zero indicates that the aggregate production function obeys the principle of diminishing returns to the variable input. This familiar principle of marginal productivity theory states that when one factor of production is held fixed and the other increases,

output/income increases at a diminishing rate. Following common practice, we assume that equal proportional changes in both inputs result in an equal proportional increase in output/income (constant returns to scale).

The introduction of this aggregate function places severe restrictions upon the model. Commodities differ because they are produced with different processes. In the production function formulation, that means with different combinations of capital and labor. If we accept this obvious definition of why commodities differ, it follows that when the commodity composition of a given level of y changes, the k and n necessary to produce the different combinations also changes.

Therefore, holding the prices of commodities constant is no longer a sufficient basis for aggregating income. It does not ensure that y is unique for a given combination of capital and labor. If all production can be summarized by this single function, then for every value of y all commodities must be produced in the same proportions. It is for this reason that the term "composite commodity" is used in presentations of the aggregate production function.

But a constant composition of production is inconsistent with the demand side of the model. On the demand side we have two types of expenditure, for consumption commodities and investment commodities. In general, shifts in the output level of the model will result in changes in the ratio of these expenditures. The equilibrium condition that aggregate demand be equal to aggregate supply now is complicated by the further condition that consumption expenditure be equal to the production of consumer commodities, and investment expenditure be equal to the production of investment commodities. These conditions cannot hold if commodities are always produced in the same proportions.

The solution to this difficulty is to assume that only one commodity is produced. Operating in a single commodity world tremendously simplifies the model as well as removing some major internal contractions, though creating others. An irony of the synthesis model is that its practitioners claim that one of its strengths is its ability to analyze the role of prices. However, the assumption of a single commodity eliminates the role of relative prices at a stroke of the pin.

For the reasons given above and more technical ones pursued in Chapter 10, the aggregate production function necessarily involves the extremely restrictive assumption that the economy being modeled produces only one commodity. This fundamental characteristic of the neoclassical "aggregate" model often goes unmentioned in standard macroeconomic textbooks, coming as a revelation to the student who continues on to higher study in the discipline. Gordon, for example, in a textbook once widely-used text, wrote,

> The firm….. has a positively sloped supply curve [due to diminishing returns to labor] even though it pays a fixed wage….. in the same way, the economy as a whole would have a positively sloped aggregate supply curve……The aggregate supply curve is just the horizontal sum of the supply curves for the individual firms (Gordon 1981, 176).

One does not have to know much economics to see that this statement is wrong. Consider an economy with two commodities, apples and oranges. When one moves to sum the supply of apples and oranges, in what units will output be measured on the horizontal axis? No such units exist which make economic sense. Sad to say, casual treatment of aggregate supply is common in macroeconomic texts, so it is unfair to single out Gordon.[1]

Not pointing out the single-commodity character of the neoclassical macro model is no minor omission. It is this characteristic of the synthesis model that renders it incapable of dealing with certain categories of economic relationships. At this point we can identify two: 1) the process by which the demand for different commodities is matched with their supply in the aggregate, and 2) lags and changes associated with the production process, occurring between the sale of one period's output and the subsequent manufacture of the next set of commodities. Since there is only one commodity in the system, the price adjustments which play such a central role in the neoclassical model must do their work outside of the market for commodities.

But before turning to the role of prices, it is necessary to reassess the variables of the model in the context of the aggregate production function. Income must be measured in units of a single commodity, which serves both as an article of consumption and is accumulated as the capital stock. Since income is the sum of consumption and investment, and consumption and saving, these variables must also be measured in units

of the single commodity. If government enters, public expenditure and tax revenue are also denominated in units of the single commodity.

The model has taken its user a long way from the economy one observes. First, real commodities are produced with material inputs (other commodities), as well as labor, and their prices are the sum of materials costs and value added. This fundamental characteristic of commodities is rejected in favor of an abstraction that production occurs with fixed capital and labor alone, and that price is the sum of the components of value added. Second, many if not most exchanges are among businesses in a capitalist economy. In place of this, all exchanges are treated as sales from businesses to households. Third, every society is characterized by a multitude of products, each achieving its uniqueness by virtue of the specific labor process from which it arises. The neoclassical macroeconomic model simplifies to a one commodity world. This vision of commodity producing and exchanging societies is sufficiently at variance with reality that it is questionable whether it can be called a mere simplification of the complexities of the real world.

Broadly speaking, there are two methods for the construction economic models. The first might be called "abstract-simplified", in which the theorist begins with concrete reality as it appears and extracts what he or she judges (perhaps incorrectly) to be the most important aspects of reality, and on this basis reconstructs the actual economy in simplified form. The elaboration of this type of model involves moving closer to the complexity of the concrete by use of the initial elements of reality selected as fundamental. To an extent, this method has an internal check to its adequacy, for the initially-selected elements should be abandoned if they cannot be elaborated to incorporate the complexities which were at first ignored.

A second method, that of the neoclassical school, can be called "abstract-ideal", though the synthesis literature prefers the term *a priori*. In this case, the model is constructed on the basis of components which directly contradict reality; e.g, the world of a single commodity, and elaboration involves developing the logical aspects of these components rather than approaching the concrete.

As we shall see, many of theoretical difficulties of the synthesis model arise not from the complexities of reality, but from the contradictions of the internal logic of the

model. As a consequence, one tends to deal with purely theoretical problems: i.e. problems which arise because of the inadequacies of the model rather than because of the complexities of the phenomena to be explained. This approach is "ideal" because the elements of the model arise from mental construction and their relationship to observed phenomena is not obvious. In this type of theorizing, actual outcomes enter only at the end of the process and are compared against the ideal constructions, usually in a statistical test.

2.2 Constructing the "Real" System

In the circular flow the hypothetical neoclassical economy was one in which no commodities were produced, only distributed. The function of this presumption should be clear. Assuming no production is an explicit recognition of the necessity of considering the world in terms of a single commodity which has no material inputs. It would be more accurate to call y = (k, n) a value added function rather than a production function, since its characteristics conform more closely to

Y = (wages + profits), than to

Q = (some collection of commodities aggregated in some appropriate manner)

With this in mind, the synthesis model can now be specified with a supply side, now using lower case letters to indicate that the variables are measured in units of the single commodity.

Commodity market:

(1)	$y = c + i$	(aggregate demand)
(2)	$y = c + s$	(aggregate supply)
(3)	$c = c(y), s = s(y)$	(consumption and savings functions)
(4)	$i = i(r)$	(investment function)
(5)	$y = y(k, n)$	(aggregate production function)

$y'(n)$ = marginal product of labor
$y'(k)$ = marginal product of capital

Factor markets:

(6)	$w = y'(n)$ or $n_d = n_d(w)$	(labor demand)
(7)	$n_s = n_s(w)$	(labor supply)
(8)	$r = y'(k)$	(interest/profit rate)
(9)	$k = k^*$	(supply of capital)
(10)	$y = rk + wl$	(total income = value added)

Relationships 1-3 and 5 have been explained. Relationship (4) specifies that investment is a function of the interest rate. The remaining five define the conditions for the markets for labor and capital. The symbols w and r refer to the wage and interest/profit rate, respectively, and k* indicates that the supply (stock) of capital is invariant during the period under review. A well-known conclusion of microeconomic theory is that under conditions of perfect competition, businesses will minimize their costs when factors are paid according to their marginal products. This rule gives the demand schedules for factors, relations (6) and (8). The supply of labor is specified in terms of the real wage, of which it is an increasing function. The market for labor services is cleared when $n_d = n_s$. Since the capital stock is given, r is determined by the wage that equilibrates the labor market.

The last relationship is the "adding-up" equation.[2] On the basis of previous assumptions, diminishing marginal productivity and perfect competition, and adding the assumption of constant returns to scale, yields $y = rk + wn$. Constant returns to scale imply that proportional increases in factor inputs yield the same proportional increase in output/income, and this assures that output/income is exactly equal to factor payments when factors are paid their marginal products. Proof of the adding up equation is part of what is called "Euler's Theorem". However, when one writes by whatever assumptions:

$y = y(k, l) = rk + wn$

The result has a tautological aspect. On the one hand, in the simplest case money income is by definition equal to value added, or wages plus profits. Factor income is just another name for value added. The relationship, value added equals wages plus profits remains a definition when measured in real terms, by whatever method of deflation. On the other hand $y = rk + wn$ also holds by definition as a production relationship, since an "assumption" (constant returns to scale) is one aspect of defining a function. There is an important difference between the two equalities, though they appear as the same equation. First case, $y = rk + wn$ is a definition which carries with it no implications for the behavior of the economy. In the second case, the same equality involves a very specific view of how the economy operates: the demand for factors is determined by a single commodity production function, factor payments are set in perfectly competitive markets, and production of the single commodity is subject to constant returns to scale.

There is the risk that a non-behavioral identity might be taken as evidence that the behavioral relationship is valid.

Tautologies or definitions have a respectable position in all sciences, and in themselves are unobjectionable. In the case of ($y = rk + wn$) there is no empirical way to distinguish its purely tautological character (value added) from its theoretic behavioral character (output of the single commodity). The basic difficulty, and source of endless confusion, is that it is not possible in the synthesis model to consider income without simultaneously meaning output, for they are the same thing. Not even in theory can one separate the pure tautology from the theoretic behavioral definition. This limitation becomes more serious later in our investigation when we discover that the behavioral definition is consistent only in equilibrium. The result is an equilibrium solution in which the key behavioral relationship, the clearing of the labor market, is indistinguishable from a tautology. In the next section shows just how key it is.

Prior to doing this, a further relationship must be added to the ten equation model presented above. When we considered the demand side of the model, investment was exogenous. With the introduction of the aggregate production function this will no longer do, or the model becomes inconsistent. Assume a fixed real wage, w, measured in terms of the single commodity. On the basis of this wage rate, the demand for labor is determined, and with k fixed at k* the level of output/income is also determined. *Via* the consumption function, relation (3), the level of income sets the level of savings. This level of savings must be equal to the level of investment for commodity market equilibrium. If exogenous investment (i^*) is above or below the level of savings implied at the fixed wage rate, a logical inconsistency results. Should it be that $i^* > s$, then there is apparently excess demand, requiring an expansion of income to generate further savings, and the reverse.

The generation of income in disequilibrium is the multiplier process of the Keynesian neoclassicals. However, more income/output will only be produced, given k* and the production function, if the wage falls (law of diminishing returns). The Keynesian neoclassicals proceeded with their multiplier mechanism on the presumption of constant unit costs up to the vicinity of full employment, so no wage adjustment, real or monetary was necessary for an expansion of employment. With the introduction of the

aggregate production and its diminishing returns to labor, a fall in the wage rate (measured in the single commodity) must accompany any increase in employment. With the introduction of the aggregate production function, it is no longer possible to specify a simple scenario in which excess demand generates increases in output and employment.

The inconsistency does not arise when the consumption function and investment function are redefined to include the interest rate as a variable. The exogenous investment relationship is replaced with

(3a) $c = c(y, r)$, $s = s(y, r)$

(4) $i = i(r)$

With the new consumption function all relevant variables are endogenous. In the absence of assumptions that restrict variables, the labor market determines the general equilibrium solution, with aggregate demand playing a passive role. When the wage measured in the single commodity equates the demand for and supply of labor, output/income is determined, at its full employment level by definition. If at this level of income saving exceeds investment, then the interest rate falls, which induces a movement along the savings and investment schedules such that the former decreases and the latter increases. Since full employment was previously assured by the labor market equilibrium, an increase in investment induces no increase in out/income; the multiplier is zero. The consequence of the increase in investment prompted by a fall in the interest rate is to reduce consumption by an amount equal to the increase in investment, for aggregate demand cannot change. Should one begin at any point in the story other than the labor market, the story must be retold if the level of output/income is not consistent with labor market equilibrium, full employment.

The characteristic of the "real" system that every variable's value is derivative from the equilibrium wage rate measured in the single commodity indicates a surprising anomaly in the model: the supply and demand for labor are specified independently of the interest rate. Consider the supply of labor. For a theorist inspired by the pre-marginalist economists, most prominently Ricardo and Marx, the absence of the interest rate is reasonable. In the pre-marginalist tradition, economic society is viewed in terms of classes. Workers sell their labor services because they have no capital and no prospects

of obtaining any. Their income can be treated as wages only. Capitalists, on the other hand, are the owners of capital, and their incomes derive from profits and interest.

In neoclassical theory the population of economic agents is not divided on the basis of class. All agents have a certain "endowment", and while this endowment varies across agents, there is nothing in the theory to suggest that the population is divided among those who have capital and those who do not. Capital is acquired in the neoclassical world by deferring consumption (saving). Neoclassical theory is quite clear in arguing that whether one is a capitalist or a worker has no impact on saving behaviour.[3] If workers save, then the model implies that they must also invest. If they invest, they must receive interest and profit payments. Since the supply of labor reflects the tradeoff between leisure and income, it must logically be a function of the interest rate, which partly determines income.

Yet no common or influential rendition of the neoclassical labor market in a macro context includes the interest rate as an influence upon the supply of labor. One can offer two explanations for this oversight. First, the neoclassical model in effect treats wages as a cost to the capitalist, a payment for a commodity like any other, and the worker is a commodity seller like any other. In so far as what workers sell is viewed as disembodied labor services, the interest rate is irrelevant. The rate of return on bonds, for example, does not in the short run have an impact upon how many apples a farmer sells on a given market day. Thus, the omission may arise from an analogy with commodity sellers in general, an issue pursued further in the next section.

However, the analogy is false. If an apple farmer can use the same resources to grow pears, how many apples are offered for sale will be determined by the relative price of apples to pears. Similarly, the seller of labor services is simultaneously a seller of "capital services" if he or she saves. In a neoclassical world workers should determine their offers on the basis of the relative price of labor services and "capital services". But this does not show itself in the model.

A second possible explanation for the omission of the interest rate from the supply of labor function is that we have a rare case in which neoclassical theory begins not from an ideal abstraction, but from an abstraction drawn from the world as it is. The overwhelming proportion of households in advanced capitalist countries derives no

substantial income from sources other than wages. When one presumes that the decision to work and how much to work is not influenced by the interest rate or profit rate, this is a quite reasonable and empirically valid simplification. But when one makes such an abstraction based upon the world as it, the abstraction enters in an *ad hoc* manner into the neoclassical model, conflicting with the method of the theory. Treating the supply of labor as independent of the interest rate is an implicit acceptance of the pre-marginalist view that people are is divided between the owners of capital and those who have no source of income but the capacity to work.

To return to the principal theme of this section, the introduction of the aggregate production function into the synthesis model apparently brings total theoretical defeat of the argument that unemployment could result from insufficient aggregate demand, "effective demand" in Keynes's terminology. At this point the defeat is purely formal. It results from a system of simultaneous equations that yields a unique solution in which the components of aggregate demand are derivative from the determination of output/income in the labor market. We have not as yet discussed the behavioral adjustment process by which this formal solution is reached. But the Keynesian neoclassical story can no longer be told.

A labor market without constraints on the value of the wage measured in the single commodity implies that an increase in investment cannot generate an expansion of output/income and employment. One can go further and say that the neoclassical specification of the labor market partitions the model between the market for labor services, which determines output and employment, and the savings-investment market, where the interest rate determines the composition of aggregate demand. This treatment is quite close to that of pre-Keynesians, who tended to view these markets as separate. In the synthesis model there is a formal link, because savings, consumption, and perhaps investment are in part a function of the level of income. But this functional link between the labor market and the commodity market is of no significance, for income is held invariant at its full employment maximum, leaving only the interest rate to operate. We consider the implications of this approach for the theory of aggregate employment in the next section.

2.3 Equilibrium in the "Real" System

The next step is to consider the mechanism in the synthesis model by which one moves from a hypothetical situation in which the labor market is not in equilibrium to one in which it is in equilibrium. The argument is clarified by first contrasting the variables used in the simple Keynesian model to those in the pure neoclassical model. Income/output, consumption, investment, saving, labor and capital are in both models. The first four of these assume both "real" and "money" values, though we have yet make the synthesis translation from the former to the latter. In both models calculations of the type, C = pc, c = C/p, are made, where C is the money value of consumption expenditure, p a price deflator, and c the "real" value.

The similarity is only apparent. In the Keynesian case, C is observed and directly measured consumption expenditure, p an empirically derived price index, and c the result one obtains when C is divided by p. In this treatment, the C which we observe is the independent category, and c exists only as a calculation useful for policy purposes. In the synthesis model, the reverse is the case: the consumption component of aggregate demand has no direct empirical or observable analogue. It is the non-saving of households measured in units of the single commodity, determined by income (also measured in the single commodity) and the interest rate. It exists theoretically prior to the determination of C, where the latter is the result of an arbitrary determined money supply (see Chapter 4). The same is true for savings, investment, and income itself in the synthesis model. This is another aspect of the "abstract-ideal" method of neoclassical theory. The basis of the model is a set of variables which are constructions of the theorist, rather than simplified expressions of what one observes.

In summary, the Keynesian model is based on nominal variables. To keep to the same example as above, consumption expenditure in money units is a function of money income. Price changes complicate this relationship, requiring some deflation procedure. Therefore, c, "real" consumption expenditure, exists only as derivative from the empirical category, C, consumption expenditure in money terms. In the synthesis model, all flow variables are defined in terms of the single commodity, generated by the aggregate income/output function. In this case, consumption in money units exists only as a derivative of "real" consumption. No deflation is involved, merely a conversion of units,

the single commodity to units of money, with money as yet defined. This characteristic of the synthesis model, that its basic concepts are specified independently of money, is of particular importance to the analysis of labor market equilibrium. The nature of the labor market in the neoclassical model cannot be fully appreciated without grasping this point.

In the Keynesian model there could be less than full employment equilibrium. In formal mathematical terms this is possible because the only equilibrium condition is that aggregate demand equal income/output. This equilibrium is based implicitly upon a presumption of constant costs in production. In the synthesis model this type of equilibrium is excluded by the further condition that the demand for labor must equal the supply. While this is a formal mathematical condition, it implies a vision of economic behavior radically different from that of the Keynesians. For Keynesians, economic agents are viewed as income constrained. For households, this means that their incomes are given in the short run, and income constrains their consumption decisions. In the case of businesses, the decision to set the level of output is constrained by anticipated sales.

Implicit in the neoclassical specification of the labor market is a reversal of the Keynesian constraint. For households, income is not given; it is a decision variable. The constraint is the wage, fixed as measured in the single commodity, and on the basis of the wage households determine their optimal mix of work and leisure. Analogously, businesses are presumed to believe that they can sell as much as they wish at the prevailing price. On this basis all agents are "price-takers": the demand and supply schedules for labor can be specified without reference to the price of the single commodity in monetary units. Some have called these "notional" schedules, meaning the quantities of labor demanded by businesses and supplied by households on the presumption that expectations will be fulfilled and all markets will clear. To put the matter succinctly, notional demands are the demands generated by general equilibrium full employment.

In the context of a single commodity, the labor market is cleared through barter exchange. The "real wage" is a certain amount of the single commodity, for which workers barter their labor services. Treating the exchange between capital and labor as barter is central to the equilibrium solution, because it makes the calculations of both workers and capitalists extremely simple. The reward for work is a certain amount of the

single commodity, and the cost of hiring labor is the same. Further, labor services are sold in a manner completely parallel to the way in which capitalists sell their produced commodities.

Consider a situation in which at the prevailing price the demand for a commodity is less than its supply. In such a situation, neoclassical theory has a particular story to tell. If the market for the commodity is a competitive one, sellers will respond by reducing their offer price. If the demand for the commodity is negatively related to price and the supply positively related, the consequence of reducing the offer price will be to eliminate the initial excess supply. This apparently simple adjustment process is considered in more detail in the next two chapters with reference to Walras' law.

In anticipation of that discussion, it can first be noted that the onus for adjustment falls upon the seller in the case of excess supply. We consider this in Figure 2.1 which is a four part diagrammatical presentation of the equilibrium solution of the simplest version of the neoclassical model.[4] The diagrams make only one change from the equations previously specified, that investment is a function of the interest rate only. Nothing significant is lost in the logic of the model by making this simplification, as we shall see when we reach the discussion of parts (c) and (d) of Figure 2.1. The diagrammatic technique used is a common one, and the labor market is presented first, at the top of the page. Putting the labor market first is singularly appropriate because its equilibrium condition determines all else. Indeed, the savings-investment relationship enters as little more that an afterthought.

Part (a) of the figure shows an equilibrium point A at which the supply of labor and the demand are equal. This determines the full employment level of output. While there are points to the right of the employment level n_e, and output levels above y_e in part (b), these do not exist even conceptually. Should the wage be above w_e, employment is determined by the demand curve, for the aggregate optimizing rule is, marginal product of labor = the wage. If the wage is below w (e), the employment level is determined by the supply curve. Any wage, above or below the equilibrium, results in a level of employment and income/output less than the full employment level.

We have used the term "wage" repeatedly, and it is necessary to be precise about its meaning. Invariably in the context of the neoclassical model the variable on the

vertical axis in Figure 2.1 (a) is identified to measure the "real wage". This is imprecise language, even misleading. Almost without exception, the neoclassical macro model involves only one commodity. Therefore, the variable w is necessarily measured in units of the single commodity, and is correctly referred to as the commodity wage. In the present context with no money, "commodity wage" and "wage" will be used interchangeably. When money is introduced the practice will not be justified.

With terms clear, consider the situation in which the commodity wage is momentarily above the equilibrium level, ($w_o > w_e$). At such a wage the supply exceeds the demand, with employment set by the latter. Were this wage to prevail, y would be determined below y_e, and the interest rate would adjust to equilibrate i and s. In the synthesis model a situation in which ($n_s > n_d$) results in a fall in the wage. The argument is as follows: workers have a commodity to sell, labor services; when they are unable to sell all the units of this commodity that they wish at the prevailing price, they reduce the offer price until the amount they wish to sell matches demand. The analogy with a producer of commodities is implied. For example, a farmer takes his or her potatoes to market and makes an offer. Unable to sell all of the potatoes, he/she offers them at a lower price, and continues to reduce the offer price until all are sold. This behavior forces other farmers to reduce their offer prices. Workers are presumed to act in the same fashion.[5]

There is a problem with the analogy, however. In the case of the farmer, it is credible to assume everyone to be alike with respect to production conditions and share of the market (infinitesimally small for perfect competition), and that each will be in a similar market position. Either all will find that they can sell all of their potatoes (with market in equilibrium or in excess demand), or all will be burdened with potatoes they cannot sell. In this hypothetical situation, all will be motivated to do the same thing: reduce the offer price of potatoes. Or, at least, such behavior is a logical possibility. However, not even hypothetically can one treat all workers as being in the same situation without additional assumptions. Even if all workers were alike, an excess supply of labor would be characterized by most workers successfully selling the amount of their labor services which they wish to sell, and only a minority of the labor force being unsuccessful in doing so.

While an excess supply of any non-labor commodity can reasonably imply disappointment on the part of the vast majority of sellers, excess supply of labor services is consistent with contentment for the vast majority of sellers. Further, the equilibrating adjustment which would eliminate the excess supply of labor services, a lower wage as measured in the single commodity, would leave the vast majority of satisfied sellers unambiguously worse off. This contrasts with the situation of the seller of a non-labor commodity who, while losing from the fall in price, gains from the rise in quantity sold. No such gain goes to the worker, who sells his commodity in an all-or-nothing package.[6] A higher level of employment in general means more workers employed for a longer time period, but at a lower wage. With these differences between workers and other commodity sellers in mind, why should the contented sellers of labor services lower the offer price which has secured them employment?

In order to achieve the clearing of the labor market, assumptions must be introduced which allow workers as sellers of their labor services to be identical to sellers of other commodities. At least two possibilities present themselves. First, one can contradict the real manner in which work is organized and contracted, and assume that workers like potato growers, sell their services bit-by-bit, so that a ten percent rate of unemployment, for example, can be viewed as each worker suffering from selling less than he/she wishes. Alternatively and equally counter to reality, it can be presumed that employment contracts are for an extremely short period of time, coinciding with the market period. In this case, each market day dawns with all workers without jobs and all businesses without workers. The second is the ideal abstraction made in the synthesis model, and labor market equilibrium is dependent upon it. Keynesians, Leijonhuvud for example, have sharply attacked the neoclassical treatment of the labor market, which is discussed in Chapter 11.

With the nature of employment redefined to conform to the needs of equilibrium, the schedules in Figure 2.1a take on particular meaning. If the prevailing wage is w_o the demand for labor will be n_o corresponding to point A' on the demand schedule. This amount n_o should not be considered as the level of employment, but rather the job openings that businesses would offer at such a wage. It is not correct to interpret the horizontal distance from the demand curve as "employment", nor the horizontal distance

from the demand curve on the supply curve as "unemployment". To use the term introduced earlier these are *notional* offers, made in the context of a logically necessary equilibrium solution. Were it possible to treat point A' as the representation of an actual hiring process that left a certain number of workers disappointed, the logical of the equilibrium solution would have been contradicted.

Armed with equilibrium in the labor market, we move on. The full employment level of income/output implies a certain level of savings, given the interest rate (part c). If the interest rate is r_o then savings exceeds investment, by amount D'D" (part d). The excess supply of savings leads to a fall in the interest rate, which brings about i = s, and this rotates the homogeneous savings-income schedule to the left. The last two parts of Figure 2.1 clarify another characteristic of the synthesis macro model: the difference between consumption and investment is purely formal. Both are positive functions of income and negative functions of the interest rate, though any income influence on investment is not shown in Figure 2.1.

In the writings of Keynes and subsequent literature, consumption and investment expenditures are differentiated in several ways. First, it is argued that the two types of expenditure are carried out by different agents, with different motivations and different purposes. This is completely eliminated by making both a function of the same variables, specified in general form.[7] Second, and on the basis of the first distinction, it was argued by Keynes and later writers that investment is more volatile than consumption, which justifies treating investment expenditure as key to the explanation of economic cycles. This also is lost when both are specified as functions of the same variables. And third, in static equilibrium in which there is only one commodity, investment plays no role as a creator of productive capacity, its last claim to distinction once its role as an independent component of aggregate demand is excluded.

The theoretical decision to drop any meaningful distinction between consumption and investment also implies dropping the distinction between consumption and saving, and saving and investment. In the Keynesian neoclassical model, saving is income not currently spent by households. In the strictly neoclassical treatment it becomes that portion of income spent under the name of investment. And investment expenditure itself merely represents the portion of the single commodity which is not consumed in this

period but carried over into the next, where it is lost from view. In this context the interest rate has a very limited and restricted meaning. Since there is only one commodity in the model, variations in the interest rate by definition have no impact upon the composition of output.

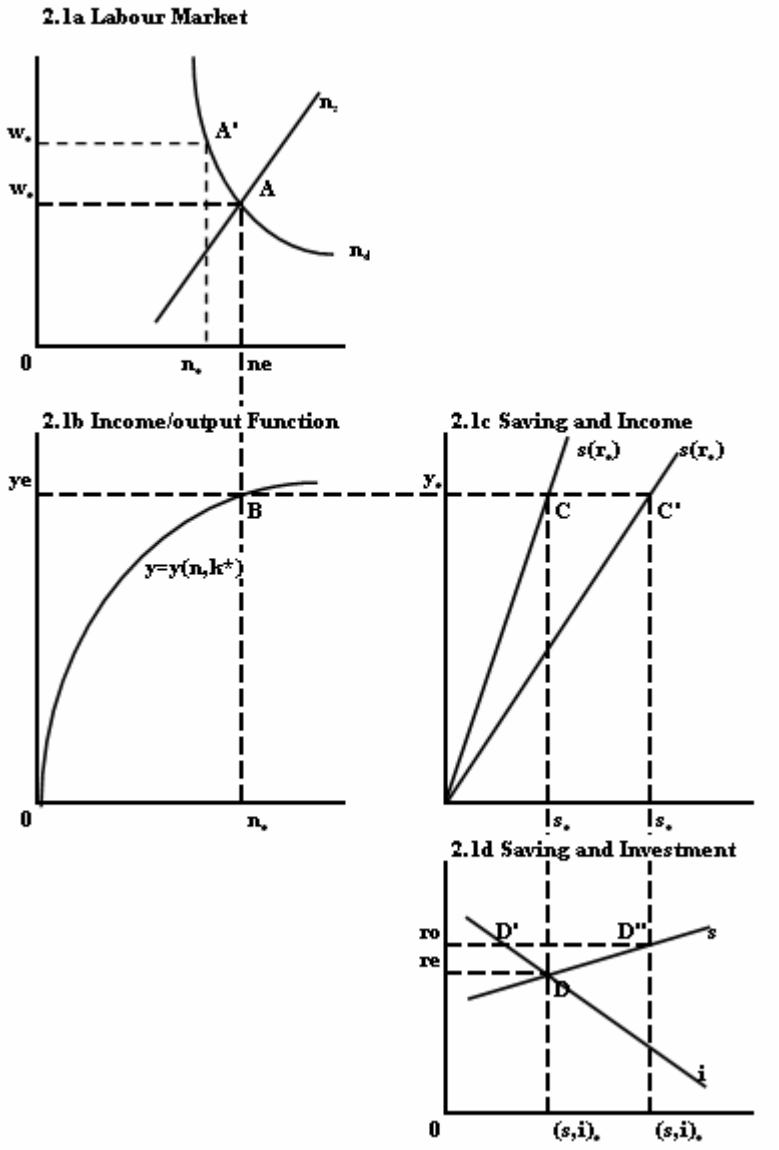
The role of the interest rate, given output/income at its full employment level, is to set the division of income between consumption and savings, and the division of aggregate demand between consumption and investment. The latter division, however, is only semantic, two words for expenditure on the same commodity or product. To the extent that these two words imply any theoretical difference, "consumption" refers to expenditure that results in immediate use of the single commodity for personal gratification, wide "investment" involves buying the same commodity but carrying it forward in to another period. Since not consuming something in the current period means saving it, investment and saving are the same act in the model.

If this is the case how does one justly having two words to describe the same thing (not consuming now) and associating the two words with different mathematical functions, i.e. s = s(r) and i = (r)? Indeed, this apparent redundancy is eliminated with the introduction of the IS function, as we shall see. The redundancy can be justified in the present context by recalling the discussion of the circular flow. We noted that some households lend and others borrow. Since the equilibrium solution can be reached on the basis of "real" variables, the borrowing and lending must be in units of the single commodity. Borrowing involves some households deciding to consume more now and less later, while lending implies the reverse.

In the neoclassical macroeconomic model the discussion of saving and investment can proceed with no reference to the capacity-expanding characteristic of the investment. The analysis can restrict itself to savings alone, and frequently does. Omitting reference to investment makes the model considerably more comprehensible for it eliminates at least two nagging contradictions: how two different categories of expenditure, consumption and investment, could relate to the same commodity, and how a system could be in equilibrium with unchanging aggregate demand but expanding capacity. The diagram reveals another characteristic of the model. It is equivalent to a circular flow with a consumption commodity only, analogous to a community of squirrels that makes

no investment but sets aside nuts for the future. The interest rate reflects the trade-off between nuts for present and nuts for the future.

Figure 2.1 General Equilibrium in a single commodity barter model



2.4 Clearing Away the Fog

It should be clear from the preceding discussion that unemployment in the usual sense of the term is impossible in the synthesis model. Appropriate assumptions are made to ensure that the labor market will automatically achieve equilibrium, which involves full employment by definition. If the wage measured in the single commodity rises above what had been its full employment value in a previous hypothetical exercise, the resulting fall in the level of employment would represent what is called "voluntary" unemployment. The level of employment is determined by notional demand and supply curves, so an increase in the wage can only be the result of workers reducing their notional supply of labor.

This is a powerful political and ideological message: changes in the level of employment are the result of the work-leisure preferences of workers; they do not result from any systemic malfunctions of the system of production, distribution and circulation. This conclusion is inherent in the one commodity model, and one needs none of the abstract-ideal assumptions governing the labor market to reach it, nor any mathematical specification of equilibrium conditions. These merely serve to give a barter system the superficial facade of an exchange economy and to ensure that the solution is "optimal" as well as at full employment.

The term "*in*voluntary unemployment" refers to a situation in which some members of the labor force seek jobs at prevailing wages or even lower than prevailing wages, but are unsuccessful in finding them. If workers are in this situation, willing and able but unsuccessful in finding jobs, then their failure must be because employers are unwilling to offer sufficient work, at prevailing or less than prevailing wage rates. Employers will be unwilling if they believe that the output which additional workers would produce could not be sold profitably.

Such a condition is called a "demand failure". When a seller perceives a demand failure, the notional demand for labor curve, the basis of neoclassical labor market analysis, is no longer relevant. The necessary condition for a demand failure is that the producer must sell his or her commodity. Such situation is ruled out of the neoclassical model by the nature of its assumptions; demand failures are not logically possible. They are ruled out because the model involves no sale of the commodity in the usual sense.

One portion of the output of the single commodity is bartered directly with workers for their labor services. This is not a sale of the commodity but a barter exchange for services rendered. It is inseparable from the decision which sets the producer's optimal level of employment. The producer can harbor no uncertainty about how much will be sold to workers, for the employment decision guarantees that amount. If for some reason, workers were to refuse a barter-wage offer, this would simultaneously imply that the level of output implied by that offer would not be produced.

Since there are only workers and profit receivers in the model, that proportion of output/income which does not go to workers is retained by the producer; it is not even bartered. Because there is no lag between the circulation of the single commodity as an item of consumption or investment and its distribution, there is no theoretical difference between income, demand and output. In this model, output is not bought and sold, but only divided into two forms of income, wages and profits.

In actual capitalist economies, there are three distinct stages, or "moments" as Marx called them: production, when commodities are created; circulation, when these commodities are exchanged and reach their users; and distribution, when the money received in exchange corresponding to the value added in the commodities accrues to various categories of income recipients. In the neoclassical "real", system, these stages three are one, not only because they are considered in timeless equilibrium, but also because no theoretical distinction is made among them. The production function is simultaneously a value added function such that (production = distribution). The exchange between capital and labor is simultaneously the sale of the product, so (distribution = circulation). There is no theoretical space in which an insufficiency of aggregate demand can present itself.

The first necessary condition for demand failures is that the sale of the producer's product not be a direct act of distribution. The second necessary condition is that the producer's output not only be a vendible article,[8] but also that it *must* be disposed of through sale of it. If the producer can keep the product for own use, then no demand failures are possible. Except in the case of self-employed producers who assemble their inputs without significant monetary exchange, the first condition implies the second. If employers of labor sell their product to anyone other than their own workers, those

workers must be compensated for their work with something that will allow the workers to obtain the products of employers other than their own. This "something", a general medium of exchange for the products of sellers, is by definition money. Once the employer of labor has paid out money to workers as a condition for obtaining their working time, the employer must exchange her/his product for money, or the production cycle cannot be repeated.

The necessary conditions for demand failures, and, therefore, involuntary unemployment, are absent in the neoclassical model. The commodity is never sold; it never has to face the test of the market, lonely and uncertain without a guaranteed recipient. At this point, we can note that our terminology has been inaccurate, for we have used the term "commodity" to refer to the single output of the synthesis model. In order that the words "product" and "commodity" not be synonymous, we shall make explicit definitions. A product is the result for a process of production. A commodity is a product which is produced for them purpose of selling it, and must be sold if the producer is to continue in his or her role as a prodcuer.[9]

This was the definition of a commodity used by the Classical economists (particularly Marx and Ricardo), and the usefulness of the definition should be clear. At the most fundamental level, the synthesis model precludes involuntary unemployment because it is a theoretical formulation without commodities. In the theory there is no difference between those products produced for self-consumption and those produced for the purpose of selling them, and the basic difference between private consumption and private production in a capitalist economy is obscured.

3 Comparative Statics and Equilibrium

3.1 Statics, Dynamics and General Equilibrium

In the previous chapters a simple definition of "equilibrium" was used: markets are in equilibrium if there is neither unsatisfied demand nor unsold supply. In anticipation of the introduction of money into the analysis, a more precise definition is required. For the rest of this book, the following definition will be used:

> A market or set of markets is in equilibrium if the agents participating in that (or those) market(s) have no cause to alter their plans of how much they desire to buy and sell.

This chapter and the next require a brief discussion of two related matters which presented themselves implicitly in the real solution to the synthesis model. The first of these is the distinction between models in which the variables reach steady-state values and models in which the variables are changing. Following convention, the former are referred to as static and the latter dynamic models.[1] The discussion of the preceding chapter involved static analysis, in which variables seek steady, unchanging values implied by a set of parameters such as the production function and consumer utility functions.

When one of the arbitrary parameters changes and pursuing the implications is comparative static analysis. The usual result of this analysis is the discovery of an equilibrium solution in which the variables are again at rest. Equilibria have three aspects, existence, uniqueness, and stability. The second two will rarely concern us. I shall assume that if an equilibrium solution exists, it is unique; *i.e.*, there are no others for the given set of parameters. The stability of equilibria is also assumed. These assumptions imply that given the parameters of the model, if a variable is "disturbed" from its equilibrium value, it will return to it, not diverge further.

Discussions of equilibrium adjustment fall into two categories, partial and general. Veterans of introductory courses in economics would be familiar almost exclusively with the former. The usual supply and demand analysis involves consideration of a partial equilibrium solution. The demand curve for a particular commodity, for example, is constructed on the assumption that the income of all

consumers in the market and prices of other commodities are fixed. These, along with other assumptions, allow one to draw a curve in two dimensions, in which quantity is a function of price. Maintaining these assumptions, one can deduce the new equilibrium price when the demand

The analysis is partial because the change in the price of the commodity under consideration will affect the demand curves for other commodities, which are constructed on the assumption that the price of the first commodity is fixed. When these demand curves shift, their change will feed back on the demand for the first commodity, shifting the price away from the partial equilibrium solution in which such feedbacks were ignored. Strictly speaking, partial equilibrium solutions are inconclusive even for the direction of movement of price and quantity.

An analysis which incorporates all of the feedback effects as they ramify through all markets requires a general equilibrium solution. It has its basis and inspiration in microeconomics, but plays an important role in synthesis macroeconomics. The synthesis model is one of general equilibrium, in which there are feedbacks among several markets, and analysis of any market taken alone is partial.

With the distinction between partial and general equilibrium analysis explicit, one can look back and see that the treatment of the real solution was partial. First, the labor market was considered, and equilibrium established there with no reference to any other market. This was possible because no variable could feed back upon the labor market. Because the model had no money, there was no price level and, therefore, no money wage which could be influenced by events in the market for commodities.

This is the essence of what is called the *Classical dichotomy*. The labor market stands alone, achieving solitary equilibrium. The absence of feedbacks from other markets is the result of the complete dichotomization of real and nominal variables. Once money is introduced, it is no longer possible to treat the labor market in isolation. The labor marker remains the keystone of the model, however. With the introduction of money, the price level becomes a variable, and the real wage is not the simple w, but W/p, where W is the money wage and p the price level. To be more precise, the so-called price level is nothing more than the price of the single commodity.

It is necessary to write “so-called” price level for reasons explained below. In the context of the synthesis model, even apparently unproblematic concepts are converted from commonsense to nonsense, and the “price level” is perhaps the best example. However, revealing the problems with this term first require treatment of the closely related concept, money, which is done in the next chapter.

Once money intrudes, disequilibrium in the labor market is not eliminated by a movement in the real wage as such, but by adjustment of W or p or adjustment of both. The real wage does not exist independently of the two nominal variables W and p. As shall be clear later; the “price level” is determined by relationships which do not directly operate upon the labor market. As a consequence, the synthesis model with money, even in this simple form, requires an explicit general equilibrium solution, in which the values of all variables are determined simultaneously, not sequentially as was the case without money. While the labor market remains the basic determinant of the general equilibrium solution, it is not valid to consider it in isolation once one must include nominal variables. It is for this reason that general equilibrium analysis is treated in some detail in Section 3.3. However, it is first necessary to deal with potential confusions arising from the relationship between equilibrium adjustment and the conceptual treatment of time in the neoclassical model.

3.2 Confusions of Logical and Chronological Time

The distinction between the "short run" and the "long run" is commonly encountered in neoclassical economics, and can serve a source of endless confusion unless clarified. The precise meaning of these terms, and the only meaning which is free from serious ambiguities, drives from microeconomics. The short run is a period of time during which the capital stock is treated as unchanging; it is "given". This is the precise sense in which the macroeconomic model of the previous chapter was "short run", because it assumed $k = k^*$.

In microeconomics the long run is not a time period. It is a “planning perspective”. In the long-run perspective, the owner of each firm is presented with a range of alternative production facilities, all using the same technology, each of which differs by the size of the capital stock. To the anyone unfamiliar with neoclassical

economics it may seem absurd that the “long run” could be associated with no technical change. It is absurd, but an absurdity with a purpose, to demonstrate the existence of a stable competitive equilibrium (Weeks 1993).

The long-run analysis requires the theorist to specify the determinants of the decision of which plant size to select. For this reason, the locus that traces out the minimum unit cost levels for each output is often and most correctly called a "planning curve". In textbooks on microeconomic theory it is common to encounter the statement that in the short run labor is variable and capital fixed, and in the long run both (or all) factors are variable. Strictly speaking, such a statement is incorrect or at best misleading, for it suggests that the two concepts, short run and long-run, are both logical abstractions from chronological time, differing only in duration.

This is not correct. The term "long run" does not refer to time, but to alternative choices. The short run is a concept of time explicitly chronological in nature. Theoretical or hypothetical processes occur in the short run: the output decision is made by the firm, prices change, demand and supply curves shift, for example. In other words, the short run is a logical time period in which the actions of economic agents are realized. In the long run nothing can occur, for it is state of perception by agents of alternative short-run situations into which they can place themselves to act.

Strictly speaking there is no such thing as a static long-run model. If the capital stock is given, the analysis is short run. If the capital stock is changing, one is dealing with growth theory, in which the terms short run and long run have no clear meaning. The short-run/long-run distinction refers to static analysis, and all static equilibrium models are short-run. What, then, is one to make of a statement such as the following?

> The neoclassical full [employment] equilibrium is a useful reference point for the study of more realistic descriptions of macroeconomics. We should expect it to converge to the neoclassical equilibrium in the long run. (Dornbusch and Fischer 1983, 367)

This is an example of loose use of precise terms that results in considerable confusion. A similarly incorrect statement is the judgment that "the Quantity Theory of Money is a long-run relationship". Such statements have no theoretical status and fall into the category of what Leijonhufvud calls a "fudge-phrase": vague use of precise terms is employed to gloss over points at which the analysis becomes problematical. On

the basis of the generally agreed precise meaning of short run and long run, nothing can converge in the long run, since events occur only in the short run by definition. If a statement like the one above refers to real time, *i.e*., it is an empirical assertion, then it is unacceptably simplistic. The neoclassical full employment equilibrium, to take the example in the quotation, is based upon an analysis in which there are no technical changes, no uncertainly, no change in consumer tastes, and no random shocks. It is simplistic indeed to argue that a model which excludes these yields a definitive predication, full employment stability, about the actual course of events in the real world over a given period of chronological time.

There is a third interpretation of this type of use of the terms short run and long run. Neither an empirical prediction nor a rigorous theoretical statement, it could be taken to refer to what happens in a successive series of short-run situations after a parameter change, such as an increase in the money supply, causes a deviation from equilibrium. In other words, after the "shock", the model seeks equilibrium again when everything has "shaken down" and sorted itself out. This would seem to be the implication intended by authors of such statements. Such an implication is invalid, a spurious attempt at realism.[2] Short-run static models exhibit their equilibrating tendency in a single instantaneous moment or not at all. To hold the capital stock and other parameter constant, then to refer to "long-run" tendencies is to mix an abstract theoretical process with real world processes that contradicts the assumptions of the model. The result is an inconsistent statement that has no theoretical content.

For this reason, there will be no reference to the "long run" in the subsequent discussion of the synthesis model, except in the precise sense in which it is used in microeconomic theory. The concern is not whether the neoclassical model tends o full employment in some vaguely specified "long run", but whether given its assumptions it tends towards such equilibrium in the short run. This allows for a strict separation of theoretical generalizations and empirical predictions. In the previous section the nature of equilibrium solutions and adjustments was clarified, and in this section it has been argued that static equilibrium solutions are by their nature short run. The process of equilibrium adjustment itself can now be treated.

3.3 Equilibration of Markets

Prior to introducing money into the synthesis model, it is necessary to pursue further the process of general equilibrium adjustment. In Chapter 2 we demonstrated an equilibrium solution for the real system. And it appeared a theoretically simple process to transform its real values into nominal terms. The stage seemed set for the entry of the quantity theory of money or some variant thereof to provide a facsimile of a monetary economy. Most textbooks would introduce the quantity theory at this point and quickly transform real variables into money values. However, the introduction of money implies that a new method of solution is necessary, which treats all markets simultaneously, *general equilibrium*.

The entry of money is what requires one to abandon the simple sequential treatment of market clearing. Therefore, the first step to convert from partial to general equilibrium analysis is to consider why money need be introduced unto the analysis at all. Recall that the solution to the model in the previous chapter was derivative from the labor market. If the labor market is considered in isolation, no concept of money is necessary. In a one commodity world, employers barter the output of their enterprises directly to the workers who along with the fixed endowment of capital produce that output. In this formulation money plays no role. While it is true that actual commodity-exchanging economies invariably involve money, this is not a theoretical justification for introducing the concept. Actual economies possess many characteristics which the neoclassical macro model never incorporates, such as intermediate inputs. These are excluded on the grounds that they are not relevant to the problem at hand. Why, then, is it relevant to introduce money? What theoretical problem is raised which leads one to consideration of the role of money?[3]

To answer that question, recall that the real system has two markets. First, there is the labor market, which I treated in detail. Second, there is the market for the single commodity, which includes the determination of the distribution of the commodity by the interest rate between consumption now and consumption in the future. If one allows for disequilibrium states, it is apparently possible for one or both one of the markets not to clear.[4] In such hypothetical circumstances, some agents (buyers and sellers) are disappointed. If a seller is disappointed, this can take no observable form without money.

Disappointed buyers have money that they wish to spend but cannot; disappointed sellers have a commodity they seek to convert into money but cannot.[5]

The function of money to accommodate the possibility of disappointed buyers, and, therefore, disequilibrium in general, is an indication of the limited content of labor market equilibrium in the real system. Because that market was analyzed as a barter exchange, it is not possible in a meaningful way to consider disequilibrium adjustments when more than one market is not cleared. Once disequilibrium conditions are allowed and the model confronts the need to introduce some concept of money, one is led logically to Walrasian General Equilibrium Adjustment and Walras' Law.

Before defining these concepts, I shall explain the problem which Walrasian market analysis seeks to solve. Consider a situation in which workers have a notional supply of their services (what they wish to sell), and they face employers who have a national demand for those services (what they wish to buy to maximize profits). Assume, that a portion of the potential workforce enters into a bargain with the employers at a money wage which is above the market clearing, full employment equilibrium wage. When the contract is implemented, workers must formulate their expenditure decisions on the basis of their negotiated incomes, which are now decision parameters. The resulting expenditure will generate an aggregate demand which is less than employers' notional offer of sales. This in turn will induce employers to cut back hiring. This is the Keynesian multiplier process described in Chapter 1. The multiplier process can be interpreted as the quantity adjustments resulting from trades negotiated at disequilibrium prices, sometimes called "false" prices (Leijonhufvud 1968, 211). If some trades occur at disequilibrium prices, there is no guarantee that full employment equilibrium will be achieved.

When "false" trading occurs, prices of some commodities become parameters in markets of other commodities. These "false prices" prevent simultaneous clearing of markets. "Simultaneous" is the key and precise word, and euphemistic terms such as "continuous market clearing" are misleading attempts at spurious realism.[6] It is not sufficient that disequilibrium trades converge toward equilibrium prices in some or most markets. Achieving the equilibrium solution requires that without exception *no*

disequilibrium trades occur. All markets must clear instantaneously and simultaneously or permanent divergence from equilibrium results.

To ensure simultaneous clearing, markets are constructed in accordance with the principles of Walras. In Walrasian general equilibrium models the analysis is confined to an instantaneous moment sometimes called a market "day" which begins after all commodities have been produced.. All agents arrive on the market day in possession of a bundle of commodities, their "endowments". Their purpose in the market is to maximize their utility through trading. The market operates under rules that forbid any disequilibrium trading, so the result is that all agents leave satisfied and all markets are cleared with no excess supplies or excess demands for commodities.

Two assumptions appear to make Walrasian models are more than the simpler assumption of that markets are always in general equilibrium, the Walrasian auctioneer and Walras' Law. The "auctioneer" plays a role which was implicitly invoked in the previous chapter. Metaphorically standing at the centre of all traders, the auctioneer hears alternative offers and is vested with the power to seek accommodation of all notional demands and supplies, and to prohibit any trades at non-equilibrium prices. With the omniscience to divine when each and every trader is content or disappointed, the auctioneer aids the market participants in groping for the set of prices which will clear all markets simultaneously. The process is bestowed with French word *tatonnement*. The auctioneer follows the rule of calling out lower prices when he perceives a market with excess supply and higher prices when excess demand is perceived. It is to be noted that the auctioneer cannot directly observe these, perhaps not a serious drawback since the auctioneer herself is imaginary, With a prohibition against disequilibrium trading excess supplies and demands cannot manifest themselves in exchanges.

Actual markets do not have auctioneers except in very specialized circumstances, and real auctioneers do not behave in the Walrasian manner. Where auctioneers exist, they serve to facilitate whatever trades agents momentarily decide, not only equilibrium trades. Further, markets are not in practice cleared simultaneously, but sequentially, with or without an auctioneer. The Walrasian rules of market clearing are another example of what I identified in the previous chapter as "abstract-ideal" theorizing. Nothing remotely

resembling a Walrasian market exists in any exchange economy, yet such markets are taken as the basis of neoclassical general equilibrium models.

The functional role of Walrasian markets in neoclassical theory is obvious: these ideal assumptions serve as a superficial justification for the view that economic agents operate with perfect knowledge and foresight of market conditions. In effect, Walrasian markets eliminate the possibility of any disruptions due to unforeseen circumstances. Since disequilibrium trades are excluded by assumption, general equilibrium is established by assumption. An implausible idea, equilibrium in all markets for all trades, is justified by an even more implausible and more complicated mechanism, the Walrasian auctioneer.

It is an interesting sociological phenomenon that such a patently absurd view of market adjustment should be incorporated into mainstream economics and generally accepted. This absurdity is formulated as the norm, and what actually occurs as a deviation from the norm. Since the 1935, exchanges at prices other than the general equilibrium set have been described as "false trading" (Hicks 1939, 119ff). This terminology is quite extraordinary: what real buyers and sellers actually do is "false" and by implication what imaginary buyers and sellers do under stylized circumstances which could never be approached in practice is "true".

One has entered into a quasi-religious realm, in which the observed world is judged in reference to an ideal construction of the mind. We shall see how powerful the influence of the ideal is as the analysis proceeds. The theoretical implication of Walrasian markets is that prices adjust with "perfect flexibility" to excess demand and excess supply. A school of economists called the post-Keynesians has focused attack upon this treatment of market adjustment. It might seem that reference to the actual workings of markets lends strength to their arguments. But one discovers that the entire burden of proof is placed upon the post-Keynesian critics to demonstrate that prices do not adjust instantaneously, with the Walrasian position taken as established. Leijonhulvud has called such an inversion of reality an example of a "tribal myth" of the economics profession (Leijonhufvud 1981, chapter 7). Placing the burden of proof upon the critics of neoclassical market theory is reminiscent of the position of the Catholic Church during the Copernican revolution. While direct observation made it obvious that

heavenly bodies did not move around the earth in perfectly circular orbits, all burden of proof fell upon the critics to show why a geocentric theory was not valid.[7]

In a Walrasian market excess demands and excess supplies are subject to Walras Law. The Law states that the sum of all excess demands and excess supplies over all commodities including money must be zero. The Law does not require each commodity to have an excess demand of zero, which holds only in general equilibrium. Rather, the Law states that the sum of all positive excess demands will be exactly matched by the sum of all negative excess demands. It provides a simple relationship between commodities and money. If the sum of all excess demands is zero, then the excess demand for all commodities taken together must be exactly equal to an excess supply of money. Thus, by Walras' Law, where XD stands for excess demand in money units (price times quantity),

(XD for commodities) = (XD for money)

The Law is easily understood in terms of the nature of a general equilibrium. Consider a static situation in which there is excess supply in the market for a particular commodity, which implies excess demand elsewhere. For this market to clear, the price of the commodity in question must change. When the price of that commodity changes, the trading situation in other markets will be upset. Price will rise for some commodities and fall for others. If the market for the first commodity is cleared, this is achieved by creating repercussions in other markets. Whatever repercussions occur, Walras' Law ensures that overall, the degree to which sellers cannot sell what they wish will exactly be matched by the degree to which buyers cannot buy what they wish.

The importance of Walras' Law in neoclassical economic theory cannot be stressed too much. Even if the theorist never allows disequilibrium to manifest itself by always considering only notional disequilibrium,[8] Walras' Law is a necessary element. While disequilibrium models are constructed in which Walras' Law does not hold, general equilibrium models are never without the Law or some variant of it.

The equality between the excess demand for commodities and the excess demand for money appears reasonable enough. Under certain circumstances, this could be taken as a tautology. If commodities go unsold, then someone must have failed to buy them. The money value of the unsold commodities for the seller must be equal to money value

of those commodities for the non-buyer, since the two amounts refer to the same thing. However, considerably more than this is involved, for the Law is defined for *notional* demands and supplies and over all markets. The equality represents an assertion that for every disappointed seller there is simultaneously a disappointed buyer, and the two are anxiously awaiting the call of the auctioneer to reconcile their differences. This implies that an excess supply of commodities is not balanced by a mere sum of unused money, but by a sum of money in the hands of a potential buyer actively seeking to trade. This in turn implies that a general "glut" of commodities over all markets taken together cannot persist if prices are flexible in the Walrasian sense. The potential to eliminate such a glut is always present, a waiting only the smooth functioning of the auctioneer's pricing mechanism.[9]

The reader familiar with microeconomics will have realized that Walrasian general equilibrium is the precise formulation of what is usually called "perfectly competitive equilibrium". Usually when that concept is introduced to the student of economics, he or she is told that such equilibrium arises when there are a large number of buyers and sellers of homogenous products and producer cost curves are appropriately shaped. Alternatively, it is said that perfect competition results when buyers and sellers are "price takers"; i.e., they presume that they can buy or sell any amount they desire at the prevailing price.

The discussion above shows that "perfect competition" is a considerably more problematical concept than as usually presented. Buyers and sellers will only be price takers if there is an auctioneer. In the absence of an auctioneer, agents would on their own initiative adjust prices if they cannot buy or sell the amount they desire. But once agents act in this way, they become "price setters", and by definition it is no longer perfect competition. Despite what one might read in standard textbooks, a large number of buyers and sellers is not a sufficient condition for perfect competition, even given the appropriate cost curves. References to actual markets such as those for agricultural products as approximating perfect competition are fallacious.

Perfect competition is an ideal construction, involving a mythological auctioneer, with no real world counterpart past or present. Actual markets should not be considered as differing from perfect competition by some quantitative measure, such as an index of

sale concentration. The difference is similar to the relationship that dragons have to alligators. The alligator is not a small dragon that does not breathe fire. The difference is that alligators exist and dragons do not. Though seldom made explicit, the requirement that all perfectly competitive parables have what does not exist in any market, a Walrasian auctioneer, is well recognized in the literature in general equilibrium theory.

Walras' Law is a necessary element in a money economy in order that disequilibrium in hypothetical markets yields a general equilibrium across all of those markets. My purpose in considering general equilibrium adjustment in such detail has been to demonstrate the fragile theoretical basis upon which it is constructed. However consistent may be the mathematics of the solution, the desired result, simultaneous clearing of all markets at prices which leaves all traders content, occurs only under extremely restrictive assumptions, namely the *ex machina* presence of the auctioneer. It is not by choice that a market clearing mechanism as bizarre as that suggested by Walras has persisted in models for almost a century. It persists because in over one hundred years no one has proposed a better explanation of how general equilibrium might be achieved. No explanation exists of how actual markets would clear in a manner to produce general equilibrium with satisfied traders, or even approach this result.

Walras' Law and general equilibrium analysis will play a central role in subsequent chapters. The critique of general equilibrium theory would not be complete, without at least brief reference to one of its distinguished practitioners and most eloquent defenders, Frank Hahn. In a series of carefully argued papers, Hahn has provided a sophisticated and compelling defense of general equilibrium theory (Hahn 1984). Three aspects of his argument are relevant to the present discussion. First, that constructing hypothetical models in which markets are all cleared and agents have no motivation to change their plans because their notional demands and supplies have been realized, does not imply that any real world situation corresponds to such a model. Second, that general equilibrium models serve as an organizing structure to identify systematic behavioral relationships, which then might be investigated for their real world analogues. And third, that by specifying the extremely restrictive conditions necessary to achieve general equilibrium, one can better understand why the real world is so different from the ideal model and beset with maladies such as unemployment and inflation. He concludes that

the concept of equilibrium should be treated elastically, though rigorously, and all equilibria need not be defined as Walrasian.[10]

If all neoclassical economists had Hahn's careful attention to detail and theoretical rigor, objections to general equilibrium theory would be reduced to broad issues of methodology. In specific, many of the objections in this and the following chapters would be moot points, because Hahn makes no claim that general equilibrium theory describes real world processes, nor does he suggest that it provides a guide to policy (Hahn, 1984, p. 123). The unfortunate reality is that not even an economist as prestigious as Hahn was successful in inspiring in the economics profession a careful and rigorous application of general equilibrium theory in macroeconomics, as Hahn himself decries in his writings.

In the high theory of Arrow, Debreu, and Hahn one does not find sanguine conclusions about how a free market economy tends to automatically achieve full employment equilibrium with optimum use of resources.[11] But, such judgments are common in textbooks and journal articles, and even more frequently encountered in journalistic writings of economists, which have great impact upon the consciousness of the public and the policies of governments. In the chapters which follow, the critique of general equilibrium theory is based on how it is used by the vast majority of economists, not with general equilibrium analysis as employed in the realm of high theory by those who know its limitations and are scrupulously honest in pointing them out.

3.4 The Homogeneity Postulate

Before leaving Walras' Law it is necessary to point out an apparently narrow technical implication of it, what is called the homogeneity postulate. In most general form, the postulate states that *an economic agent's demand for commodities and services including "leisure" is independent of the absolute price level*.[19] The postulate will seem of limited interest, but it returns to haunt the analysis when considering the quantity theory of money. The postulate is commonly invoked in economic theory, independent of any explicit consideration of Walras' Law.[12] Most of the microeconomic analysis of consumer and business behavior is based on it.

The postulate is frequently illustrated by the following type of hypothetical example: were all prices and incomes to double, the decision by economic agents of how much of each commodity to buy and to sell would be unaffected. Since in the synthesis model price is composed only of income payments, wages plus profits or interest in the present context, a general rise in prices implies an equal proportionate rise in income. Therefore, at the aggregate level, it is redundant to include incomes in stating the postulate, and one can merely say that trading incomes are independent of the general price level, determined by relative commodity prices.

The presence of the homogeneity postulate has an important implication for the excess demand identity derived from Walras' Law. The excess demand for commodities is identically equal to the excess supply of money. According to the postulate, if commodity prices were to double, the quantities of commodities demanded and supplied would not change, because these are independent of the absolute price level. With quantities unchanged and all prices twice as high, the excess demand for commodities doubles, and so must the excess supply of money. Walras' Law with the homogeneity postulate implies that the excess demand for money changes proportionately with the price level. This will be the source of some complications in the next section.

Walrasian markets provide for market clearing in the neoclassical macroeconomic model at the cost of considerable "willing suspension of disbelief",[13] to use Coleridge's famous phrase about how the contented reader treats fictional literature. It does so by providing a mathematically consistent solution to the set of relative prices in the model. It does not provide a theory of the price level. A solution for the general price level requires theory of money.

4 Money in the Neoclassical Model

4.1 Introduction

Chapter 2 presented the basic neoclassical macroeconomic model as a "real" system, measuring all variables in units of the single product. It might be thought that this presentation was a straw man, for the analysis of monetary relationships is apparently a central characteristic of the neoclassical school. Indeed, the term "monetarist" refers to an orthodox sect of the neoclassicists. However, this partitioning of economic analysis between the real system and the system in its monetary or nominal form is a fundamental trademark of the synthesis school, as inspection of any standard textbook will show.

This trademark approach manifests itself in a particular characteristic that the neoclassical school claims for its theory of aggregate economic behavior, the neutrality of money. The precise definition of the term is:

> Money is neutral if, following a disturbance to an initial full employment equilibrium caused by a change in the nominal money supply, a new equilibrium is reached in which all real variables have the same values as before the change in the money supply.[1]

In other words, in the standard presentation the equilibrium full employment solution to the synthesis model is independent of the amount of money available for circulating commodities. This implies the crude deduction that a change in the money supply results in a proportional change in the price level. It is necessary to qualify the statement with "in the standard presentation", because in not all versions of the neoclassical macro model does money play a neutral role. However, the exceptions to neutrality are usually presented as the preserve of specialized and esoteric theory. The typical student of economics would have to pursue his or her studies with exceptional zealousness to encounter models in which money plays a non-neutral role.

The definition of neutrality refers to positions of full employment general equilibrium. Were one to introduce assumptions to create a hypothetical situation in which the model produced stable values for variables at less than full employment, then changes in the money supply could result in changes in real variables. I consider such situations in the treatment of "rigid" money wages. However, at the moment our interest is in the workings of the pure, unadulterated neoclassical system. Why and under what

conditions money might be neutral is analyzed below in some detail. But first, the implications of a money-neutral model should be made be made explicit.

If one confines the analysis to general equilibrium, the neutrality of money implies that there is no fundamental difference between the barter-exchange model of Chapter 2 and a model with money exchanges. Given the parameters of the barter exchange model, all real variables are determined. The neutrality of money implies that none of these real variables changes as a result of monetary exchange. The money economy of the models is no more than a transformation of the real system into nominal values, a "tidying-up" exercise in which minor loose ends such as the price level are sorted out. Indeed, it could be argued that except for the analysis of the labor market, all theorizing involved in the synthesis macro models is a "tidying-up" exercise, for it is there that the general equilibrium solution is born, fully mature, lacking only consumption, investment, and finally, money.

In this and subsequent chapters money is introduced into the synthesis model. The discussion of a neoclassical money economy will become quite involved, with numerous qualifications and complications besetting the analysis. Therefore, it is useful to anticipate the discussion by stating clearly the general conclusion to be reached. It shall be shown that the static model in its full form can *either retain neutrality as a logical property or have an unqualified tendency to full employment equilibrium, but cannot in general have both of these characteristics*.

In other words, if the model is to claim an unambiguous full employment solution, the values of the real variables in that solution are not unique with respect to the nominal money supply. Alternatively, if the real variables are to unique at full employment equilibrium with respect to changes in the money supply, then there are logically unavoidable circumstances in which that full employment equilibrium cannot be reached. To use a metaphor discussed below, money is a mere "veil" over the real system only when the logic of the model does not assure full employment equilibrium. If the full employment solution is logically guaranteed, then nominal variables such as the money supply and the price level assume causality status with their real analogues. The implication of the model losing its automatic full employment guarantee should be

obvious: the unregulated working of a capitalist economy is consistent with extensive unemployment and human misery even in theory.

4.2 Neoclassical Money

The first task in developing a theory of money is to define the concept. Definition involves identifying what it is and specifying the form it takes. Following the tradition of the American monetary economist Irving Fisher, neoclassical theory defines money in terms of exchanges: money is anything generally accepted as medium of exchange.[2] Using this definition, Johnson wrote that money is anything acceptable "as such", where "as such" refers to the property of general exchangeability (Johnson 1972, chapter 7). The "acceptability" criterion has serious ambiguities, because what may be acceptable for one purpose may be unacceptable for another. To take an obvious example, one can purchase a meal with a credit card; but cannot use that credit card to pay the bill received from the credit card company. But at this point the neoclassical argument that money can be anything is accepted.

If money can be anything, it has no intrinsic value of its own; i.e., it need not be a produced commodity and need have no significant resource cost. In the case of exchanges of produced commodities, the process is barter by definition of the term. While one can define money to be anything, a theory of money cannot be constructed on this basis. If money can be anything, then it is undefined and cannot be isolated for analysis. A necessary initial step in the neoclassical theory of money is to restrict by an analytical argument the *forms* which valueless money can take. As discussed below, the neoclassical theory of money presumes the existence a "money supply", which as a first approximation is treated as exogenous with respect to all real variables. This view of the money supply implies money is not "anything" even in theory, but something very specific.

Neoclassical writers resolve this problem, in principle money can be anything, but for rigorous theory it must be something quite specific, by reference to practice. In practice, anything does not serve as money. By some process commodity producing societies restrict money to a limited number of things. Neoclassical textbook writers are content to leave the issue as settled: anything can be money, but in practice only a few

things are; custom and history have resolved the indeterminacy. Monetary theory proceeds on the assumption of a determinate definition and a supply of money that is exogenous with respect to the level of economic activity.

This is not a satisfactory approach either theoretically or for empirical application. First. there is a definition: anything can serve as money. This theoretical generalization proves to be essential for the analysis, because it is the necessary defense of the argument that money has no value. However, this generalization creates an analytical problem of major importance: how are limits set on the definition of money so that the supply of money can be treated as exogenous? Second, one discovers that the theoretical prediction, "anything can be money", is refuted in practice because very few things serve as money. Then, third, the empirical rejection of the definition is taken as the vehicle to solve the major analytical problem created by the definition of money as potentially "anything". In brief, empirical rejection of the definition is used to reconcile its own contradictory nature.

Even at this early stage the neoclassical theory of money requires an explanation of why money takes limited forms, even though money was defined to suggest otherwise. Doing so is not merely a question of tidying up logic. Later in this chapter I show that the failure of neoclassical theory to resolve explicitly the contradiction between money as anything in principle and something very specific in theoretical models, leaves the entire concept of "the money supply" open to attack from within the synthesis school itself.

Rather than seeking to resolve the contradiction between definition of money and the use of the concept in practice, I ignore the definition and go straight to the theoretical treatment of money. I define M as valueless money, i.e. it has no cost of production, its unit value is one (unity), and its supply is determined by the "monetary authorities". The monetary authorities leave the money supply unchanged until they are summoned to act by the theorist. In other words, the money supply is given until the model builder decides to change it.

No such money supply exists in reality. The assertion common to neoclassical monetary theory that there exists a determinate money supply over which the monetary authorities have monopoly and control is a fiction. Not even neoclassical writers would argue that this is anything but a convenient assumption. The only part of the money

supply over which a hypothetical monetary authority might have direct control is coin and paper notes, which account for a tiny portion of the portion of the total means of circulation and payment in a modern economy. Further, coins and notes are frequently ignored in modern theoretical modeling, with the money supply defined as "demand deposits". Demand deposits can at this point be defined as ledger entries of certain institutions which individuals and businesses can draw upon to make purchases. The institutions which are the repositories of these ledger entries will be called banks. Banks can act to expand and contract the total value of these ledger entries by making new loans or calling in old loans. Thus, banks are the immediate creators of money when money is defined as demand deposits.

The monetary authorities influence, not control, the supply of money to the extent that they can influence the behavior of banks. Therefore, essential to neoclassical monetary analysis is bank behavior in which credit creation or contraction by banks systematically responds to decisions by the monetary authorities. The assumption of a given money supply cannot otherwise be justified. On this point there has been no controversy (Chick, 1979, 13-14; and Harry G. Johnson 1974, 41ftnt). Not withstanding the central role an analysis of bank behavior plays in the assumption of a given money supply, such a theory is rarely treated in detail in neoclassical macroeconomic textbooks. The student is left to take an autonomous money supply as proved, with elaboration relegated to specialized courses in monetary economics.[3]

The student of macroeconomics can easily emerge from his or her studies unaware that the assumption of a money supply fixed with respect to the other variables in the neoclassical model is a subject of great controversy, and that quite prominent and respectable economists rejected the assumption altogether.[4] I pursue this issue after investigating the theoretical role of a fixed supply of valueless money. The purpose of this section has been to clarify the concept of money which will be employed in the presentation of the neoclassical model. The result of the discussion is somewhat inconclusive, for it has been demonstrated that there is an apparent inconsistency between the abstract definition of money and its manifestation in the model.

4.3 Money and the Price Level

Above I defined y to be the output/income in the model, measured in the single commodity. Let p be the price of the single commodity in units of money, or the "absolute price level". The value of output/income in money units is py. In keeping with the operation of Walrasian markets, all exchanges occur simultaneously. Money is used only once in the Walrasian market day, so py is the amount of money necessary to trade y amount of the single commodity at price p.

However, the analysis of .the determination of the price level abandons this timeless context. Breaking with the treatment of exchanges occurring as in some instantaneous market period, we now assume that trading takes place over a period of time, and during this time period the same representation of money serves to realize a number of trades. If the supply of money, as defined in the previous section, is M*, then 1/v = py/M* is called *the velocity of money,* and measures the average number of times a representative unit of money is involved in a trade over a specified time period. Since output/income y is a flow per unit of time in the model, v is defined for some hypothetical chronological period. By rearranging the definition, one gets, M* = vpy. The inverse of the velocity of money, v, can be interpreted as .the average proportion of the money supply held idle at any moment by traders in anticipation of impending exchanges.

This relationship is true by definition. The inverse of the velocity of money is calculated by dividing the money value of output/income by the potential money supply. It is also an empirically measurable definition, though the specific value of v obtained depends upon one's operational definition of M*. Were it the case that the velocity of money and the level of output/income were fixed, the presumption of M* as exogenous yields a determinate price for the single commodity (the "price level"). Further, since M* = vpy is a homogenous function, a change in the money supply as a result of action by the monetary authorities would result in a proportionate change in the price of the single commodity. This one-to-one proportional relationship between the money supply and price(s) has long been interpreted as a central message of the quantity theory of money (see e.g. Shapiro, 1974, 268-71),

Some economists have gone back to the writings of the pre-Keynesian monetary theorists to demonstrate that attributing to them a crude proportional relationship between M* and p is a misrepresentation of their work (Harris 1981, 6). True though this defense of the pre-Keynesians may be, it remains that the thrust of modern monetary theory is to demonstrate that under conditions of full employment general equilibrium the elasticity of the price level with respect to the money supply is unity. That is, under such conditions a doubling of the money supply results in a doubling of the price level with all other variables left unchanged.[5] The crude quantity of money equation, M* = vpy (with v and y fixed), is the simplest expression of the neutrality of money. The essence of the interaction of real and nominal values in the neoclassical model (e.g., y and py) is captured by using the quantity theory, for all of its simplicity.

At this point interest focuses on the explanation of the price level in full employment equilibrium, since no analytical circumstances have arisen in which the labor market does not clear, which the necessary condition for a less than full employment equilibrium. If the Walrasian markets behave as they are designed to do, then output/income is determined at its maximum value on the basis of the wage measured in units of the single commodity. It remains only to establish that v, the inverse of the velocity of money, is constant with respect to the other variables in the model.

As mentioned above, v can be interpreted as reflecting the proportion of money or nominal income which economic agents wish to hold as money balances at any moment in time. Since this holding of money is in anticipation of making transactions, it is called the transactions demand for money, written as M_{td} = vpy. Since there is only a transactions demand for money at this point, $M_{td} = M_d$. The quantity equation now becomes an explicit equilibrium theory. In Chapter 2, the neoclassical "real" system was set out in behavioral and definitional equations covering the markets for labor and the single commodity, the latter implying the equilibrium of saving and investment. Three more equations can be added to cover the money market. At a later point the demand function will be expanded.

(11) $M_s = M^*$ (autonomous money supply)

(12) M_d = vpy (demand for money)

(13) $M_d = M^*$ (money market equilibrium)

The essential characteristic of this treatment of the money market is the presumption that the demand for and supply of money are independent of each other. Independence is achieved in a very crude way. The supply pf money is treated as autonomous, and the demand for money comes from the need to purchase output. As the money market is treated with more sophistication, this independence must be retained at all costs, for it is the necessary condition for a consistent theory of valueless money.[1]

At this point it is worth stressing that the history of economic thought offers only two mutually incompatible ways by which to resolve the indeterminacy of the absolute price level. If money is valueless, then the price level is determinate if and only if the availability of money is independent of the demand for money, where the major determinant of the demand is the level of economic activity. Alternatively, money can be a produced commodity, in which case the absolute price level is strictly related to the inverse of the cost of producing the money commodity.[2] It is unlikely that a third alternative exists that does not beg the basic questions of monetary theory.

Pre-Keynesian writers devoted considerable attention to the determination of the parameter v, especially to its stability over various theoretical time periods. After Keynes the debate over the stability of the velocity of money involved different issues, perhaps the most important being the impact of the interest rate. Since I have introduced an interest rate related demand for money, it is most convenient at this point to assume the velocity of money to be constant without providing a justification.

Armed with a given money supply and a constant velocity, the determination of the price level would seem to be an easy task. Let us invoke the Walrasian labor market, cleared by movement in the wage measured in the single commodity. This yields full employment of labor, which implies a determinate level of output/income. The price level then "falls out" of relationship (13) as $p = M^*/vy_e$, where y_e is full employment income, fixed by labor market equilibrium, so $y_e = y^*$. This is the "classical dichotomy", in which the equilibrium solution of the real variables is established through a Walrasian general equilibrium model in which only relative prices are relevant variables, and the price level set by the quantity equation. As tempting as this procedure may be, it is invalid. The dichotomy is false. The real variables cannot be determined in general

equilibrium without some explicit reference to the money supply. The model cannot be partitioned between real and nominal variables.

4.4 Walras' Law and the Quantity Theory

The simple application of the quantity theory to the real system is invalid because of a contradiction between Walras' Law and the quantity equation. In an earlier section I demonstrated that Walras' Law requires that the excess demand for all commodities equal the excess supply of money,

(XD for commodities) = -(XD for money).

In the present case of the single commodity, one can write, (where y^* is the fixed (full employment) supply of output/income and y_d the notional demand),

$$p[y_d - y^*] = M_{xd}$$

or,

$$py_d - py^* = M_{xd}$$

The quantity equation can also be manipulated to produce an equation for the excess demand for commodities and money,

$$vpy^* - M^* = M_d - M^* = M_{xd}$$

Close inspection shows that the two expressions for the excess demand for money cannot hold simultaneously. In the case of Walras' Law, the excess demand for money, $(py_d - py^*)$, implies that a change in the price level yields an equal proportionate change in the excess demand for money, because both terms are multiplied by p. In the second relationship, the excess demand for money is $vpy^* - M^*$, in which price enters against only the first term. In this formulation the excess demand for money increases more than proportionately with increases in the price level.

Not even in theory are variables allowed to simultaneously increase by two different rates. One of the excess demand equations must be abandoned.[3] The inconsistency arises because Walras' Law is formulated on the basis of the homogeneity postulate, implying that the excess demand for commodities measured in physical units is unaffected by changes in the price level; i.e., the excess demand for money is directly

proportional to the price level. In the Quantity Equation, on the other hand, homogeneity of any degree is ruled out by the assumption of given money supply.

This contradiction does not invalidate the neoclassical analysis of monetary exchange; nor does it undermine the .principle of neutrality of money. However, to render the model consistent, it is necessary to re-specify the demand for commodities. Patinkin's solution to the inconsistency, which has been generally accepted as valid after some resistance,[4] was to introduce the *Real Balance Effect.* Patinkin inserted another "real" variable into the commodity demand equations, the nominal quantity of money divided by the price level, "real balances", M*/p. With this variable in investment and consumption functions, the previous specifications must be re-written. The impact of M*/p on consumption and investment is presumed to be positive: a rise in the purchasing power of money increases the demand for the single commodity.

(3a) $c = c(y, r, M_*/p)$, $s = s(y, r, M^*/p)$

(3b) $i = i(y, r, M_*/p)$

The demand for money may also be a function of real balances:

(12) $M_d = M_d(p, y, M_*/p)$

The excess demand for money now has a different form,

$M(xd) = M_d(p, y, M_*/p) - M_*$.

The homogeneity postulate no longer holds. A rise in the price level results in a fall in real balances, which provokes in a decline in the demand for the single commodity both as an article of consumption and as an item of investment. Further, a change in the price level enters directly into the consumption and investment functions. The market for the single commodity and the money market are now integrated in a consistent way.

Assume that all markets are initially in equilibrium and the price level doubles. The logical result is to create an excess demand for money, because existing money balances have fallen in purchasing power. Simultaneously, the excess demand for money is balanced by an excess supply of the only commodity, and this is the result of the real balance effect depressing demand. Depreciated money makes existing money holdings inadequate and existing commodity demand excessive. Walras' Law holds. Following the rules of Walrasian markets, excess commodity supply will cause a fall in the commodity's price, restoring equilibrium there. At the same time, the falling price will

reduce the excess demand for money to zero. Everything returns to its original state of equilibrium; the doubling of the price level cancels itself out.

Money is neutral in the re-specified, consistent model. Should the initial equilibrium be disturbed by the monetary authorities increasing the nominal supply of money (from M* to 2M*, for example), an excess demand for the commodity will result via M*/p, exactly balanced by an excess supply of money, again via M*/p. The excess demand for the commodity will force price up in a Walrasian world which eliminates both the excess demand for commodities and excess supply of money. The original "real" equilibrium is regained at a doubled price of the commodity. The neutrality of money and the equilibrium mechanics in a model incorporating the real balance effect are explained in more detail in Chapter 6. As shown there, the neutrality of money breaks down when the real balance effect is generalized to include forms of wealth other than money, such as. bonds.

In a textbook widely-used in the past in there was an interesting analogy to illustrate the demand for real balances. The author asked the question, what would happen to the behavior of economic agents if everyone awoke one morning to discover that the national currency had been re-denominated (for example, one new dollar replaced ten old dollars)?

> Is there any reason for you to change your demand for money? No. All prices, incomes, and wealth values would have changed proportionately, reduced to 1/10 their former values. Nothing real has changed.
> But this is the same as if the price level just changed overnight by the same amount![5]

The message, common in current textbooks, is that changes in the price level are inconsequential events, arbitrary occurrences that are treated by economic agents as water off a duck's back. To the extent that the analogy holds, it is a direct result of the model in which the analogy is posed, and the relationship to any actual economic process is not obvious. The model presumes an autonomous money supply over which the monetary authorities have strict and absolute control. On the basis of this assumption, changing the denomination of the currency and changing the money supply are more than formally equivalent; they are the same thing.

It must be remembered that the "thought experiments" in neoclassical analysis that involve changes in the money supply are usually in the context of a one commodity model. As a consequence, the only "real" decision that an economic agent has to make is whether to buy the commodity or not to buy it. Any lags between expenditure and production, production and payment of receipts, and receipts and expenditure, have been eliminated through the general equilibrium method. When the price level is the price of a single commodity and price changes translate directly and instantaneously ("overnight") into money income changes, it is small wonder that nothing else changes. What is surprising is that neoclassical theory has found it so difficult and complicated to establish this, requiring Walras' Law, the real balance effect and an autonomous money supply. This and other apparently simple propositions in the neoclassical analysis of money prove esoterically complicated as a result of the theoretical inadequacy of valueless money.

To summarize this section, we have seen that transposing the real solution to the neoclassical model into nominal variables via the quantity equation is not possible, as tempting as its apparent simplicity makes it. An additional variable, M*/p, real balances, must be introduced. This leaves open to question what relevance the solution to the barter model has to the model that includes money. The issue of relevance is pursued in the next section. Notwithstanding the crucial theoretical importance of the real balance effect to the consistency of one version of the neoclassical model, its empirical importance is not obvious when inflation is low.

In general, my purpose in this book is to explore the logic of the neoclassical model, rather than to seek its inadequacies with respect to the actual phenomena it wishes to explain. However, when a theory must be rescued by a mechanism that may be of no practical importance, the question arises whether the theory has been rendered more robust by the inclusion of a heretofore overlooked element of strategic importance, or has been salvaged by a fortuitous discovery of an *ad hoc* method of exit from a blind corner. As we see below, .the real balance effect exhibits a sufficiently jerry-rigged character that many neoclassical economists play it down in favor of the same mechanism in a more general form (the Pigou effect).

Neoclassical logic suggests on *theoretical* grounds that the real balance effect may be miniscule, even zero. This logic involves the controversy over "inside" and "outside"

money. For the real balance effect to operate, M* must represent a *net* asset in the model. This means that what is money should not be an asset for one group of economic agents and a liability to another set. If this were the case, the net effect of a rise in the price level would be to reduce the real value of assets while off-setting this by an equal change in the real value of liabilities. Therefore, demand deposits or bank-created money cannot affect the operation of the real balance effect, for these are both an asset for the depositor and a liability for the bank. Similarly, the loan banks make are not a net asset. Money which is not net wealth is called "inside" money.

What, then is outside money? Over this issue there is controversy. Suffice to say, the extent to which the controversy is unresolved is indicated in the early neoclassical literature by two extreme positions: there is no such thing as outside money, and all money is outside money (Gurley and Shaw 1960, and Pesek and Saving 1967). It is quite extraordinary that neoclassical theory, for which the analysis of monetary phenomena is so central, could not find consensus on its definitions of money and wealth. As with so many neoclassical conundrums, subsequent generations of economists, in lieu of resolving the problem would ignore it.

Pursuing the debate over outside and inside money is beyond the scope of this book. The importance of the debate for the current discussion is that it indicates that one inconsistency, between Walras' Law and the Quantity Equation, has been bypassed by creating another which is equally serious, to establish the existence of outside money.[6] The reproduction of essentially the same inconsistency in altered form is characteristic of neoclassical theory, and the consequence of the theoretical inadequacy of the initial concepts, in this case valueless money.

4.5 The Money Supply Further Considered

Before treating the general equilibrium solution to the neoclassical model with a money market, further consideration of the concept of an autonomous money supply is required. The entire theory of valueless money collapses if the supply of money is not independent of the demand for it. This independence is the necessary, though not sufficient, condition for the existence of monetary authorities who somehow determine changes in the money supply. Were there no other theoretical difficulties, failure to

establish the theoretical existence of a determinate, autonomous money supply would render the neoclassical model invalid in its analysis of a money economy, invalid to the point of an analytical void.

The theoretical role of a fixed money supply is not merely a question of sorting out the price level in the model. While one can obtain a general equilibrium solution to the "real" system (see Chapter 2), because of the inconsistency between Walras' Law and the Quantity Theory this solution cannot be transposed to the system of nominal values. The general equilibrium solution of system with money is not and cannot be the real system with all relevant variables multiplied by p. With the necessary presence of the real balance effect in the consumption function and demand for money functions, the price level must be determined *simultaneously* with the values-of the real variables.

In other words, the system with money has its own specific equilibrium adjustment process, determined in part by M* and p. While the real variables may be invariant with respect to changes in p and M* in full employment equilibrium, this is a property of the solution to the monetary system itself, not a relationship between a dichotomized real solution and its monetary analogue. The neutrality of money, which holds in the model I have been discussing, does not imply the relevance of a real solution to its monetary analogue. By "monetary analogue" is meant a system characterized by all the same behavioral relationships (parameters), differing from the real system only by the presence of the money market.

The solution to the system of monetary variables requires that a value for M* imply a unique p. If a valid argument cannot be made for a money supply independent of the demand for money, then M* does not imply a unique price level. If the price level is not unique, then the real variables are not unique. In effect, an autonomous M* "closes" the neoclassical system and makes it determinate. The general equilibrium solution for a barter economy as presented in Chapter 2 is irrelevant to the solution of a model with money, though the two models may be identical in every other respect.

The stakes riding on the autonomous money supply are high, indeed. As mentioned above, there is considerable controversy over whether or not it can be established theoretically that the supply of money is independent of the demand. One of the most perceptive Keynesian critics of the neoclassical treatment of money played

down this theoretical controversy, arguing that the definition of money need not be resolved at the level of abstract theory, but is rather a "practical matter".[7] For an empirical investigation referring to a specific context, the judgment is valid.

However, at the level of abstract theory, the mechanisms and elements of a model must conform to the rules set by the model itself, and the synthesis model has quite clear rules which govern the analysis. In order that the model be valid, it must be determinate with no "loose ends" that require *ad hoc* resolution at the last moment, when one discovers that all has not emerged from the logic as it should. At the level of abstract logic, the rules of analysis require that the concepts employed be unambiguous and possess the properties sufficient for their theoretical role. We saw this in the case of the real balance effect, which is theoretically key to one version of the synthesis model, though theoretically suspect and empirically trivial if it exists.

The definition of money must be equal to its theoretical task, for the presumption of its autonomy is central to the "thought experiments" of neoclassical theory. The adjustment dynamics of the neoclassical model are investigated by presuming a change in some parameter or autonomous variable. Perhaps the most common of these to select for arbitrary manipulation is the money supply, to presume it changes in response to action by the monetary authorities, then pursue the logical consequences. This thought experiment cannot legitimately be initiated unless it has been established theoretically that the money supply is independent of the demand for money.

4.6 Neoclassical Monetary and the Realism of Models

Those readers who were distressed in the first two chapters by the divergence of the "real" system from any semblance to an actual economy may have looked forward hopefully to the inclusion of money as a vehicle to draw the synthesis model closer to reality. If one had such hopes disappointment must now reign. If anything, the introduction of money renders the model more abstract and ideal. One can imagine the economics professor saying to his student, "let us be more realistic by considering money". But money is introduced in a manner no less ideal than the "real" system itself.

Money appears on the analytical stage in an arbitrary and counterfactual manner unique to itself. Instead of approaching, reality recedes further into the mist of

assumptions. A new layer of counter-intuitive masonry is constructed upon the previous, with the theorist isolated inside. These layers of ideal isolation render the theorist increasingly immune to any infection from the concrete world (to mix a metaphor). The theorist, like the medieval priest, is safely sequestered in a world of his or her own making, a world of ideas which is treated as a world of existence. And like the world of the medieval priest, the neoclassical model has its purpose. It stands as an ideological construction to guide the thoughts and actions of those who move in the reality outside of it. In the next chapter I begin to consider in detail the mechanics of this ideal neoclassical world.

Part II: Presentation of the Basic Model

Main Points:

Chapter 5: False Dichotomy Model

1. This chapter begins the demonstration that the neoclassical model cannot have an unqualified tendency to full employment equilibrium if money is neutral and *vice-versa*.
2. A model in which the real variables are determined independently of the money market is logically invalid, a *false dichotomy*. However, it offers a clear indication of the basic result that neoclassical analysis wishes to achieve in more complex models.
3. The model reaches full employment equilibrium through the clearing of the labor market, from which all other variables derive. Unemployment is voluntary, the result of workers or their representatives enforcing a money wage above the equilibrium level.
4. The only functions of money in the False Dichotomy are to determine the price of output and the money wage.
5. The possibility that the equality of investment and saving might occur at a negative interest rate (the "inconsistency" between saving and investment) makes full employment a special case.

Chapter 6: Money-neutral Models

1. The real balance effect provides the simplest mechanism to escape the false dichotomy and reach unqualified full employment. However, it is of no practical importance.
2. The more general models with an interest-elastic demand for money resolves the dichotomy but does not result in unqualified full employment.
3. The neoclassical approach excludes what Keynes considered the inherent nature of the money market, uncertainty.
4. The possibility of an inconsistency between saving and investment, and that the demand for money might be highly interest-elastic ("liquidity trap") make full employment a special case in this version of the neoclassical model.

Chapter 7: The Wealth Effect

1. Central to neoclassical monetary theory is the distinction between inside wealth (wealth that is not a *net* asset) and outside wealth (wealth that is a net asset). The wealth effect requires the latter.
2. The inside/outside distinction is purely a phenomenon of capitalist societies that obscures the actual basis of productive wealth.
3. The wealth effect is the impact of accumulations of outside wealth on the values of real variables.
4. A model with a wealth effect eliminates the possibility of an inconsistency between saving and investment and the liquidity trap, but also renders money non-neutral.
5. The wealth effect exposes a contradiction at the core of the neoclassical model, ignoring the stocks of assets that result from flows.

5 The Classical False Dichotomy Model

5.1 Introduction

The previous chapters set out the basic elements of the neoclassical macroeconomic model. In this chapter, the equilibrium solutions to the simplest version of the model with money will be treated in detail. The purpose is not merely to reproduce what can be found in standard textbooks on macroeconomics. The intention of this and the next two chapters is to substantiate the earlier assertion that holding to strict logic, the model cannot produce a solution in which there is an unqualified tendency to full employment equilibrium and in which money is neutral.

To sustain this assertion, the presentation begins with a simple formulation of the model which is flawed by the "false dichotomy". This flaw is rectified in the next chapter by the introduction of Patinkin's real balance effect. As will be seen, the Patinkin model ensures full employment equilibrium and the neutrality of money, but for reasons I explain it is not satisfactory. Also, in Chapter 6 an alternative solution to the false dichotomy is given, one more Keynesian in character, in which the demand for money is assumed to be interest-elastic. In this case money plays a neutral role, but full employment is not guaranteed for all possible parameters of the model. In Chapter 7 the logical extension of the real balance effect, the wealth or Pigou effect, is introduced. Invoking the Pigou effect provides for full employment equilibrium, but money is non-neutral. In all of these models the solution is presented graphically and by use of simple algebra.

5.2 A False Dichotomy Model

The investigation of the equilibrium mechanics of the neoclassical system with money begins with a model in which the real variables are directly converted to nominal values by the application of the quantity theory of money. There is a strict dichotomy between the real and monetary sectors of the model and money is neutral. As explained in the previous chapter the model is inconsistent, because it incorporates two contradictory relationships for the excess demand for money. Particularly in older textbooks, models very similar to that developed below were presented as a summary of

the pre-Keynesian or "classical" treatment of macroeconomic relationships, without noting its internal inconsistency.[1] Beginning with an invalid model is purely pedagogical. The simplicity of the model provides a useful introduction to graphical and algebraic manipulation, both of which will become complicated as the analysis proceeds. In addition, false though the model may be, it offers a clear indication of the basic result that neoclassical analysis wishes to achieve, but can do so only in more complicated versions, if at all.

The analysis begins with the labor market. For mathematical simplicity, I assume that the supply of labor is fixed, $n_S = n^*$. To obtain the demand for labor, an explicit form of the single commodity output/value added function is required. The simplest functional form is the Cobb-Douglas function, which takes the algebraic form, $y = k^{\alpha}n^{1-\alpha}$. This function incorporates the property of diminishing returns to the variable factor, as well as being extremely easy to manipulate mathematically.[2] By making appropriate assumptions, this output/value added function can yield an expression for the demand for labor. By definition, the net revenue of a firm is sales minus cost. If it were the case that all of the firm's output could be sold at the prevailing market price, (the firm is a "price taker"),[3] and if there were no inputs other than labor and capital, then one could write,

$y = k^{a}n^{(1-a)}$ (output/value added function) (5.1.1)

$NR = py - [pwn + rpk]$ (net revenue) (5.1.2)

If it is not necessary to reduce price to sell more, then sales revenue is py. The two terms within parentheses remind one that he or she is in a one commodity world, in which the real wage (w) and the capital stock (k) are same product, both measured in units of and consisting of the single commodity. As a consequence, pw is the money value of what is paid to workers, the nominal or money wage, W. Similarly, pk is the money value of the capital stock, K. On the assumption that the firm in question can sell as much as it produces at the prevailing market price, the only discretionary variable for the firm is the level of output. Price, the interest rate and the money wage are given in perfectly competitive markets, and the capital stock is fixed in the short-run model. In neoclassical microeconomic analysis assumes that the level of output is selected to minimize losses or maximize net revenue (profits) in the short run. This is called

"optimizing behavior". Because the level of output is determined by the level of employment, the employment decision is the optimizing decision. Optimization is achieved mathematically by taking the first derivative of net revenue with respect to the labor input and setting it equal to zero. When expression (5.1.1) is substituted into (5.1.2), one gets the following.

$$p[(1 - a)\, k^a n^{(1-a)}] - W = 0 \qquad (5.1.3)$$

If one substitutes, $y/n = k^a n^{(1-a)}$, $n = y/k^a n$,

$$W = p[1 - a]y/n$$

$$n_d = [p(1 - a)y]/W \quad \text{(demand for labor)} \qquad (5.2)$$

In (5.1.3) the first term is called the value of the marginal product of labor (or the marginal value product), which is marginal product of labor times the price of output. Under perfectly competitive conditions the value of the marginal product measures the sales revenue that results from hiring an additional infinitesimally small unit of labor. Optimization is achieved by equating this to the money wage. In the case of the Cobb-Douglas function, the marginal product of any factor is proportional to its average product, making the algebra simple. When the symbol for the labor input is moved to the left of the equality, the demand for labor schedule is the result, expression (5.2). Combined with the labor supply assumption, $n_S = n^*$, one can set the equilibrium condition for the labor market. Assuming a fixed demand for labor has avoided the problem of a quadratic expression for labor market equilibrium.

$$n^* = [1 - a]py/W \quad \text{(labor market equilibrium)} \qquad (5.3)$$

This mathematical relationship stands on its own, for both y and p/W are direct functions of n, under the assumptions of perfect competition and optimization. Elsewhere in the model the nominal values p and W must be determined, consistent with the optimization condition that $W/p = [1 - a]/y/n^*$. But first I turn to the other real variables in the system, consumption and investment. Again, simple relationships are assumed. The model has no public sector and is no external trade. Terms with stars represent constants. The symbol b is the marginal propensity to consume, and d is the rate of change of investment with respect to the interest rate, both constants.

$$c = c^* + by \quad \text{(consumption function)} \qquad (5.4)$$

$$i = i^* - dr \quad \text{(investment function)} \qquad (5.5)$$

By definition,

$s \equiv y - [c^* + by]$.

With these equations, one can simplify the graphical analysis by using a relationship called the IS schedule, which is defined as a locus of points for which savings and investment are equal. Along the IS schedule, the market for the single commodity is in equilibrium. The IS curve is derived in Figure 5.1, according to the following conditions.

$y = c + i$ (aggregate expenditure)

$y = c + s$ (aggregate income)

$c + i = c + s$ (commodity market equilibrium)

$i^* - dr = y - [c^* + by]$

As in chapter 1, let μ be the multiplier, in this case $1/(1 - b)$.

$y = \mu[i^* + c^* - dr]$ (IS curve) (5.6)

In Figure 5.1.a saving is shown as a function of income, and in 5.1b investment is drawn as a function of the interest rate. Assume that the interest rate is fixed at r_o. If income were above y_o, saving would exceed investment, implying that all of the single commodity would not be sold. As a result, income would fall, reducing saving until $s_o = i_o$ at y_o. The point e_o in quadrant 5.1c marks such an equality. The point e_1 is associated with interest rate r_1 and so on. Quadrant 5.1d transfers income from one axis to another. In terms of mechanics, the IS curve allows one to reduce two diagrams into one, Figure 5.1a and 5.1b into 5.1c.

Some Keynesians see in the IS curve a procedure considerably more pernicious than analytical simplification (Chick 1983, 4). As mentioned in the second chapter, the neoclassical model makes no distinction between consumption and investment on the supply side. With the introduction of the IS curve, any difference between the two on the demand side is also eliminated. Now aggregate demand in general is an undifferentiated function of income and the interest rate. If one believes that investment is substantially more volatile than consumption, for which there is considerable empirical evidence, then combining the two into a single expression is rather like adding lambs and lions. Further,

the two are put together in an equilibrium condition, so that disequilibrium in the commodity market is obscured.

In a sense, submerging consumption and investment into one behavioral relationship is the natural extension of the single commodity model. It indicates that commodities as such play no role in the analysis. Analytically the IS curve does not connect points of commodity market equilibrium. It is the equilibrium between non-spending in the current period and spending out of current income in future periods. In Section 2.2 I pointed out that investment in the neoclassical macro model, because its capacity-expanding aspect is ignored and consumption and investment involve the same commodity, is treated implicitly as deferred consumption. When one traces back the definition of terms, the so-called "goods market" equilibrium condition (commodity market), states that deferred consumption (saving) in terms of income must be equal to deferred consumption in terms of the single commodity (investment). There is a strong hint of tautology in such a condition. Finally, and of immediate import, it should be noted that use of the IS curve shifts all attention to the labor market for adjustment mechanics, especially since the money market will also be formulated in terms of an equilibrium condition.

For the money market in this False Dichotomy model, demand is implied by the simple quantity theory of money, along with a fixed supply.

M(d) = vpy	(demand for money)	(5.7)
M(s) = M*	(supply of money)	(5.8)
M* = vpy	(money market equilibrium)	(5.9)

These equations complete the specification of the False Dichotomy model, and the analysis can move to the equilibrium solution.

5.3 False Dichotomy General Equilibrium

With the necessary relationships defined, we can turn to Figure 5.2, where general equilibrium is derived graphically. It is useful for pedagogical purposes to solve this general equilibrium algebraically before considering the diagrams. In the labor market,

full employment equilibrium requires that $n_d = n^*$. With a fixed capital stock the full employment level of output/income is $y_e = (k^*)^a(n_e)^{1-a}$. To keep notation simple, the full employment level of y will be written simply, as y_e. Saving and investment are,

$$s_e = i_e = y_e - [c^* + by_e]$$
$$= [1 - b]y_e - c^*$$

The other real variable to determine is the interest rate, which is done by substituting the last expression, which is equal to full employment investment, into (5.5):

$$r_e = [(i^* + c^*) - (1 - b)y_e]/d$$

It only remains to determine the nominal wage and the price of the single commodity. From (5.9) one obtains the value of p,

$$p_e = M^*/vy_e$$

Because the money wage is price times the commodity ("real") wage; this variable's full employment value is given by the following expression.

$$W = [M^*/vy_e][(1 - a)y_e/n^*] = (1 - a)M^*/vn_e$$

The nominal values of consumption, investment, and income are similarly obtained, by multiplying each by the price that was derived above. This is the essence of the Classical Dichotomy, that all real variables are independent of the price level and the money supply. In this false dichotomy model money is strictly neutral. If we ignore the problem of the inconsistency between Walras' law and the quantity theory, a doubling of the money supply leaves all real variables unchanged, while p and W double. This is the result that the more sophisticated versions of the synthesis model seek unsuccessfully to maintain.

The graphical solution is given in Figure 5.2, presented in six parts. First, as in Chapter 2 the labor market determines the level of output and the IS curve. The saving and investment schedules are not shown. The money market is introduced by the horizontal line in Figure 5.2d, $y = M^*/vp$. Values marked "e" indicate the general equilibrium for which both the money market and the commodity market are simultaneously cleared. Figures 5.2c, 5.2d and 5.2e explicitly show the relationship between commodity output and nominal output, and between nominal output and the price level. Finally, Figure 5.2f gives the real wage as a ratio of W and p.

The result of an increase in the exogenous money supply is simply demonstrated. Should M* rise to 2M*, the quantity equation yields y = 2M*/vp. With y determined by equilibrium in the labor market and v constant, only p can change. This is shown in Figure 5.2d by a rotation clockwise of the price line, implying an increase in nominal income and movement along the line l/v in Figure 5.2e. The rise in the price level is associated with an equal proportionate rise in the nominal wage, consistent with labor market equilibrium.

This simple model can be used to demonstrate the synthesis view of unemployment. In Figure 5.3 the previous set of diagrams is reproduced, with the additional assumption that the money wage is fixed at W_o (see Figure 5.3f). When called upon to relate the assumption of fixed money wages to the observed world, economists frequently justify it by the alleged power of trade unions and legislated minimum wage regulation, though the former is hardly credible for the United States of the United Kingdom in the twenty-first century. Once a fixed money wage is assumed, the level of employment cannot be deduced from the labor market alone (Figure 5.3a), because that market is defined in terms of the real wage. However, one knows,

$$n_d = [p(1 - a)y]/W$$

Because the money wage is above the full employment level, the labor input in the output/income function will be determined by n_d, the demand for labor. This level of employment is indicated in Figure 5.3 as n_o. Using the output/income function; the demand for labor can be solved immediately. Substituting y = M*/vp, one obtains,

$$n_d = [1 - a][M*/vp][p/W*]$$

$$n_d = [(1 - a)M*]/vW*$$

With a fixed nominal wage, the demand for labor is determined by the money supply, the velocity of money and the parameter [1 - a].[4] With the level of employment determined, it follows that the output of the single commodity is determined.

$$y_o = k^a[(1 -a)M*/vW*]^{(1-a)}$$

The other real variables in the solution derive directly from y_o.

$$c_o = c* + b\ y_o$$

$s_o = y_o - c_o$

$i_o = s_o$ (commodity market equilibrium)

$r_o = [i^* - i_o]/d$

It only remains to solve for the price of the single commodity,

$p_o = M^*/vy_o$

The real or commodity wage, at which the demand for labor is less than the supply, completes the solution. It can be expressed in two ways.

$w = [W^*vy_o]/M^* = [(1 - a)y_o]/n_o$

The first expression is the commodity wage in terms of nominal influences (M and W), and the second is the marginal product of labor. The set of values associated with the nominal wage w* is shown in Figure 5.3. When the rigid wage equilibrium indicated by "o" is compared with the full employment equilibrium "e", employment falls by more than the output of the single commodity falls. This follows from the principle of diminishing returns, that marginal productivity of labor has risen (w). Second, the money value of the output of the single commodity does not change. This follows from the quantity equation. Because equilibrium in the money market requires M* = vpy, if M* and v are constant, py must be constant. Therefore, price must rise by the same proportion in which y falls, or p(o)/p(e) = y(e)/y(o). However, this proportionate increase in price is less than the proportion by which the fixed money wage exceeds the full employment equilibrium money wage, W_o/W_e; the real wage has risen, as explained above.

Two results of this analysis, that will be found in subsequent versions as well, stand out as counter to commonsense. First, the model implies that a fall in production and sales is associated with a higher price level; and, second, that a fall in employment is accompanied by (caused by) a rise in real earnings for employed workers. One commonly observes the opposite in both cases: real earnings rise when labor is in short supply, and prices rise when output and sales are expanding. Most people would not associate higher money wages with an excess supply of labor, as this model does. It could be argued that these conclusions are the result of static analysis; that we do not observe these basic relationships because in the real world there are many simultaneous

changes which hide the true relationships between wages and employment, and prices and output. By this argument, one concludes that the simple model and its more sophisticated versions reveal what the complexities of reality conceal. If it is the case that an increase in employment must be bought at lower wages, then the model is powerful indeed.

Paul Samuelson has offered an analogy to justify such counterintuitive conclusions. In physics we learn that an object dropped from any height within the earth's gravitation pull accelerates at thirty-two feet per second. This, however, refers to conditions in a perfect vacuum. Any actual falling body will accelerate slower, due to air resistance. The analysis of real earnings and employment is allegedly similar. The argument goes that were economists able to isolate social phenomena as physicists do natural phenomena, the conclusions of the synthesis model would be verified.

The analogy is inappropriate. It is not the case that the two counter-intuitive conclusions reached above are the result of a static analysis which abstracts from extraneous complexities. The first conclusion, that price and output are negatively related, is the result of the assumption of an exogenous money supply and a constant velocity. If the money supply is endogenous, or has a substantial endogenous component, then price and output are not necessarily inversely related even in a static model. Similarly, the second conclusion, that a drop in employment is associated with rise real earnings,[5] is not inherent in static analysis. This conclusion results from specifying production in terms of a single commodity output/income function. The inverse relationship between employment and real earnings (the commodity wage) is a logically consistent argument if and only if the model involves one and only one commodity.[6] Near-perfect vacuums can be approximated in laboratory conditions and in interplanetary space. One commodity economies cannot be approximated in any experiment outside the mind of the theorist.

In this model, as in all neoclassical models, unemployment is the fault of workers themselves, either because they demand a money wage that is "too high" or support political intervention in the labor market to establish legal minimum wages. It is common to read in this context that organized labor benefits at the expense of unorganized labor. Higher wages for the employed are achieved at the expense of

unemployment for workers who are so unfortunate as not to be in strong unions or protected by minimum wage legislation. This seems a powerful critique of the alleged monopoly power of organized labor and has passed into the folklore of conventional wisdom. There is nothing immutable or even very interesting about this conclusion, except its flagrant ideology. It follows from the arbitrary treatment of the economy as a one commodity system.

As constructed the model presents a simple solution to the problem of unemployment. Given the quantity equation, an increase in the autonomous money supply will call forth an immediate increase in the price of the single commodity. Given W*, a rise in price will result in a fall in the commodity wage, W*/p. A fall in the commodity wage will induce a higher level of employment and output/income. Unemployment can be eliminated by a sufficient increase in the money supply in this model.[7] This is shown in Figure 5.3 by a shift in M* to M**. Given this new level of the money supply, the money value of output rises to be consistent with all of the full employment levels of the real variables, noted by "e".

Neoclassical economists have traditionally taken a jaundiced view of this remedy for unemployment. The judgment is commonly encountered that monetary expansion involves "endorsing inflation", and what increasing the money supply achieves would also result from a fall in the money wage. Workers should be indifferent between the two paths to full employment, since each results in the same real wage. The ideological instinct of many economists is to prefer the real wage adjustment on the grounds that it involves the automatic working of the market, while monetary expansion requires government action.

5.4 The Arbitrariness of the Full Employment Solution

Even ignoring the false dichotomy inconsistency, the full employment solution to this model is unsatisfactory. A look back at Figure 5.2 shows that the investment and saving schedules were drawn such that they yielded i = s at a positive interest rate for the full employment level of output/income. As one of his three famous exceptions to automatic full employment, Keynes suggested that the saving and investment schedules

might be of the form in Figure 5.4.[8] In this case; there is no point on the IS curve that corresponds to full employment.

This is sometimes referred to as an "inconsistency" between saving and investment.[9] For all positive interest rates, the clearing of the commodity market implies excess supply for labor, and disequilibrium in the labor market cannot be corrected. If money wages are flexible, their fall will not induce more employment, for any output in excess of y_o cannot be sold, assuming r cannot fall below zero. If falling money wages result in falling prices, then the model experiences continuous deflation with no tendency to full employment. In the next chapter the inclusion of the real balance effect eliminates this problem. The "inconsistency" epitomizes the employment suffered by the major capitalist countries at the end of the 2010s.

Before proceeding to more complex models, it is useful to summarize the results obtained so far. In the case in which none of the variables of the model is constrained (e.g. flexible money wages) and the functional relationships in each market are constructed to be consistent with full employment ($i = s$ at $r > 0$ for y_e), all real variables are independent of the exogenous money supply when they have achieved their full employment values. Money is strictly neutral, determining only the price of the single commodity and the money wage. If the money wage is fixed above the equilibrium level, then all variables, real and nominal, move with changes in the money supply. Any change that might be brought about by an increase in the exogenous money supply would also be achieved by a fall in money wages. The outcome of the model results from two arbitrary assumptions: that the money supply is exogenous and that there is only one commodity.

Figure 5.1 Graphical construction of the IS Curve

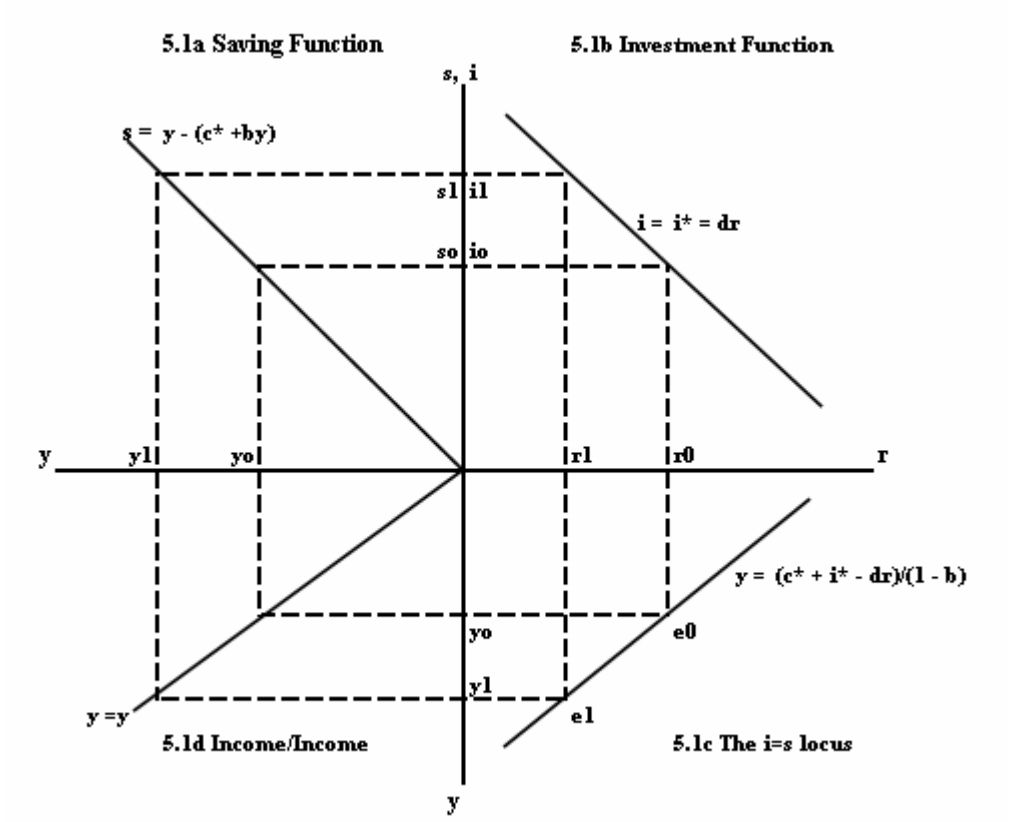


Figure 5.2 General Equilibrium in a false dichotomy model

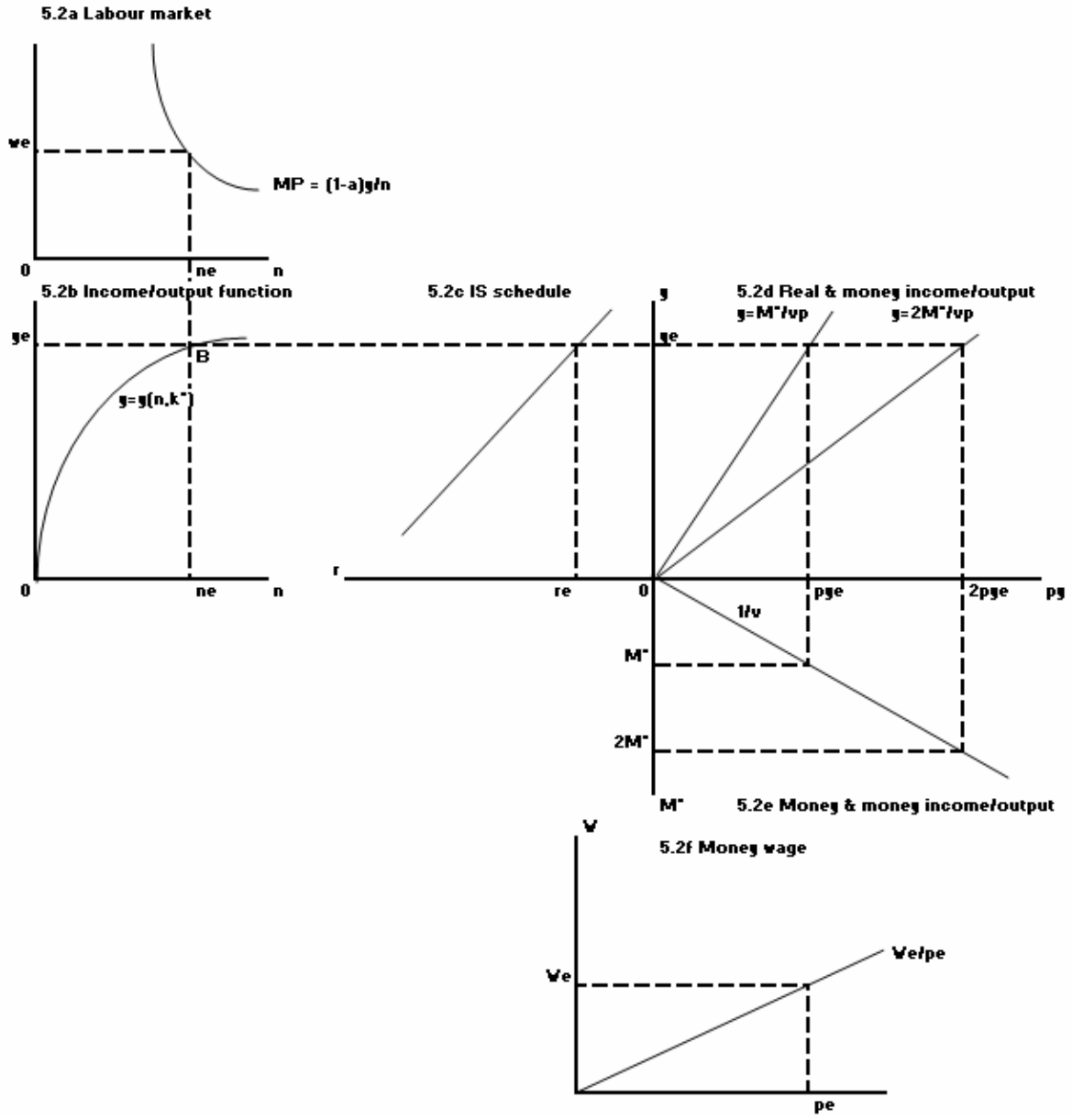


Figure 5.3 False dichotomy model with a rigid money wage

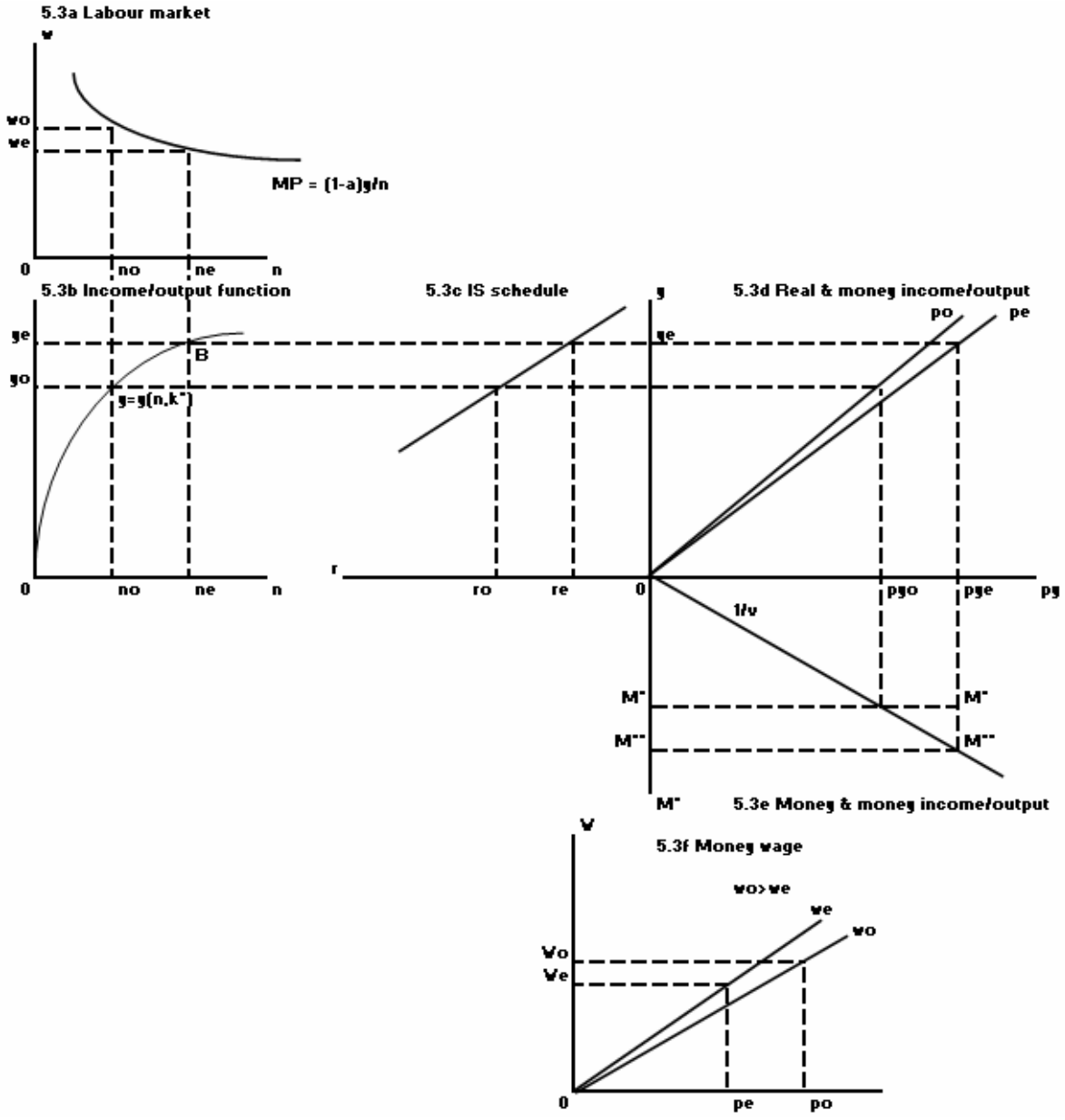
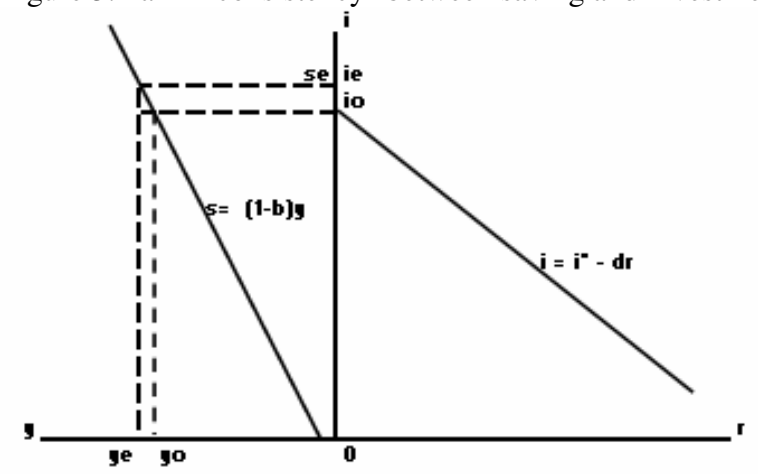


Figure 5.4 an "inconsistency" between saving and investment



6 Logically Consistent Money-neutral Models

6.1 A Real Balance Effect Model

The model of the previous chapter is invalid, because of the contradiction between Walras' Law and the quantity equation. That problem can be solved by the introduction of the real balance effect. Let the purchasing power of money be defined as M*/p, which a ratio called *real balances.* In this section I assume that money is the only form in which people can accumulate and hold wealth. A more general treatment of wealth-holding will be presented in Chapter 7.

For each household it is reasonable to assume that its consumption expenditure will be affected by the value of real balances. A rise in the price level reduces the wealth of holders of money, while a fall in the price level increases their real wealth. On the presumption that people have in mind some desired level of real balances or real wealth, it follows that a rise in the price level, by reducing real wealth, will stimulate a lower level of expenditure, and the opposite for a fall in the price level.

What seems reasonable behavior for people taken individually is not necessarily true for all people taken together. This contradiction is called the fallacy of composition, which reappears in the treatment of saving. If all money is *inside money* (see Section 4.3) then in the aggregate the real balance effect is zero, for the gains (losses) of asset holders are exactly off-set by the losses (gains) of holders of liabilities. In the model presented in this section I arbitrarily assume that all money is a net asset, it is "outside". To keep matters simple, I assume that the real balance effect influences consumption but not investment. The purchasing power of money must logically affect the demand for real balances themselves. If a person is holding an initial amount of money and is content with this amount, a rise in the price level will reduce the real value of that amount of money and leave the person with an excess demand for real balances and nominal balances, because one must acquire nominal wealth in order to increase real wealth. Except for the consumption function and demand for money functions, all schedules remain as in Chapter 5. The new explicit consumption function takes the following form.

$$c = c^* + by + g[M^*/p]$$

The demand for money now has two parts, the transactions demand as such and the demand for real balances.

$M_{td} = vpy$

$M_{bd}/p = f[M./p]$

$M_d = vpy + fM^*$

The new functional relationships arise as a result of the distinction between real and nominal variables. Consumption demand in real terms measured in units of the single commodity is a function of real variables only, real income and real wealth or balances. Were one to multiply the consumption function by p, the result would be a function in which the money expenditure on consumption was determined by money income and nominal wealth. If the price level and the money supply were both to double, money expenditure on consumption would double, but consumption measured in units of the single commodity would be unchanged. Using the new consumption function, the IS curve is (with μ the multiplier),

$y = \mu[c^* + i^* - dr + g(M^*/p)]$

Clearing of the money market requires that $M^* = M_{td} + M_{bd}$. Behavior has been re-specified in terms of real balances. The demand for money function shows that agents in the aggregate hold a proportion of the money supply as idle balances, which is independent of the price level. This simple assumption indicates that their desire is to maintain a certain level of real wealth, rather than seeking to maintain some level of nominal balances. Were agents to set their goal in nominal terms, the result in neoclassical language would be called "money illusion".[1] The equilibrium condition is,

$M^* = vpy + fM^*$

$M^* = vpy(1 - f)$

Before considering the equilibrium of this model, it should be verified for internal consistency. The excess demand equations for money implied by the simple quantity equation and Walras' Law contradict each other.[2] The real balance effect eliminates the inconsistency.[2] From a position of full employment equilibrium, should the price level double, the real balance effect in the demand for money equation creates an excess demand for cash balances; operating in the consumption function, it simultaneously

generates excess supply of the single commodity. Thus, a rise in the price level induces people to hold more money and to buy fewer commodities. Excess supply in the commodity market results in a fall in price, which eliminates the disequilibrium in both markets.

As before, the general equilibrium solution is first worked out algebraically. The labor market functions are the same in this model as in the previous, so the commodity wage at full employment is as before,

$w_e = (1 - a)y_e/n_e$

where

$y_e = (k^*)^a(n_e)^{(1-a)}$

In the previous model it was possible at this point to move to the IS curve and determine investment, saving and the interest rate. Now, the IS relationship includes the real balance effect, so one must first derive p_e in order to find the equilibrium value of M*/p. From the condition for money market equilibrium one can write $p = (1 - f)M^*/vy$; therefore,

$p_e = (1 - f)M^*/vy_e$

The money wage is $pw = W$, and when the substitutions are made,

$W_e = [(1 - a)(1 - f)M^*]/vn^*$

Now it is possible to return to the IS curve.

$y_e = \mu[c^* + i^* - dr_e + g(M^*/p_e)]$

If we substitute for p, the nominal money supply is eliminated and the IS schedule is again a function of only one variable, the interest rate.

With y_e determined, the equilibrium interest rate, r_e, can be found, as well as c_e, i_e, and s_e). Money is neutral in this model. A review of the solution to the full employment equilibrium shows that neither the money supply nor the price level enters the behavioral equation for any real variable. By introducing the real balance effect Patinkin pulled off an extremely clever conjuring trick. Superficially, money appears to play a more central role in this model than in the Classical false dichotomy case. The effect of making the demand for money more complex is to achieve the Classical goal of

neutrality while resolving the excess demand for money dilemma upon which the Classical model floundered. The trick was achieved by introducing another "real" variable M*/p, which, it develops, is merely a fractional part of real output/income itself. Further, the introduction of y in disguised form has a profound consequence: it eliminates the possibility of a full employment solution being blocked by the inconsistency between saving and investment (see below). No one has improved upon the simplicity of Patinkin's rescue of the Classical system from its internal inconsistencies of equilibrium adjustment.

The full employment solution to the model with the real balance effect can be presented graphically. In Figure 6.1 the analysis begins with the labor market. The full employment equilibrium solution in itself is of relatively little interest. One considers it to establish that its existence and ensure that there are no conditions which would render it a special case. In the model, full employment was a special case even if wages and prices were flexible, because there was no guarantee that saving and investment could be equated at the full employment level of output/income. That problem can be eliminated. Consider the possibility that the investment schedule is i*, interest inelastic and equal to s_o. This equality of saving and investment below lies the full employment level. With saving schedule s' investment would have to be s_1 for full employment. For the given level of investment, $i^* = s_o$, aggregate demand is less than aggregate supply in the commodity market.

Let the initial price level be p_1. The excess supply of commodities in a Walrasian world induces a fall in price. The fall in price results in a rise in M*/p, which activates the real balance effect. With real wealth increasing, there is a movement to the right along the savings schedule in Figure 6.1f, where s is a function of M*/p, which implies a shift to the right of the saving schedule in Figure 6.1c, where s is a function of y. A falling price shifts the saving-income function such that less is saved at each level of income. When the saving-income function has shifted so that schedule s" prevails, the full employment level of output/income is achieved, such that i = s for y_e.

This logical sequence demonstrates the extent to which the solution to full employment is derivative from the labor market. At first inspection it appears that the

consumption and the saving schedules were independent of other functions in the system, though sharing some of the same variables. However, the position of the saving function in Figure 6.1c is dictated by the labor market. Given equilibrium in the labor market, M*/p is determined: the money supply is exogenous and only one price level is consistent with full employment. Two components of the solution, y_e and M^*/p_e determine everything. This can be seen in Figure 6.1 by again referring to investment i* and saving function s. Investment i* implies a level of saving of s_o Figure 6.1c. Moving left to 6.1b, this level of saving implies income level y_o and level of employment n_o. Figure 6.1a reveals that the labor market is in excess supply and that the real wage is above its equilibrium level. Thus, income cannot be equilibrium.

However, momentary unemployment in this case is not the result of the real wage being too high. This is an extremely important point to understand and will loom large in the next chapter. The excess supply of labor is the result of the position of the investment function; that the real wage is above its equilibrium level is the necessary symptom or manifestation of a problem arising in the commodity market where s and i cannot be equated at full employment. Keynes sought to establish precisely such a conclusion: if the real wage is above its equilibrium level this is the consequence not the cause of unemployment.[3] But the real balance effect brings the blame for unemployment back to roost in the labor market. Were there no mechanism to shift the saving schedule to eliminating the inconsistency between i and s, unemployment would unambiguously be involuntary in the model. Idleness would be thrust upon workers by circumstances over which they had no control. Thus, the real balance effect plays an important ideological role by removing the prefix "in" from "involuntary unemployment".

Now return to Figure 6.1c. If one moves to the right, it is discovered that the less-than-full-employment level of single commodity income, y_o, implies a level of money income the same as at full employment, $(py)^*$, just as in the false dichotomy model. The money value of income does not change because nominal balances are a constant portion of the money supply, so the money left over for transactions balances does not change. Because money income is invariant to changes in the level of output, the notation (py)* rather than $p_e y_e$ is used in Figure 6.1e. If money income is not changed while production

of the single commodity is lower, $y_o < y_e$, then the price of the commodity must have risen. This is made explicit in Figure 6.1e, where the price line rotates in a clockwise direction. The rise in price y_1 to y_2, renders the less than full employment solution inconsistent. A higher price results in a fall in M*/p, which increases saving and increases the excess supply in the commodity market. Back in the labor market this inconsistency is being resolved, for $n_d<n^*$ results in falling money wages, as all workers re-contract under the gavel of the auctioneer (see section 2.3). In a perfectly competitive world, falling money wages prompts a falling price. While this cannot directly equilibrate the labor market, it results in a reversal of the fall in M*/p. As M*/p rises, there is a moment along the saving schedule in Figure 6.1f, which dictates a shift downwards in the saving-as-a-function-of-income schedule in Figure 6.1c. This continues until the latter schedule finds its intercept at point (-c*) on the income axis in Figure 6.1c. No other intercept for the saving function is consistent with the functions in the model.[4] Full employment achieved, and y_e is unique.

The docile movement of the saving function to serve the needs of equilibration in the labor market indicates how far the neoclassical model has moved from Keynes's analysis in *The General Theory*. Keynes's general conclusion was that the level of employment in a capitalist economy was dictated by conditions in the commodity market, "effective demand". The real balance effect returns one to a classical world in which the clearing of all markets is derivative from the instantaneous, Walrasian adjustment of wages and prices. In the next section I consider a "Keynesian neoclassical" model in which the commodity market can under limited circumstances achieve the importance Keynes assigned to it. Its moment in the spotlight is brief, however, for in Chapter 7 the real balance effect is re-introduced in general form and the commodity market again plays at best a supporting role.

6.2 Interest-elasticity Money Market Model

In this section we present what was once called "the Keynesian model" or the "complete Keynesian system".[5] It omits the wealth effect, though writers frequently make *ad hoc* reference to it when discussing exceptions to full employment equilibrium.

What allegedly makes the model "Keynesian" is the introduction of the interest rate into the function for the demand for money.

Unsynthesized Keynesians as well as pure neoclassicals agree that the demand for money should be modeled as interest-elastic, but controversy has waxed and waned as to the theoretical justification. In *The General Theory* the interest elasticity of the demand for money is closely related to Keynes's treatment of uncertainty and expectations of capitalists. Keynes stressed the obvious fact that a capitalist economy creates an environment that is inherently uncertain. He argued that to a great extent economic fluctuations are a result of uncertainty and the behavior of capitalists in response to uncertainty. Central to his treatment of uncertainty and expectations was the presumption that the future is both unknown and unknowable. No amount of information about the past and present can do more than indicate what will occur in the future. Further, predictions based upon full knowledge of the past and present are frequently contradicted by what actually occurs in the future.

With regard to the demand for money, Keynes argued that capitalists tend to hold cash for speculative purposes. In Keynes speculation occurs because the future cannot be accurately predicted, which creates the potential for making money by guessing outcomes. The role of speculation in the demand for money can be shown by assuming the simple case in which wealth can be held in only two forms, money itself and interest-yielding bonds. For the moment I ignore the transactions demand for money. In this simple example of money and bonds, assume that one knows without doubt that the prevailing interest rate would persist for the foreseeable future. On the basis of such knowledge there would be no reason to hold money. With each passing moment the holder of money forgoes interest income.

If one has suspicions that the interest rate might rise or fall, but is not certain, the situation is different. A fall in the interest rate would have the result of increasing the market value of bonds, while a rise would decrease the value of bonds.[6] It seems reasonable to presume that holders of wealth will keep a large portion of their wealth in money form if they anticipate a rise in the interest rate and in bonds if they anticipate a fall in the interest rate. If all wealth holders have the same anticipation (guess) of what

the interest rate would do at any moment, they all would either want to hold only money (anticipating a rise in the interest rate) or hold only bonds (anticipating a fall).

Because it seemed to him self-evident that the future could not be accurately predicted, Keynes presumed that everyone would not have the same guess about what coming events would bring. At any prevailing interest rate some wealth holders anticipate a rise in the interest rate, while others anticipate a fall (and some think it will not change). As a result of these mixed anticipations, some hold money and others hold bonds. If one assumes that the higher is the interest rate the fewer are those who think it will go still higher, and vice versa, one obtains a demand for speculative balances which is inversely related to the interest rate.

Keynes viewed the bond and money markets analogously to a horse race. A horse race may have a predicted winner (the "favorite", which has the lowest payoff). But, all parties do not bet on the favorite, because the favorite does not always win. People bet on different horses because the outcome of a horse race is inherently uncertain; one can have possession of all possible knowledge and still select a losing horse.

This view of the markets, that they are dynamic and subject to changes which at best one can only vaguely anticipate, has been rejected by the neoclassical synthesis. This was most explicit and unabashed in the rational expectations New Classical Economics school, treated in a later chapter. Not only do these latter-day pre-Keynesians model a world of predictable outcomes, they also assert that the actual world is no different. This is clear a case of "nature imitating art" (Oscar Wild). The synthesis, even in its pre-rational expectations days, was never at home with Keynes's treatment of uncertainty. His explanation for an interest-elastic demand for money was rejected in the literature in favor of explanations that yield similar functional forms consistent with a world of certain outcomes.[7]

Neoclassical monetary theory has reformulated the interest-elastic demand for money in terms of opportunity cost, which is interest income lost as a result of holding money. To the extent that Keynes's speculative motive was retained it bore little resemblance to the original concept in which the non-predictability of the future arid the volatility of expectations played such a central role. An interest-elastic demand for money can be inferred from the transactions demand alone. The idea is quite simple. An

agent has a certain chronological sequence of income receipts and a certain sequence of payments to make. In general these two sequences do not coincide. Assume there to be some cost in shifting funds from bonds and other forms of wealth that bear a return to cash, which by definition has a zero return. The agent will hold some cash idle even if the income sequence and the payment sequence are known with certainty. In other words, a wealth holder will not send a sell order to his bond broker every time he buys an ounce of caviar. Other things equal, such as the brokerage cost of a transaction on bonds, the higher the rate of interest the less attractive it will be to keep on hand a given amount of cash to meet payments. This line of argument implies that the transactions demand for money is a function of the value of exchanges to be made and the interest rate.

As in the previous model, the demand for money is specified in terms of real balances. In general form, this can be written as $M_d/p = L(y,r)$, with the letter L indicating that this is the liquidity preference function. As before, the exchange-motivated demand for money is vpy. To this we add an interest rate element, and obtain the following.

$$M_d/p = vy + [h - jr]$$

The notation for the demand for money is indicated simply by the letter "d", indicating that the reader can attribute its interest elasticity to a number of motivations (transactional, precautionary, and speculative) and obtain the same function. Equilibrium in the money market requires that supply equal demand, or $M^*/p = M_d/p$. This yields the LM curve, which shows all possible points of equilibrium for the supply and demand for money. As with the IS curve above, it can be solved for y in terms of r.

$$y = \{[(M^*/p) - h] + jr\}/v$$

In money market equilibrium, income is a positive function of the interest rate. Prior to an explanation of this, the reader can note that it is a quite satisfactory neoclassical result. Since in the commodity market equilibrium income is negative function of the interest rate, one now has two functions in y and r, which if they intersect at all in the positive quadrant must yield a stable equilibrium.[8] The LM curve has a positive slope because a higher interest rate results in a fall in holdings of cash. This represents a shift of cash from idle to active balances, which means that this money is available for and seeking commodity transactions. If the commodity price is assumed constant; equilibrium can be maintained only by an increase in output/income. A rise in

the interest rate creates an excess supply of idle balances and an excess demand for commodities. If price is assumed fixed, the excess demand for commodities calls forth a greater supply to satisfy it.

If the Keynesians were discontent with the neoclassical treatment of consumption and investment, combining them in the IS curve, they would be no more pleased with the LM curve. In both cases all distinction between more and less volatile economic behavior is obliterated. Treating investment and consumption as equally stable functions of two variables, income and the interest rate, eliminates what Keynes and other economists considered as the main source of fluctuations on the demand side. The IS treatment implies a abandonment of what in the thirty years after *The General Theory* was called "business cycle theory", an attempt to explain why developed capitalist economies exhibit systematic fluctuations in the level of aggregate economic activity. If one presumes the investment function to be stable and analytically indistinguishable from the consumption function, then stability and equilibrium is the subject of theory, not fluctuations.

As for investment and consumption, Keynes distinguished between the income related demand for money and the rate of interest related demand in order to focus on the relative stability of the former and the relative instability of the latter. On theoretical grounds and from his experience in financial markets, he concluded that the interest-elastic demand for money was an inherently unstable function, and, therefore, a central cause of the cyclical volatility of capitalist economies. This, in turn, was part of his argument that money economies are inherently unstable if left unregulated.[9] If the demand for money is volatile in the sense that agents quickly and unexpectedly change their targets for idle balances, then markets are rendered unstable. The commodity market is upset by sudden shifts in effective demand, which are passed on to the labor market. The money market is affected directly, undermining the role of the rate of interest in equilibrating saving and investment.

With the introduction of the LM curve, the demand for money is discarded as a possible source of instability. The simple neoclassical model is complete. First, the labor market was specified in terms of the commodity wage and a notional demand for labor which assumed that firms have no sales (demand) constraint. This was followed by

formulating the commodity market to eliminate the distinction between consumption and investment, and, therefore, any distinction between saving and investment. Now the money market has been modeled to ensure stability. It only remains to solve the complete model for equilibrium.

Before solving the model, it should be investigated whether it is consistent with Walras' Law. The situation is now complicated by the introduction of another market with an additional vendible article, "bonds". With the introduction of bonds, the excess demand for money becomes equal to the sum of the excess demands for the commodity and bonds. Looking at the excess demand for money implied by the liquidity preference function, we see that it is determined by the interest rate, the commodity price, and the level of income, which is held constant for this exercise. The same is the case for the excess demand for the commodity and bonds. A rise in the price level increases the excess demand for money and decreases the excess demand for the single commodity, both in a linear relationship. A rise in the interest rate increases the excess demand for bonds and decreases the excess demand for money. The two excess demand equations for money are consistent.[10]

We can move to the full employment general equilibrium solution. The steps follow as before, beginning with the labor market, where the same functions are employed as in the first two models.

$y_e = y_e = (k^*)^a(n_e)^{(1-a)}$

$w_e = [1 - a]y_e/n_e$

$c_e = c^* + by_e$

$s_e = [1 - b]y_e - c^*$

$i_e = s_e$

$i_e = i^* - dr_e$

At this point we encounter a difference compared to previous models. Unlike in the previous model, the interest rate must work to clear the money and bond market as well as to equate investment to saving. The same equilibrium interest rate must satisfy the commodity market. Following convention, I solve for the r which satisfies the IS curve, then use that r elsewhere as needed. Such a procedure is valid only if one knows

in advance that all functional relationships will be consistent with full employment, because the solution is a simultaneous one in which r must satisfy more than one equation.

As in the false dichotomy model, solving for r_e yields the following:

$r_e = \mu[(c^* + i^*) - (1 - b)\, y_e]$

With the interest rate determined, one moves on to the demand for money; M(d):

$M_d = p_e v y_e + h - j r_e$

This expression contains a variable yet to be determined, the equilibrium price, p_e. The value of this nominal variable can be found from the equilibrium condition for the money market, the LM curve.

$M^* = p_e v y_e + [h - j r_e]$

From which it follows,

$p_e = M^*/[v y_e + h - j r_e]$

It only remains to determine the money wage, W(e).

$W_e = [(1 - a)\, y_e p_e]/n_e$

Money is neutral in this model. Looking at the equation for p_e, one sees that both y and r have been determined elsewhere by the equilibrium condition i = s, and can, therefore, be taken as given. Should the money supply, M., double, the price level will double with no change in any real variable. Because a doubling of M* implies a doubling of p, the implicit real variables M*/p (and M_d/p) are unchanged.

The full employment general equilibrium solution is easily demonstrated diagrammatically. In Figure 6.2 the analysis begins with the labor market. In order to make the equilibrium conditions explicit, IS and LM curves have not been used, but rather the functional relationships which underline them. By now the sequence of logical events should be familiar. In Figure 6.2a we have the notional demand curve for labor and the notional supply, assumed fixed at n*. One should remember that the demand for labor assumes that firms act as if they have no sales constraint; i.e. it assumes a Walrasian process in which there is no False Trading. In the labor market output/income is determined, unless somewhere else in the model one encounters conditions that contradict full employment. In Figure 6.2b, full employment output/income is shown

explicitly as y_e. To the right is the saving function in Figure 6.2c, and above that in Figure 6.2d is the investment function, which shows that the interest rate adjusts to equate investment and saving. All of this differs in no way from the False Dichotomy model, and establishes the values of the "real" system, with the exception of M*/p.

In this model the interest rate, already determined, divides the money supply between idle and active balances (Figure 6.2e). The distance M_e to M* is that portion of the money supply which is not held as idle balances, the active money supply. As defined, M_e is the portion of the money supply which is available to facilitate transactions (in equilibrium equal to vp_ey_e). In Figure 6.2e it is the distance from the origin to M_e on the horizontal axis. At full employment equilibrium, money is a "veil" over the real system in this model.

The interest-elastic component of the demand for money, which Keynes introduced to explain the observed instability of a money economy, merely determines the transactions supply of money as a residual. Whether this residual is large or small, and the interest rate low or high, is no consequence in the model. If the schedule in Figure 6.2e were more elastic with regard to the interest rate, M_e would move to the left, also in Figure 6.2f and 6.2g. This would require a lower price: the line 1/vp would rotate clockwise in Figure 6.2f, but full employment is consistent with any price level. The entire national income could be circulated by a single penny if that penny could be divided into enough parts.

This "complete" version of the so-called Keynesian model can be reconstructed to generate unemployment by assuming a fixed money wage. The result is hardly different from invoking the same assumption in the false dichotomy model. This is shown in Figure 6.3, which should be compared with Figure 5.3. Let W = W*, with W* above the full employment equilibrium level. Now it is considerably more complicated to solve the system for the values of the variables than was the case in the same model with unconstrained full employment. The complication arises because the level of employment is determined by the commodity wage, but the commodity wage cannot clear the labor market because the money wage is above its only possible full employment value. In this variation of the model the commodity wage, w_o is derivative

from the level of employment, not vice versa. Employment is set by the level of aggregate demand, which reflects the two arbitrary parameters M* and W*.[11]

Understanding is facilitated by dispensing with the algebra and going directly to Figure 6.3. As we know, only one money wage is consistent with the commodity wage w_e. Because by assumption W* is above W_e, the model cannot be at full employment. If some labor is unemployed, this requires that the commodity wage associated with W* be above the full employment commodity wage, w_e. When employment falls below n*, to n_o, output/income falls to y_o. Because saving is a function of income, saving falls, to s_o. This lower level of saving must equate to a lower level of investment in order that the commodity market clear. With investment greater than saving, the interest rate must rise to clear the commodity market. A higher interest rate creates an excess demand for bonds and an excess supply of money, which increases the money available for transactions.[12] The price level rises, because the level of output/income is lower and the quantity of money chasing commodities has risen.

This last sequence, the release of more money for transactions, results in yet another of those strikingly counter-intuitive conclusions of neoclassical theory. The previous, simpler models predicted that falls in employment and output/income would be accompanied by a rising commodity wage, money wage, and price level. Now, a fourth unexpected outcome appears. With the inclusion of an interest-elastic demand for money, less than full employment equilibrium results in a money value of output/income that is *higher* than at full employment. Because a higher interest rate implies a greater transactions supply of money, people as a whole are better off in nominal terms but worse off in real terms. Money, the model tells us, is not only a veil but actively misleading of real relationships. It is fortunate that neoclassical rational agents, unlike mere mortals, are not victims of money illusion.

As in previous models, the labor force is to blame for unemployment. Given the functional relationships as drawn in Figures 6.2 and 6.3, the model fails to achieve full employment equilibrium if the money wage is inflexible. The present model and the false dichotomy version arrive at the same basic conclusions, and the similar outcomes indicate an interesting aspect of the neoclassical synthesis analysis. While its analysis can be and is made progressively more complicated, adding an interest-elastic element to

the demand for money in the current case, its message remains the same: workers are to blame for unemployment. And, more generally, any failings of capitalism result from the actions of workers (and government, discussed in Part III).

This analytical invariance is both a strength and a cause for disquiet. It is a strength in that apparently the simplistic version of the model tells the same story as much as the more sophisticated and esoteric versions. It appears all levels of complexity yield the same conclusions, which might be interpreted as evidence of analytical generality. At the same time, the value of analytical invariance is open to question. When all avenues of inquiry lead back to the same conclusion, doubt is sown as to whether the more complicated and sophisticated trails are necessary. One normally thinks of science as progressing by uncovering new and sometimes startling discoveries which disprove accepted doctrine. The neoclassical school seems content to take as progress finding new ways to verify what it already knew.

6.3 The "Liquidity Trap"

The full employment solution in this last version of the synthesis model is in serious need of the Wealth Effect. The inconsistency between saving and investment, discussed in Section 6.1, is equally appropriate here. Its impact in this model is exactly the same as before, so there is no need to labor it. However, the introduction of the interest-elastic demand for money creates the possibility of another logical barrier to full employment, the "liquidity trap". The liquidity trap refers to the possibility that at some low rate of interest the demand for idle balances may become infinitely elastic.[1]

One explanation for the existence of the liquidity trap is that the interest rate might at some moments be so low that all wealth holders would anticipate it to rise in the near future. This would imply a fall in the price of bonds and induce wealth holders to have a strong preference for money to avoid a capital loss. Alternatively, wealth holders might wish to hold only money because the rate of interest is so low that is does not justify the default risk involved in holding bonds.[2] Whichever the case, liquidity trap behavior need not necessarily present a problem for the logic of full employment equilibrium. Difficulty would arise if the interest rate required to equate saving to

investment at full employment were below the interest rate at which the demand for idle balances becomes infinitely elastic.

The logical consequence of the liquidity trap is demonstrated in Figure 6.4, where only the commodity and money markets are shown. The mechanism by which the interest rate changes in this model needs explicit explanation. Changes in the interest rate are the result of disequilibrium in the portfolios of wealth holders. If there is an excess demand for money, wealth holders sell bonds, which drives down the bond prices and pushes up the rate of interest. If there is an excess supply of money, the resultant purchase of bonds drives the interest rate down. If at any moment the interest rate is above the full employment level, what is required is an excess supply of money which will induce bond purchases by wealth holders.

An increase in the demand for bonds increases the price of bonds, which by definition implies a fall in the interest rate. In the case of Figure 6.2, an excess supply of money could be brought about by the commodity price falling according to Walrasian rules. Were price to fall, the transactions need for cash would decline, creating an excess supply of money and an excess demand for bonds. The situation is different in Figure 6.4. As before, disequilibrium in the commodity market logically causes price to fall, and a decline in p releases money from transactions needs. But in Figure 6.4 a decline in price cannot rectify the situation, because wealth holders will absorb any amount of money into their portfolios as idle balances. The situation depicted is indeterminate. With an instantaneously adjusting money wage and price the model implies continuous deflation with no remedy in logic.

If one wished to relate the diagram to some real world process where presumably wages and prices do not fall without limit, it would be sufficient to presume that the demand for money were extremely elastic with respect to the interest rate, rather than infinitely so. While in theory a full employment equilibrium exists, the price decline necessary to achieve it would be catastrophic for the economy. This was the judgment traditionally made by Keynesians. Their remedy for a liquidity trap would be to increase aggregate demand through public expenditure or lower taxes. Graphically, fiscal intervention could be represented by a parallel shift to the left of the investment schedule, so it becomes (i + A), with A standing for real public expenditure.

There has been considerable debate over the empirical importance of the liquidity trap. Some economists denied its existence altogether or assert that at most it would occur only in a severe depression. This argument would be refuted in Japan at the end of the twentieth century when nominal interest rates fell to zero. If the liquidity trap deniers were not convinced by Japan, an even more obvious demonstration of the Trap would come at the end of the 2000s, when central bank rates in most developed countries would approach zero.[3]

However, empirical arguments are irrelevant in the context of the synthesis model. Were one to start requiring empirical credentials for concepts, the liquidity trap would fare quite respectably alongside the wealth effect, the interest elasticity of the investment schedule, and the aggregate production function, not to mention the assumption of a single commodity world and the instantaneous equilibrating of markets. The model is a logical one, and defending it by singling out awkward aspects for the acid test of empirical evidence while exempting others from the same test is inconsistent, to say the least. The issue is a logical one: can the synthesis model be formulated in such a way as to preclude theoretically the possibility of the liquidity trap blocking the full employment solution? The answer is "yes". The rescue is achieved by introducing the wealth effect, not as an aside to be placed in a footnote, but as an integral part of the model. This approach is pursued in the next chapter.

Figure 6.1 General equilibrium in a classical model with a real balance effect

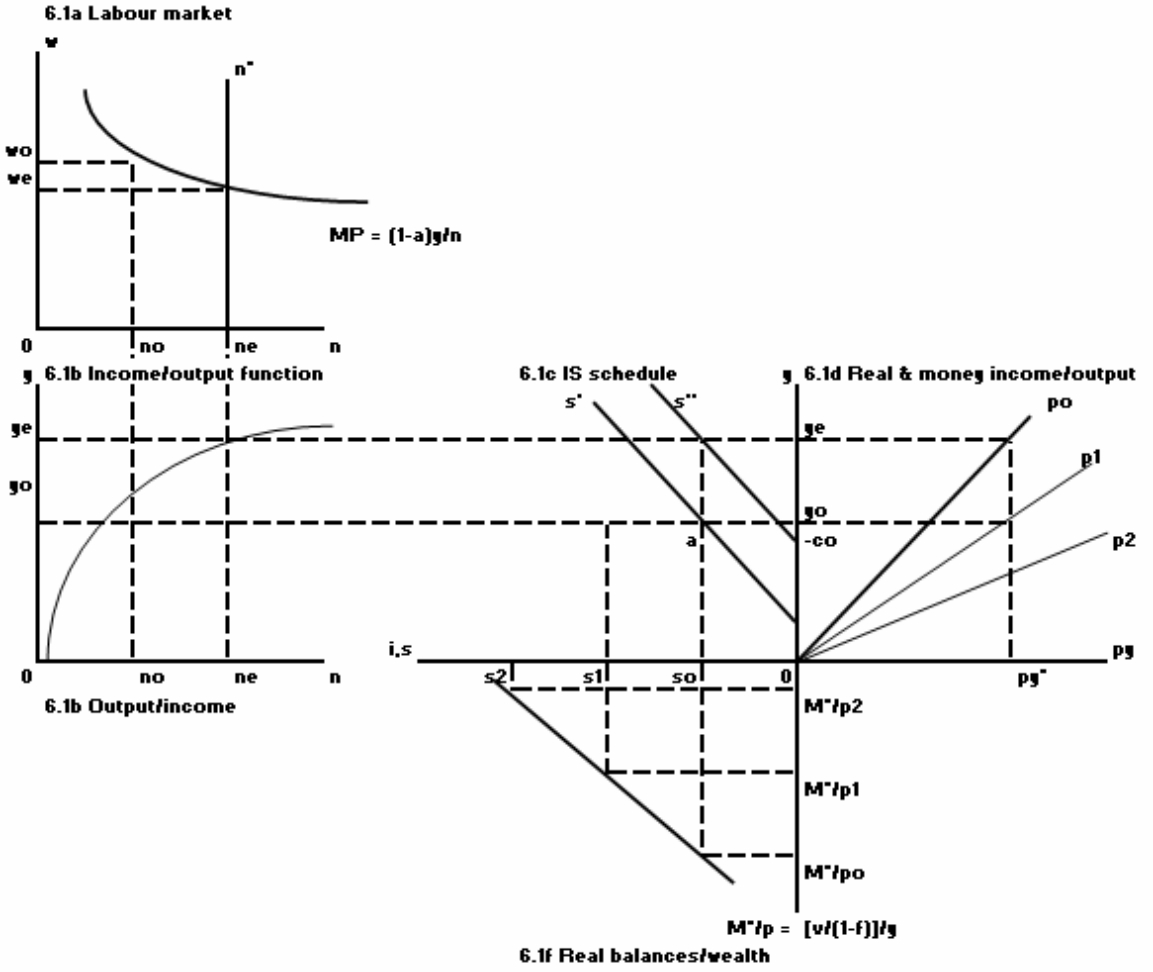


Figure 6.2 General Equilibrium in the "complete Keynesian system"

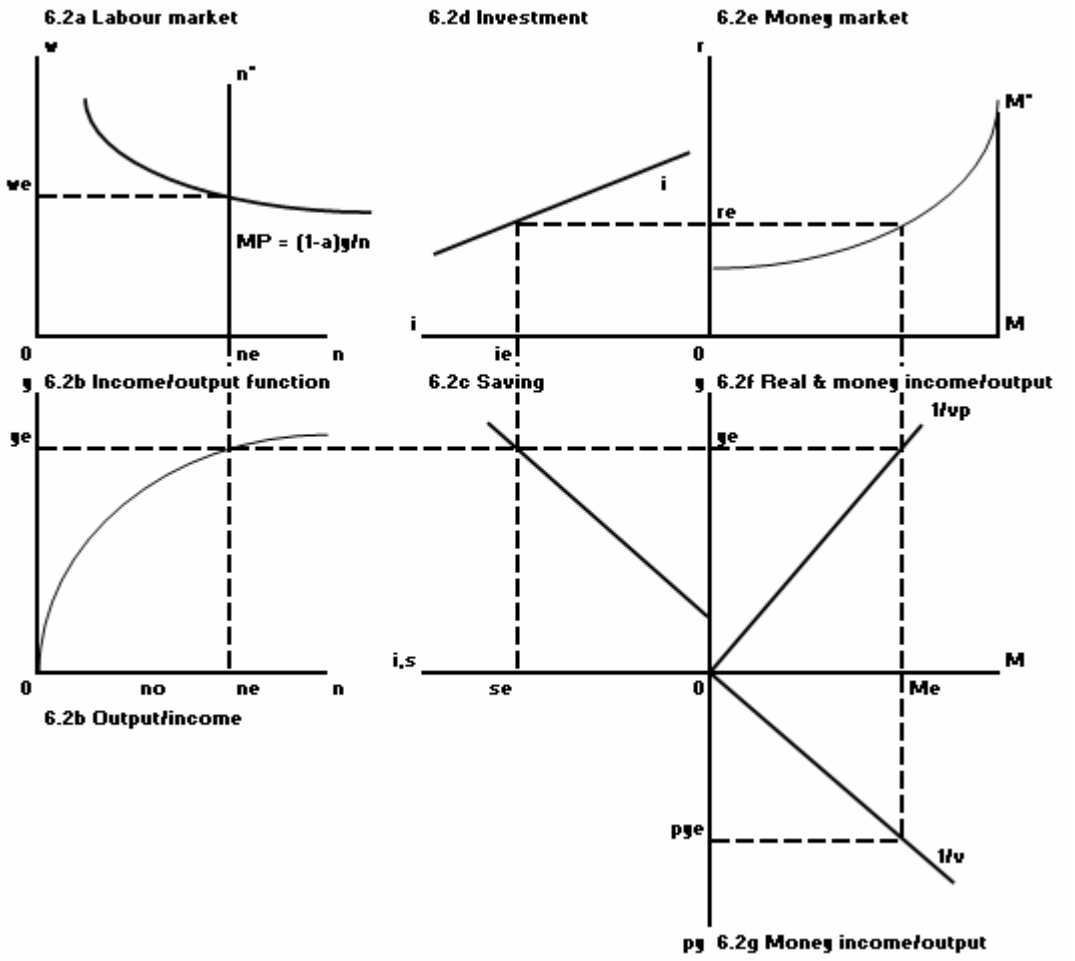


Figure 6.3 Rigid money wage in the "complete Keynesian system"

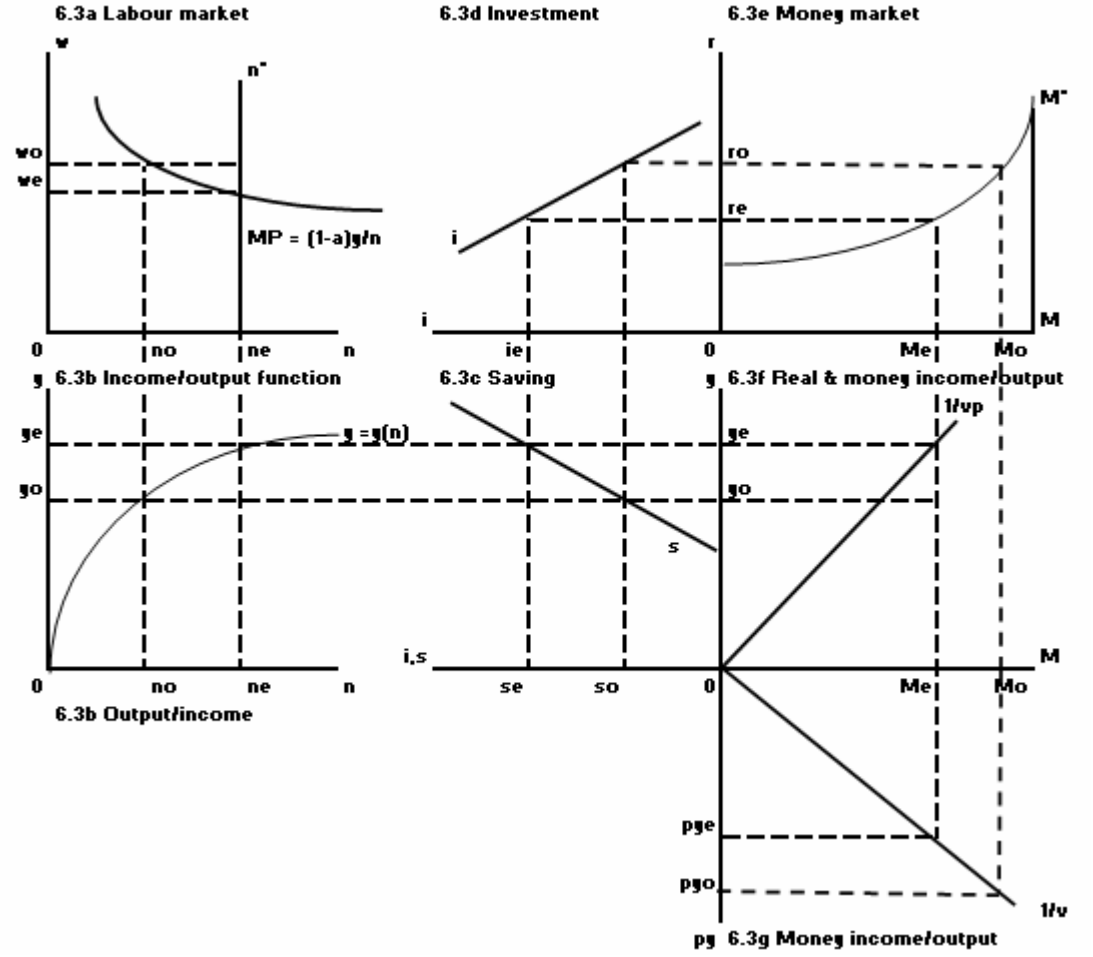
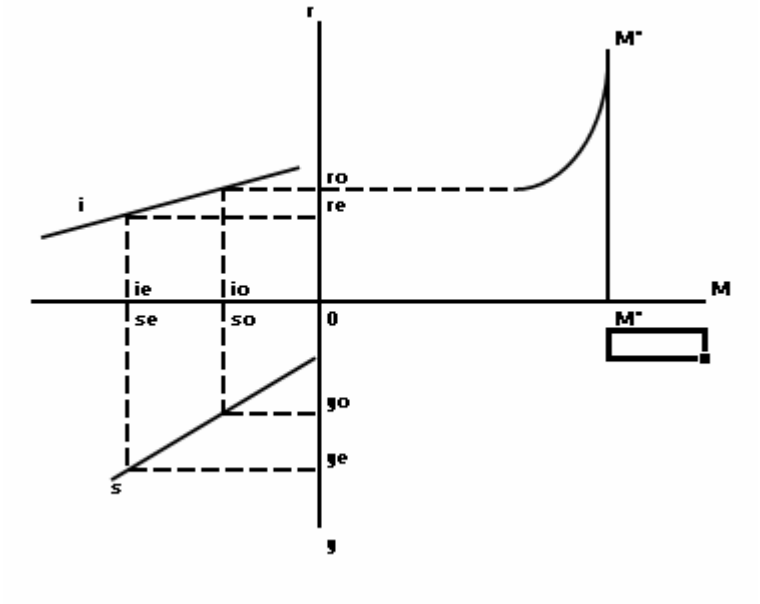


Figure 6.4 Full employment blocked by the liquidity trap



7 The "Complete" Model with a Wealth Effect

7.1 Inside and Outside Money

The final version of the synthesis model which with the wealth effect. It differs from the real balance effect model in Section 6.1 in an important respect. In that model money was the only form in which wealth could be held. Once the demand for money is interest elastic, money-only is no longer sufficient, because the model includes bonds. The inclusion of bonds as part of wealth is logically necessary, not arbitrary. If the demand for money is interest elastic, then there are bonds in the system and these bonds are part of wealth. If the demand for money is not interest elastic, then we return to the naive "classical" model of Chapter 5 or the real balance effect model of Chapter 6.

Before considering the wealth effect, it is necessary to return to the discussion in Chapter 4 of "inside" and "outside" money. "Inside" money is not a net asset; for each unit of money there is a debtor and a creditor. "Outside" money refers to money for which there is no canceling liability. Debate once raged over whether the money supply in abstract models and actual economies should be treated as primarily inside or outside (Lagos 2006). A similar debate raged over bonds. It is obvious that bonds issued by corporations are not net wealth by the neoclassical test. The debt of the issuing institution cancels the credit of the bond holder. Controversy arises over bonds issued by governments. This controversy need not distract us, though it is of central importance to neoclassical monetary theory.[1] I assume that the bonds in the model are outside and represent net wealth. If there are no outside bonds, then we return to the complete Keynesian model of the previous chapter, in which money is neutral but there may be no full employment solution.

The argument over inside and outside wealth indicates the extent to which capitalist societies are controlled by illusions arising from property relations. Private bonds and other private securities represent productive assets, buildings, machines, vehicles, etc. These productive assets are by any commonsense judgment society's true wealth, the source of its material well-being. For example, in a non-exchange society, no one would argue that land and the means of producing on land were not net wealth. The debate over inside and outside money and bonds involves what Marx called "commodity

fetishism", in which the fundamental character of wealth is obscured because of its role as a commodity.

By passing through a moment in which they are exchanged, productive assets assume a money form, though their essential character material wealth. Neoclassical economics focuses on the exchange of assets and ignores their role as real wealth. Emphasis on *individual exchange* completes the process by which the material nature of assets is lost. In every exchange there is a buyer and a seller. In the case of bonds, the buyer purchases the credit aspect of the bond and the seller receives the debit aspect. Though this is true by definition, it does not change that the exchange may have involved a net accumulation of wealth for society as a whole.

7.2 Specifying the Wealth Effect

In the model in this section bonds are "outside". The symbol B* will stand for the aggregate interest yield on bonds. That is, I assume that bonds are issued with a fixed contractual interest yield in pounds, dollars, etc. The total interest yield is given at any moment, because the number of bonds in circulation is given. If the market rate of interest is r, then the aggregate market value of bonds is B*/r. For example, if the interest yield on bonds is ten billion dollars and the market rate of interest is ten percent, then the aggregate value of bonds is one hundred billion dollars. If all bonds and all money were outside, then aggregate wealth, Q, is [M* + B*/r]. Real wealth is q = Q/p.

The impact of q on the various variables in the model is the *wealth effect*, or Pigou effect. This new variable, q, is introduced into all relevant function relationships, saving, investment, the demand for money and the demand for bonds. Further, the interest rate is included as a determinant of saving. To keep notation simple, the functional relationships are written in implicit form, breaking with the practice of the previous two chapters.

$s = s(y, r, q[r, p])$

$i = i(y, r, q[r, p])$

$M_d/p = m(p, y, r\ \ q[r, p])$

$B_d/p = b(p, y, r\ \ q[r, p])$

The discussion of adjustment to general equilibrium will prove quite complex, so a clear understanding of each behavioral relationship is necessary. The *saving function* is

familiar, but now more complex. As before, increases in income induce more saving. However, the interest rate has both a direct effect and an indirect effect via its impact on wealth. An increase in the interest rate directly generates more saving by raising the opportunity cost of current consumption, and stimulates further saving because it reduces the real value of bonds. The decline in the value of bonds reduces total wealth, provoking people to save more to restore their desired real wealth position. Finally, a rise in the price level stimulates saving by reducing real wealth.

The interest rate also plays a dual role in the investment function. The direct result of an increase in r is to reduce investment expenditure. Working through real wealth, q, the increased interest rate also depresses investment by reducing the real value of bonds and total real wealth. This relationship, that decreases in real wealth reduce investment and *vice versa,* is based upon a portfolio-adjustment argument. If one assumes that a firm holds its desired portfolio, a decrease in the value of financial assets, for example, due to the interest rate increasing, would provoke a reduction in investment in productive assets to restore the original portfolio balance. Similarly, a *ceteris paribus* rise in price depresses investment by reducing real wealth, both money and bonds in this case.

Interactions become more complicated for the *nominal demand for money function*. The impact of output/income is straightforward and positive as before, but price and the interest rate both have dual effects. For the interest rate the direct and indirect effects are in the same direction: an increase in the interest rate directly raises the opportunity cost of idle balances. Working through q it reduces the value of bonds, and with less total real wealth agents desire to hold less money in real terms. The impact of price is ambiguous, however. An increase in price raises the nominal value of exchanges, inducing larger nominal holdings of money for transactions; but by reducing real wealth in both bonds and money, it reduces desired real money holdings.

The impact of variables on the *real demand for bonds* is analogous to the impact on the commodity. Increases in income raise the demand for bonds, and an increase in price decreases it by reducing real wealth. In this case the interest rate which plays an ambiguous role. By reducing the real value (price) of bonds, a rise in the interest rate stimulates demand, but by simultaneously reducing real wealth *via* those same bond

prices, an increased interest rate also depresses the demand for bonds. However, the net effect of the interest rate on the demand for bonds is positive.

7.3 Mechanics of the Wealth Effect

For analytical simplification I assume that the model is at full employment, so the level of output/income is given and unique.[2] This assumption has already been justified. In the classical real balance effect model, we saw that the limited version of the wealth effect, the Real Balance Effect, eliminated any problem of an inconsistency between saving and investment, and a more inclusive definition of wealth strengthens the logic of that argument.

The wealth effect also eliminates the liquidity trap. The liquidity trap involved an across-the-board decision by wealth holders to absorb any available money into cash balances. Now the demand for money is determined in part by the real wealth of agents. If a liquidity trap occurs, the logical result is deflation, as argued in the previous section. Deflation, a falling p, increases the real value of wealth, which shifts the consumption function and the investment function upwards, raising aggregate demand. At some point price will fall sufficiently so the downward shift of the saving function and the upward shift of the investment function equate full employment saving and investment at the "trapped" interest rate.[3] We can proceed confident that under Walrasian rules nothing but rigid money wages will prevent an instantaneous move to full employment.

The analysis limits itself to the markets for the commodity, money and bonds. The mechanics of these markets under present assumptions are presented in two diagrams, Figures 7.1 and 7.2. These diagrams show two stages in the equilibrium adjustment process, divided in order to minimize confusion, though this division is purely heuristic. In logic all the adjustments occur instantaneously and there are no steps or stages. With income given, each market can be drawn as a function of the interest rate, and shifts in the schedules are the result of changes in the wealth variable. In each market the relationship between r and the variable in question refers only to the direct impact. The indirect impact of r, embodied in B*/rp) is part of the shift parameter, q = [M*/p + B*/rp].

I use two diagrams to investigate the impact of a change in the money supply on the real variables in the system. The analysis demonstrates that money is not neutral in this version of the neoclassical model, which is the most complete so far. Since this is not a detective story with suspense until the end, the source of non-neutrality can be betrayed at the outset. As shown above, wealth is the sum of money and bonds, both of which are exogenously given. When the money supply doubles, for example, and the supply of bonds remains unchanged, and neither nominal nor real wealth can double. Therefore, a change in the money supply necessarily results in a change in at least one real variable, q.

In Figures 7.1 and 7.2 all variables are price-deflated, not only the familiar investment (i) and saving (s), but also b = B/p and m = M/p. The analysis begins with the schedules marked 0, and the reader is reminded that the labor market remains in full employment equilibrium throughout the analysis. Looking at the two diagrams, one might be initially confused to see that in Figures 7.1b and 7.2b the price-deflated money supply is drawn as a vertical line, while the price deflated bond supply has a negative slope, though the nominal supplies of both are fixed. This is because, given the price level, the value of the money supply is invariant with respect to the interest rate, while the value of bonds decreases as the interest rate increases. Other things equal, a fall in the interest rate is equivalent to issuing more bonds at the same interest rate. This is a rare case in neoclassical theory in which a demand curve is upward sloping and a supply curve downward sloping with respect to a price variable.

With these preliminaries, consideration of the diagrams may begin. In Figure 7.1, from the equilibrium marked with 0, let the nominal money supply double, from M* to 2M*. Prior to any other change, the impact effect of this is to shift the vertical line in Figure 7.1b (representing the real money supply initially at m_o) to point m_1. Measuring along the horizontal axis, the shift is $0m_1 = 2[0m_o]$. The increase in the nominal supply of money sets off shifts for all of the schedules. In Figure 7.1a the saving schedule shifts to the left to s_1, and the investment schedule shifts to the right to i_1.

The result of the shifts in saving and investment is an excess demand for the commodity, because at interest rate r_o, $i > s$ (referring to schedules i_1 and s_1). The wealth

effect also does its work in Figure 7.1b, shifting the demand for money upwards, to md_1. The supply of money doubled, but demand for money does not for a given interest rate. The nominal and real money supplies doubled (M* and M*/p = m), but nominal wealth and real wealth (Q and q) do not double, because the nominal supply of bonds is unchanged. It is the change in wealth that determines the shift in the demand for money. In the next part, Figure 7.1c, the demand for bonds increases, does not double, and the supply of bonds remains the same. Summing up the situation for the shifts, we are left with an excess demand for the commodity ($i > s$), an excess supply of money, and an excess demand for bonds at interest rate r_o.

If the rules of Walrasian markets hold, the excess demand for the commodity results in a rise in its price, and the excess demand for bonds provokes a fall in the interest rate so that bond prices rise. All schedules shift in response to the price change. The real money supply and the real supply of bonds decline toward their respective vertical axes, saving increases for any interest rate, and the investment schedule falls. All of these shifts represent the work of the wealth effect, generated in this second phase by a rise in p, as opposed to the increase in M* in the previous phase. The second wave of shifts is noted with the number 2.

If money is neutral, then the increase, M* to 2M*, should imply an increase of price, from p_o to 2 p_o, with no alteration in any real variable. Let the schedules marked with 2 be associated with $2p_o$. They cannot logically be associated with the same equilibrium interest rate that began the exercise, r_o. Consider saving and investment. The schedule s0 was implied by y_o, p_o, and q(o), when the latter was the following,

$$q_o = [M^*/p_o] + [B^*/r_o p_o]$$

However, the position of schedule s2 is determined by an altered wealth effect. We know by assumption that schedules noted by 2 are associated with price level $2p_o$. Because neutrality cannot be assumed, the interest rate associated with price level $2p_o$ is unknown at this point. Let this unknown interest rate be designated as $r_?$.

$$q_o = [2M^*/2p_o] + [B^*/r_? p_o]$$

In order that no real variables be changed, it is necessary that $r_? = r_o$ and that $q_o = q_o$. If we set $q_o = q_2$ and attempt to solve for r, we discovers that real wealth is unchanged only if the interest rate falls. If the interest rate falls, other real variables must also change. Money is not neutral and the reason should be clear. The nominal supply of money has doubled, but nominal wealth has not (B* is unchanged). No shifting of the schedules can bring back the equilibrium to the initial interest rate after a change in the money supply.

Pursuing further the position associated with a doubled price level, one should note that it would involve a shift in the real money supply back to its original position, $m_o = M^*/p_o = 2M^*/2p_o$. However, the doubling of the money supply and the price level do not leave q unchanged; $B^*/2rp_o$ is less than B^*/rp_o. With real wealth lower than before, the demand for money falls compared with the initial situation. In the bond market real supply has fallen, cut in half should the price level double. If the price level were to double, the result would be an excess supply of the commodity and money, and an excess demand for bonds.

If the reader finds this sequence confusing, the situation can be summarized more simply: from an initial position of general equilibrium, the nominal money supply and the price level double. By definition the real supply of bonds must be cut in half, but the real demand for bonds declines by less than this due to the wealth effect. Thus, the impact of a change in the money supply on the bond market alone requires a fall in the interest rate, for supply has decreased relatively to demand because the demand for bonds is negatively related to the interest rate.

The final equilibrium position is shown in Figure 7.2, with the relevant schedules noted by the number 3. An increase in the nominal supply of money has provoked a wave of once-and-for-all changes. While involving full employment, the new equilibrium bears little similarity to the initial position. The rate of interest is lower, as are the market clearing quantities of m and b. In this model the wealth effect ensures that money cannot be neutral. Each equilibrium is set by the nominal values of money and bonds. In the next chapter explores the implications of non-neutrality. It is no longer true that a change in the nominal money supply results in an equal proportionate change

in the price level. The simple parables of the quantity theory do not hold, in the short run, long run or any run.

Thus betrayed in the financial markets by the mechanism invoked to save the model from Keynes's inconsistency between saving and investment and the liquidity trap, some neoclassical economists sought a solution to salvage neutrality. One possible solution is that bonds be "indexed". This implies that bonds are issued such that their real value is independent of the price level (price of the single commodity, to be precise). This is not a solution to the theoretical problem, because it invokes an arbitrary institutional assumption to extract itself from the undesired results of the model's own logic.

Even if we allowed this convenient assumption, it must be accompanied by additional assumptions even more arbitrary. In order that indexed bonds serve their purpose of rendering real wealth impervious to changes in price, the nominal stock of bonds must be independent of the nominal stock of money. This assumption would contradict both the theory and practice of monetary policy. In advanced capitalist countries the typical instrument used by central banks to affect the money supply is the buying and selling of public sector bonds. A sale of bonus by the monetary authorities has the affect of reducing the money supply by taking money out of the hands of people and banks,[4] the while the purchase of bonds has the opposite effect.[5]

An apparently simple parable that seems obvious, an increase the money supply results in a proportional increase in the price level, has proved impossible to sustain in a model in which Walrasian market-clearing full employment equilibrium is guaranteed.

7.4 Non-neutrality and the Wealth Effect

One finds statements in the neoclassical literature suggesting that neutrality is an inherent property of money, directly derivative from first principles or common sense. For example, Harry G. Johnson, one of the most distinguished monetary theorists of his generation, summarized the neutrality issue as follows:

> Money's property of being desired for its ability to purchase other things results in the property of homogeneity whereby an equal proportionate change in the nominal quantity of money and prices results in no change in behavior. (Johnson, 1972, p. 55)

Despite its distinguished source, this long-standing generalization is false. It suggests that the assumption of valueless money is sufficient unto itself to make money neutral. Or put more explicitly, it asserts that if a model is constructed faithful to the property that money is "desired for its ability to purchase other things", money will be neutral in that model. The model of the previous section was constructed faithful to that property and money is not neutral in it. Neutrality is not an inherent property of valueless money, no matter what presumptions are made about the motivation for desiring it. Neutrality cannot be deduced from first principles. Rather, neutrality or non-neutrality emerges from the interaction of the variables in a model. The neutrality result is the end-product of a general equilibrium solution, and the theorist proceeds invalidly if he or she assumes neutrality at the outset. Neutrality cannot be assumed. This last point will loom large in the discussion below of the New Classical Economics.

As a final point, a warning should be issued about the wealth effect. The wealth effect ensures that there can be a full employment solution to the neoclassical macro model as presented here. However, it cannot he taken as a definitive refutation of the liquidity trap and the inconsistency between saving and investment. The models dealt with in this chapter have an extremely important characteristic, namely that no creditor ever loses the value of a loan; i.e., debtors do not go bankrupt.

If bankruptcy is allowed, private assets are no longer "inside" wealth. To be more precise, they are at some moments, when no bankruptcies occur, and not at others. Bankruptcies represent a potentially powerful effect that renders inappropriate the assumption that changes in the price level result in no distributional shifts between debtors and creditors.[6] Further, one would expect that the distributional effects of bankruptcies would be to reduce the real wealth of agents. If this is accepted as a reasonable working hypothesis, then the wealth effect is seriously undermined. It is the process that activates the wealth effect, falling prices, that is closely associated with waves of bankruptcies in the real world. The wealth effect, like the real balance effect, might be thought of as a convenient logical solution to nagging problems in an abstract model rather than a mechanism of practical significance. However, this book focuses

upon the logic of the neoclassical model, and in subsequent discussion the wealth effect will be taken at face value.

7.5 Stocks and Flows and the Wealth Effect

Quite separate from its impact on the neutrality of money, the wealth effect exposes a fundamental contradiction at the core of the neoclassical macro model. This contradiction arises from the interaction of stocks and flows, on the one hand, and the requirements of achieving full equilibrium, on the other. A short run macro equilibrium requires that all markets be cleared and that all agents be content with the outcome of the market clearing; i.e., that they have no desire to re-contract the exchanges they have made.

Using this standard definition of a static general equilibrium, let us inspect the complete model with the wealth effect. The equilibrium requires that all agents have adjusted to their desired level of wealth. However, it is impossible for this to be the case, because the agents in the standard model are engaging in saving and investment, both of which increase private wealth. Portfolio balance models, which seek to analyze the wealth holdings of agents, resolved this obvious contradiction by assuming zero saving and investment. Logically sound macro models constructed by neoclassical rules would restrict equilibrium, even short run equilibrium, to a steady state in which nominal and real wealth are constant, saving is zero, and no accumulation of the capital stock occurs.

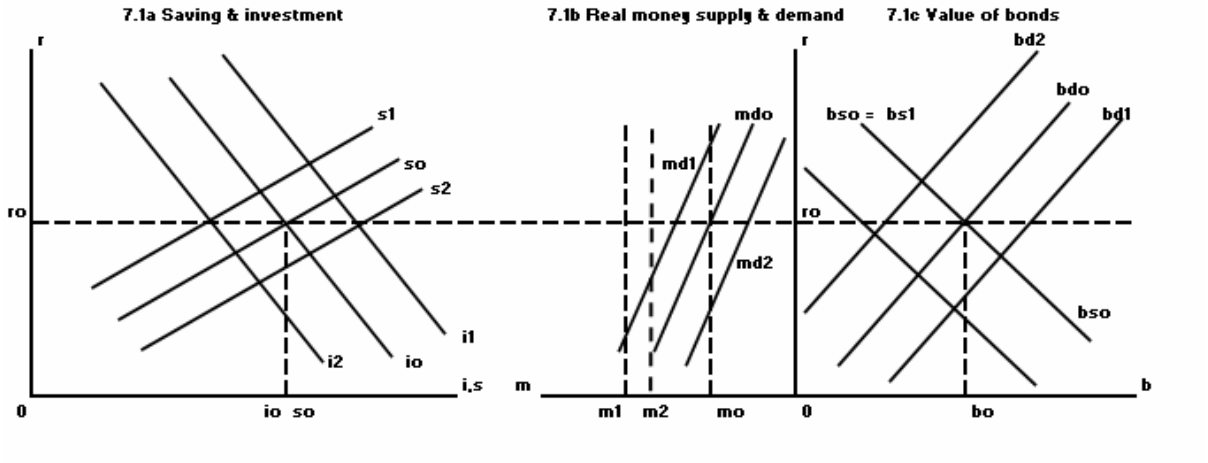
These outcomes are absurd, eliminating all practical relevance the model might otherwise claim.[7] The problem lies not in the wealth effect itself. We have encountered the same problem in the first two chapters, when trying to reconcile short term equilibrium with the growth in the capital stock arising from investment. Neoclassical analysis can and does eliminate the difference between consumption and investment on the expenditure side. However, it cannot eliminate their function in an economy, because the former being eliminated in use, and the latter being the means to produce other commodities.

Therefore, the problem of maintaining the level of desired wealth in short term equilibrium requires establishing an "optimal capital stock". There can be no doubt that such a concept is both implied and required by short run macro models. To put the

matter in simple partial equilibrium terms, the interest rate cannot equate saving and investment unless the desired wealth of savers and desired capital stock of capitalists are realized. But, if they are realized, there is no reason for savers to save or capitalists to invest. Once one considers even these two simple stocks, wealth and productive capital, saving and investment become manifestations of *disequilibrium*.

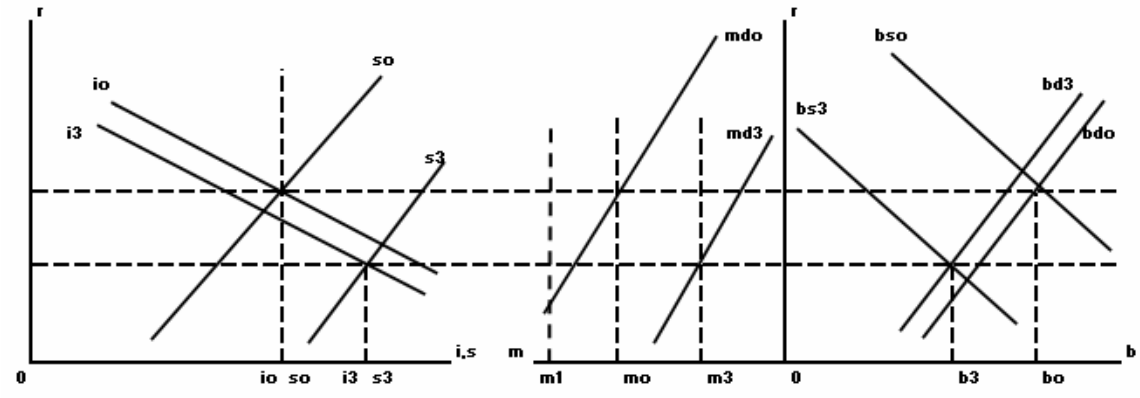
As with other internal contradictions of the neoclassical macro model, the stock-flow inconsistency cannot be resolved within the rules of the model. In order do so, one requires an entirely different type of model, such as those constructed by the Ricardo and Marx, which use the gross output of production, not value added categories.[8]

Figure 7.1 Impact of a change in the money supply in a model with a wealth effect (interest rate constant)



Source: Harris 1981, 248.

Figure 7.2 Impact of a change in the money supply in a model with a wealth effect (equilibria compared)



Source: Harris 1981, 248.

Annex to Part I: Keynes and Aggregation

1 Insights from the Past

Part I provided a critique of the main aspects of the standard neoclassical model. The purpose of this annex is somewhat different, from the work of Keynes to consider an alternative approach to aggregate economic problems. This appendix seeks to encourage the reading of the work of Keynes, above all *The General Theory of Employment, Interest, and Money.* In the first half of the twentieth century Keynes made many of the critiques of neoclassical macroeconomics presented in this book. In the 1950s almost all students of macroeconomics were required to read Keynes. In the 1960s most were. By the 1980s few if any; and subsequently an economist trained in the neoclassical paradigm would be as likely to read Marx as they would Keynes (i.e., never). Much is lost by not reading Keynes, even for those who disagree with him, and the author of this book falls into that category. As well as finding important insights in Keynes, the reader is charmed by his wit and humor.

The tendency in the social sciences to assign students interpretations of great figures in place of the writings of the great figures themselves is insidious. In economics this practice partly reflects a fervent belief that knowledge accumulates and discovery proceeds in a strictly linear fashion. By this view each succeeding generation of economists culls the wisdom and discards the errors from the work of the previous, so at each successive moment we reach a new peak of knowledge and understanding. Every day in every way theory becomes better and more complete (without ever changing any substantial conclusion).

While few sophisticated economists would explicitly voice such a naive and self-serving view of the profession's progress, the vast majority would judge that decades of shifting through *The General Theory* must have resulted in the discovery of all that is valuable in it. Indeed, those few who continue to seek insights from the work of Keynes risk the danger of being accused of ancestor worship.[1] Why read *The General Theory* after over half a century of progress in theoretical macroeconomics?

Keynes himself provided an answer to this question: economics is a science which can accumulate knowledge without gaining wisdom or even understanding. Because of its ideological element, economics is not a science that proceeds primarily on the basis of formulating hypotheses and testing the validity of these against observed phenomena.[2] The different social groups in society find it in their interest to

portray capitalist economies in different ways. Perhaps the most difficult task in understanding economic phenomena is trying to separate the scientific content of each theory from its ideological message.

Because of the strong ideological component in economics, theories which contain valuable insights may be discarded for a considerable length of time because the general orientation of those theories is at variance with the prevailing political climate. The economics of Marx is an obvious victim of political prejudice. Whatever the failings of Marx's analysis may be, it contains a number of important contributions to cycle and growth theory, yet few respectable orthodox economists would explicitly admit to being influenced by the nineteenth-century revolutionary writer. Many of Keynes's basic insights have also been discarded for political reasons. In particular, his conviction that capitalist economies do not automatically tend towards full employment and that it is wishful thinking to treat them as doing so. Such views made and make Keynes theoretically suspect in the profession.[3]

In this annex no attempt is made to present the reader with an interpretation of the "real Keynes". My purpose is to bring together some of his more unorthodox arguments which directly relate to the theoretical critique of neoclassical macroeconomics that I developed in previous chapters. In part the following reinvestigation of Keynes is an unabashed attempt to lend authority to the arguments of this book. But the more important motivation is to indicate the exciting possibilities opened up for aggregate economic analysis when one breaks from the confines of the single commodity, general equilibrium macro model.

2 The Central Theoretical Problem of Macroeconomics

In the preceding chapters I made a critique of the neoclassical approach to macroeconomics, with the purpose of logically refuting two basic parables: that increased employment is achieved through a lower real wage, and that increases in the price level are the consequence of increases in something called the money supply. The critique treated in detail a number of issues and concepts judged as crucial to the neoclassical argument: general equilibrium adjustment, the aggregate single commodity, the autonomous money supply, and the neutrality of money. While the critique has at times been complex and involved, all of the arguments made in this

book stem from a very fundamental theoretical problem which the neoclassical approach fails to resolve in a satisfactory manner.

The fundamental problem of all aggregate economic theory is to relate the money value of production to the material quantity of that production. In an economy with monetary exchange products have a monetary value as well as their diverse material forms. These two aspects of commodities I call their exchange value form and their material form.[4] The essence of macroeconomics is specifying the relationship between the two. This specification involves discovering a way in which the total collection of commodities in their material form can be consistently related to the monetary value of those same commodities. The problem can be illustrated with an apparently trivial example. Assume that an economy produces only two commodities, wheat and beer. Let the production of wheat and beer in the first period be four units and three units, respectively, and three units and four units, respectively, in the second period. In which period is output greater? The difficulty in comparing different collections of commodities I call the valuation problem.[5]

In microeconomics this question does not arises, because each theoretical market and price refers to one commodity. For a single homogeneous commodity output can be measured in physical units of the product. Many markets can be treated simultaneously by use of partial or general equilibrium analysis, and the issue of expressing production or value as an aggregate need not concern the theorist. Macroeconomics is the analysis of aggregates. Therefore its basic foundation is the manner in which many things of great diversity, the material form of commodities, are related as an aggregate.

There are three different aggregates, two of which are strictly empirical. First, there is the collection of commodities in their material form. This collection exists as a real world phenomenon and is an aggregate in the sense that one can conceive of it, all the economy's commodities brought together in a great pile. An aggregate number cannot be assigned to it, because one cannot add tons of wheat and bottles of beer.[6] Second, there is the monetary form of these commodities, which also exists as an observable phenomenon and can be measured in a single number, because one can add the price of wheat and price of beer.

The *sine qua non* of macroeconomics is the discovery of a third aggregate which is the expression of the collection of diverse commodities in homogeneous units, with these homogeneous units independent of the prices used to compute the

total monetary value of commodities. This third aggregate exists for the purpose of allowing for quantitative comparisons of different combinations of commodities. One aspect of such comparisons is assigning a unique value to a given collection, so its quantitative assessment remains unchanged whatever set of market prices may prevail for it. To avoid the ambiguous modifier "real", I shall refer to this third aggregate as the "price-independent" measure of output. The need for such an aggregate in order to create a field called "macroeconomics" is so obvious that elaboration of the concept may seem trivial. However, modern economics hardly deals with this issue at all, or does so only at the most superficial level.

This third aggregate allows one to construct short-run macro models and models of economic growth. On the basis of it we can make statements about the rate of flow of production and changes in society's productive assets. However, unlike the first two types of aggregates *the third is not directly observable.* A beer can be drunk and its price paid, but beer measured in homogeneous units that allow it to be added to other commodities can only be inferred. This third aggregate is an analogue of the material form of commodities, but cannot itself be measured in the physical units one uses to measure each commodity taken alone.

Several great economists sought to specify the nature of this third aggregate with varying degrees of success. Ricardo was the first to treat the problem systematically, with the purpose of deriving a theory of the distribution of income and long-term accumulation. By his attempt to solve the problem of "an invariant measure of value", Ricardo can be assigned the distinction of being the first macroeconomist. His solution involved measuring the output of a diverse collection of commodities in terms of their labor content, though theoretical difficulties which he found insurmountable drove him to use a one commodity model at critical points in his analysis.

The neoclassical treatment of the valuation problem is not without its sophistication and complexity, but either trivial or irrelevant to short-run models. The valuation problem is trivialized by the assumption of a single commodity, as was explained in some detail in Chapter 2. The construction of a one commodity supply side ignores the valuation problem rather than confronting it, creating a system with no relative prices or relative costs.

Neoclassical theory offers another approach to the valuation problem which is not trivial, but has no relevance to aggregate analysis. Assume a two commodity

system with fixed resource endowments. Following neoclassical logic, one can say that output is less than its maximum if all resources are not fully used or fully in a manner which does not involve cost minimization. In this case, more of both commodities could be produced with the given resources. However, maximum output is not unique. Output is at its maximum if all resources are devoted to wheat, all to beer, or all to the infinite combinations of wheat and beer.

The analysis need not stop at this point. On extremely restrictive assumptions, one can construct a "community utility map" or "community indifference curves", which show all combinations of wheat and beer that all economic agents taken together find equally desirable (for each curve the level of community welfare is constant). One can then say that at the point where the wheat/beer production transformation curve, or "production possibilities curve", fixed by technology and the given factor endowments, is tangent to the highest community indifference curve production maximizes community welfare.

Even if one accepts the extremely dubious and *ad hoc* idea of aggregating individual preferences,[7] the result is of little relevance to macroeconomics. With regard to comparisons of less than full employment to full employment, all that can be said is that more complete use of resources results in increased output, though one cannot quantify the increase unless production remains in the same proportions. With regard to full employment positions, all output combinations look alike because even in principle there is no way to know if the community is in equilibrium in its consumption choices.

During the 1950s and 1960s when Keynesians dominated the profession, there was a tendency to create a compartmentalization between macroeconomics and microeconomics, which the anti-Keynesians such as Friedman quite correctly found unsatisfactory on grounds of theoretical consistency.[8] Along with this compartmentalization frequently went a judgment that macroeconomics was more realistic and more relevant to the real world than microeconomics. The latter appeared bogged down in a number of dubious and non-empirical concepts such as utility, perfect competition, and subjective optimization.

It would seem, however, that despite the failings one might find in microeconomics, it has been on stronger theoretical ground than macroeconomics. Even in its early origins as part of monetary theory, neoclassical macroeconomics never resolved the central issue of aggregate analysis: the valuation problem. This

failing did not go unnoticed by Keynes. In the section that follows, Keynes's incomplete and sometimes confusing approach to the problem of aggregate valuation is analyzed. The purpose is not to offer a general interpretation of the work of Keynes, of which there are many. Rather, I demonstrate the profound doubts held by the twentieth century's greatest economist about the basic building blocks of neoclassical macroeconomics, doubts which are quite similar to those raised in this book.

3 Keynes' Views on "Real" Variables[9]

In a comment that has gone relatively unnoticed, Keynes tells the reader of *The General Theory* that it is his goal to provide an integration of the theory of money and the theory of value, a task he felt that his "classical" opponents had failed to achieve or had not seriously attempted. At one level his objection was that Classical economics had by virtue of the dichotomy between real and monetary variables failed to integrate the theory of relative prices with the theory of money.[10] A close reading of *The General Theory,* particularly those parts largely ignored by mainstream economics, suggests that he had ambitions to do something considerably more fundamental: to provide a general theory of a money economy based upon a radically different solution to the valuation problem. This more challenging task that is discussed below.

Among the least read parts of *The General Theory* are the passages that grapple with the problem of valuing aggregate output in monetary and in price-independent terms. The lack of attention to Keynes's discussion of the aggregation and valuation problem is in contrast to his own statement that deciding upon the proper choice of units to measure his aggregate concepts was one of the "three perplexities which most impeded my process" (Keynes, 1936, 37). Throughout this book we have dealt with models specified in terms of "real" variables, real income, consumption, investment, *etc*. At an early stage in *The General Theory* Keynes explicitly rejected such concepts as inappropriate for the construction of economic models.[11]

Real concepts play two quite different roles in macroeconomics that should be distinguished in order to grasp the significance of Keynes's objections. First, there is their role as empirical measures. At one point in time one measures a certain level of

money GNP, for example, and at a subsequent point in time another level. Which involves the greater level of production? Answering this question involves the construction of index numbers about which there is a large and quite technical statistical literature. While no method of construction is ideal, some can be judged as providing more accurate answers to the question than others. Keynes considered this use of "real" variables, more precisely, price-deflated variables, to be valid. However, he warned, and any economic statistician would endorse this, that these were "vague concepts", "avowedly imprecise and approximate", and their use should be limited to cases "when we are attempting historical comparison" (Keynes 1936, 43).[12]

Second, there is the use of "real" categories as elements in an abstract economic model, and to this Keynes objected vehemently, especially to "real income" whose "precise definition is an impossible task".[13] In the construction of his model, Keynes abandoned "real" variables, choosing instead to employ only two units of measure, "quantities of money-value and quantities of employment", and concludes his discussion by saying,

> It is my belief that much unnecessary perplexity can be avoided if we limit ourselves strictly to the two units, money and labor, when we are dealing with the behavior of the system as a whole. (Keynes, 1936, 43)

Formulating models in terms of units of money and labor lead to a radical break with the prevailing economic wisdom of Keynes's time and subsequent neoclassical macroeconomics, though it is not clear whether Keynes realized this. Keynes's objection was to the use of a spurious aggregate measured in physical units. If his objection is sustained, then the aggregate production function must be abandoned. With the aggregate production function gone, capital-labor substitution must also be dropped from the analysis.[14] As we shall see, Keynes did not draw these conclusions from his "choice of units".[15]

Before proceeding with the implications of labor and money as sole units of measure, one should note Keynes's method of abstraction. The reader might wish to refer back to Section 2.1 and the discussion there of two theoretical methods, "abstract ideal" and "abstract simplified". In the first, the theorist begins with mental constructions which need have no direct analogue in the phenomena to be explained. In effect, the theorist reduces complexity, "abstracts", by creating a simple fictitious world of his or her own construction. Neoclassical economics refers to this method as *a priori* reasoning. Output measured in physical units is a purely ideal concept, for it

has no analogue in a functioning economy. In all economies there are physical inputs and physical outputs and a more-or-less established technology that links the one to the other. However, in no economy except in mythology is there an aggregate homogeneous commodity which is both the system's input and output.

Keynes recognized this indisputable fact and quite sensibly concluded that it would be ridiculous to assume the existence of that which cannot be. His choice of money and labor as theoretical quantities indicates use of the abstract-simplified method. These are not concepts created by the mind of the theorist, but categories of actual economies. While neither is a simple category because many things can serve as money and labor comes in many varieties, for all their complexities they are "real" categories in the dictionary sense of the word. Keynes did not create these two abstractions, money and labor, but drew them out of the confusing complexity of reality and assigned them simplified definitions.

4 Keynes's Money Aggregate

Whether or not Keynes was aware of the distinction between ideal abstractions that are creations of the mind and abstractions drawn from reality is difficult to judge, for he gives little explicit treatment of methodology in his writings. However, there is considerable textual evidence in *The General Theory* to suggest that he had a strong intuition that reality should inspire theory. One of the clearest examples is his treatment of aggregate income, which is in sharp contrast to the neoclassical approach. All the models treated in this book begin with homogeneous value added or income, then reach money income as a variable derivative from the price level. In Keynes's view, money income could not be decomposed into the product of "physical output" and "the general price level". In order to understand Keynes's treatment of national income, we must consider the institutional context of his abstract model.

Recall from the first chapter that the neoclassical macroeconomic model is formulated in terms of households or individuals, with all national income representing personal income. This is one of the most fundamental characteristics of the neoclassical macro model, a not very subtle ideological obfuscation of the economic power of business enterprise. Keynes rejected the view that economic models should be formulated in terms of socially undifferentiated economic actors, be they called "agents" or "households". At the outset of his analysis a money economy

is treated as a capitalist economy, whose most important actors are business enterprises, not households.

There is a quite clear reason for this difference between neoclassical models and the model of Keynes. In neoclassical theory economies are treated in terms of notional demand and supply curves, so the system is not demand-constrained. In the absence of demand constraints, the relevant constraints refer to individual choices between income and leisure. In Keynes's demand-constrained system, the crucial actors become business enterprises, and their expectations with regard to the future are crucial. Having conceptualized a money economy with business enterprise at the centre of it, Keynes proceeded to define the components of national income in terms of the cash-flow or net worth position of these enterprises (Keynes (1936, 53-4).[16] By this procedure Keynes sought to extract from the complexity of business transactions that part of cash-flow which represents the net addition to society's production during any time period; i.e., the value added created by the process of transforming intermediate products.

It might be thought that this is an extremely tedious method. Why not begin with a concept of value added in production ("payments to factors") and ignore intermediate costs altogether, since we know that these cancel out in the aggregate? The answer to the question is that the workplaces of business enterprises do not produce value added. They produce commodities in which value added is embodied, and only part of the sales revenue from these commodities becomes factor incomes. By treating income in the context of the cash-flow of enterprises, Keynes's analysis incorporates the characteristic that money economies are composed of commodities. Neoclassical theory, on the other hand, treats economies as systems which produce value added.

It is necessary to elaborate this point, because habits of neoclassical thought are so ingrained that its significance could easily be lost. In neoclassical macroeconomics, costs of production other than those that correspond to factor payments are not merely netted out, they are assumed not to exist. In Keynes's approach, there is an explicit analysis of the netting-out process that allows one to isolate, not begin with, factor payments. Keynes's route to the concept of income results in quite subtle insights. Some of these could make a neoclassical economist feel like a Euclidian lost in a non-Euclidian world.

To demonstrate the theoretical implications of Keynes's procedure, the steps he takes to obtain factor incomes will be briefly explained. Beginning with gross receipts of the enterprise, Keynes subtracts out purchases from other firms. This subtraction eliminates the money value of intermediate inputs. Next Keynes adjusts for changes in the valuation of the enterprise's capital stock, which accounts for that part of the sales revenue covering depreciation. The result of these theoretical calculations, that could also be carried out in practice, is to obtain the net sales revenue which accrues to factors of production.

By proceeding in this way, Keynes broke the definitional equality found in neoclassical macroeconomics between value added and the aggregate production of final commodities (consumption commodities plus investment commodities). In neoclassical theory these two must be equal because there are no intermediate commodities and no changes in the valuation of the capital stock. In practice they are never equal except by chance. In Keynes's analysis the principal reason the two can differ arises from changes in the valuation of the capital stock, Prior to explaining this, let the three money aggregates be clearly defined;

1. total factor income, equal to sales minus intermediate cost, with adjustment for equipment and stocks due to price changes;
2. aggregate supply of final commodities, equal to the market value of consumption and investment commodities; and
3. aggregate final demand, the expenditure by workers and capitalists on consumption commodities, and the expenditure of capitalists on investment commodities.

Keynes argued that the aggregate supply and aggregate demand for commodities (numbers 2 and 3) could differ because of insufficient aggregate demand (some final commodities go unsold). Implicit in his analysis is the possibility that factor income and the aggregate supply of final commodities could differ. The implications of this second inequality are considerably more interesting theoretically than the first.

Assume that a major technical change, such as computerized automation, renders a significant proportion of the economy's capital stock obsolete. Part or all of the depreciation of the obsolete capital stock that is embodied in commodities as money costs cannot be recaptured in the selling price of commodities. Though the depreciation of the capital stock as such cannot be recaptured in the selling price,

money must be set aside by enterprises in order that at some future date the productive stock be replaced with new plant and machinery. The money to do so must be deducted from factor incomes.

In the short term the money will be taken from profits and perhaps in the longer term by forcing wages down. The effect of shifting money from factor payments to the depreciation account is to make disbursed factor payments less than the money value of final commodities. With disbursed factor incomes less than the value of final commodities, some final commodities will go unsold even if all income is spent.[17] This provides an explanation of demand failures somewhat more convincing than Keynes's emphasis upon a declining average propensity to consume. Further, the possible incongruity between final commodity supply and factor income provides a convenient vehicle for treating economic relationships dynamically, particularly the dynamic effects of technical change. While he lays out the possibility of an inequality between aggregate supply and factor incomes in some detail, Keynes does not employ it as an analytical device in his discussion of the determinants of effective demand.[18]

The discussion so far has demonstrated how Keynes sought to define his national income aggregates with reference to the commodity-producing nature of money economies. This attention to commodities also manifests itself in his treatment of the apparently simple category "price". As explained above, Keynes derived factor incomes by taking gross receipts of the enterprise and subtracting out intermediate costs including depreciation. The part of gross revenue which does not accrue to factors of production Keynes called "user cost". As any student of first year economics knows, in neoclassical microeconomics, like at the macro level, output is treated as produced without intermediate products, with capital and labor alone. As a consequence, "marginal cost" is "marginal labor cost". At the micro level firms are treated as producing value added, not commodities. Referring to his concept of user cost, Keynes proceeds to take issue with the orthodox treatment of price theory:

> The concept of user cost enables us, moreover, to give a clearer definition than usually adopted of the short period supply price of a unit of a firms' saleable output. For the short period supply price is the sum of the marginal factor cost and the marginal user cost…
> Whereas it may be occasionally convenient in dealing with *output as a whole to deduct user cost, this procedure deprives our analysis of all reality.* It is habitually (and tacitly) applied to the output of a single industry or firm, since

> it divorces the "supply price" of an article from any ordinary sense of its price… (Keynes, 1936, p. 67)

Keynes's point would be quite obvious were it not for habits of thought induced in economists for generations: the price of a commodity includes all of the elements which go to produce it, be they factor services or inputs of materials. Consider any commodity, such as beer. The price of beer includes labor cost, other factor payments, depreciation on equipment, and commodity inputs such as the bottle, hops, and electricity. Keynes's recommendation is that the production of the beer industry be treated as what it is, the amount of beer produced in a time period, embodying non-factor costs as well as factor costs. This is in sharp contrast to neoclassical microeconomics, where for purposes of analyzing price behavior, the production function for beer is written, q(b) = q(k, n), and q(b) refers to that amount of beer which corresponds to the value added embodied in beer, not the actual production and sale of beer.[19]

The implication of treating prices as what they are, inclusive of all costs, rather than as what they are not, factor costs only, is quite radical. Pursuing this sensible approach leads one to abandon marginal productivity analysis in favor of some version of the labor theory of value or commodity-production models set within an input-output framework. Once there is explicit consideration of intermediate costs, a part of the money value of every commodity is not created in the production of that commodity. Intermediate commodities arrive at the production process with their money value already determined, and this money value is passed on to the final item ("final" with respect to the production process in question).

To put the matter simply, the electricity used to heat the vats in a brewery does not create value added, but represents a cost of production. Once one includes a category of inputs which transmit their money value in production without expanding value, the *raison d'etre* of a value-expanding capital input is lost. Machinery can also be treated as passing its money value on to the final product through use, what Keynes called the "sacrifice" of equipment. It is not obvious why a vat which lasts several production periods should not be treated similarly to electricity and hops in its role in the determination of the price of beer. This was the argument of Ricardo and Marx, that only the labor input generates value added (expands value),[20] and Keynes endorsed this view:

> I sympathize . . . with the pre-classical doctrine that everything is *produced by labor, aided by what used to be called art and is now called* technique, by natural resources which are free or cost a rent according to their scarcity or abundance, and by the results of past labor, embodied in assets, which also command a price according to their scarcity or abundance. It is preferable to regard labor…as the sole factor of production, operating in a given environment of technique, natural resources, capital equipment and effective demand. (Keynes, 1936, pp. 213-14)

Because Keynes did not formulate a theory of price on the basis of the labor content of commodities, it is more precise to say that he is endorsing a labor theory of production and aggregation rather than a labor theory of value.[21] It is by use of labor as a unit of measure that he sought to relate the money aggregates to material production.

5 Keynes's Price-Independent Aggregate

The production of commodities results in the output of a heterogeneous collection of useful products, on the one hand, and an aggregate value that represents their market value, on the other. Keynes discarded a concept of "real" variables, implicitly measured in physical units, as a valid tool for constructing economic models. His proposed solution to the aggregation problem was the "labor unit".

Keynes defined a labor unit to be homogeneous labor performed for a standardized amount of time, one person-day, for example. With this unit he proposed to construct his theory of effective demand. Applying empirically the hypothesis of homogeneous labor is a problem which has plagued practitioners of the labor theory of value for over one hundred years. The first difficulty is that labor is not homogeneous. In order to render labor homogeneous, Keynes proposed that different types of labor be evaluated on the basis of their remuneration.[22]

This is an appealing and simple solution which is adopted by some Marxists and Ricardians. There is very little theoretical justification for it. At the outset it would seem to fail the test which Keynes himself has used to flunk "real income" out of economic theory. This latter concept was rejected by Keynes because of the "...grave objection…that the community's output of goods and service is a non-homogeneous complex", and the same is true of the community's labor force. If this labor force can be aggregated on the basis of relative wages for some base period,

why is not one justified in aggregating commodities using relative prices? Keynes's main defense of the labor unit, that wage differentials are more or less fixed by comparison with commodity prices, is both empirically suspect and suspiciously *ad hoc.*

Keynes's labor unit was from its inception a non-starter, rarely employed even by those most in sympathy with the innovative aspects of his work.[23] The basic problem with the labor unit is that it offers an alternative aggregate measure to that of the neoclassical but keeps the same method. Like the neoclassicals, Keynes in effect created by assumption the element central to his aggregate analysis, homogeneous labor. As a consequence, use of the labor unit appears quite arbitrary. If one is willing to assume labor to be homogeneous, one might as well assume output homogeneous as well.

The attempt by Keynes to provide a fresh solution to the valuation problem immediately ran into trouble when he tried to relate employment in labor units to money output. In specifying the output side of his model, Keynes defined an industry supply curve as follows:

$Z = Z(N)$

where *N* is employment in labor units, Z is the sales revenue, and Q is the output in physical units, so $Z = pQ$.[24]

The aggregate supply function is defined for levels of sales revenue. By definition sales revenue equals price times the quantity of output, $Z = pQ$, but output can only be assigned a number in the case of an industry that produces a homogeneous output. Keynes's case for the adoption of his version of the industry supply curve in place of the familiar neoclassical supply curve is that it can be aggregated across industries to obtain an aggregate supply curve.[25] The usual supply curves cannot be added because they are measured in physical units. The aggregation is achieved, Keynes argued, by summing labor units across industries.

With some regret one must conclude that Keynes's aggregate supply curve was no improvement upon the neoclassical assumption of a single commodity. In order that Z, sales revenue, be unique with respect to the level of employment, at least two assumptions are necessary. First, the price of each commodity produced by the industry must be constant. This Keynes achieved by assuming constant returns to scale and a constant money wage. More important in terms of the "Classical"

(neoclassical) aggregates Keynes sought to discard, his supply function requires that commodities always be produced in the same proportion.

If an industry produces more than one commodity, the amount of sales revenue generated by a certain level of employment will depend upon how much of each commodity is produced. The same restriction carries over to the aggregate supply curve. Given the set of commodity prices, the aggregate supply curve is unique with respect to the number of labor units if and only if the composition of output remains unchanged. If the composition of output remains unchanged, there is no difficulty in measuring "real" output, because such a situation is equivalent to a one commodity system.

In the construction of the aggregate supply function the labor unit becomes superfluous. After an exciting start in his formulation of money aggregates, Keynes provided limited insight into solving the aggregate relationship between the material production of commodities and their market value. His great contribution on aggregation was to point out that the neoclassical approach was theoretically unacceptable.

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[1] I shall use Frank Hahn's definition of neoclassical economics:

> I have frequently…been classified as a neo-classical economist…There are three elements in my thinking which may justify it:
>
> 1) I am a reductionist in that I attempt to locate explanations in the actions of individual agents.
>
> 2) In theorizing about the agent I look for some axioms of rationality.
>
> 3) I hold that some notion of equilibrium is required and that the study of equilibrium is useful. (Hahn 1984, 1)

[2] This analysis is found in Volume II of Capital by Karl Marx. This has with justification been called the "lost" volume (see Weeks 1982, 1983 and 2011).

[3] At the beginning of the twenty-first century there could be some limited hope for a return of "macroeconomics after Keynes" (Chick 1983). Two men with strong Keynesian credentials, Joseph Stiglitz and Paul Krugman, won the Nobel Prise in Economics, a quite surprising result given that the award had been almost monopolised by the right wing of the profession for at least two decades.

[4] Relevant to my plea is a comment by Hahn,

> The most strongly held of my views I have left to the last…It is that neither is there a single best way for understanding in economics nor is it possible to hold any conclusions, other than purely logical deductions, with certainty. (Hahn 1984, 7)

[1] Throughout this book we shall avoid use of the term "goods", which has a strong normative connotation, derived from subjective utility theory in which anything one buys is by definition a source of pleasure and therefore a "good". Instead, we use the neutral and precise terms "commodity" and "product", where a commodity is a product produced for the purpose of selling it.

[2] At the risk of pedantry, the term is placed inside quotation marks. The neoclassical and post-Keynes Keynesian application of the category is arbitrary. Machinery is an intermediate commodity but is treated as "final". The significance of the intermediate/final dichotomy will become clear as the analysis progresses.

[3] The sin of double-counting allegedly results from the error that would result if the exchange of steel between a steel producer and an automobile producer were summed along with the sale of the vehicle itself. This is not an issue of double-counting but of the time period chosen for the analysis. This issue is treated in Weeks (forthcoming, annex to Chapter IV and annex to Chapter XI).

[4] One of these few is Chick, who writes, "…I came to realize that the circular flow and Keynes's treatment of finance and money were not really compatible" (Chick 1983, v).

[5] "The aggregate procedure is . . . as important in determining the properties of an economic model as are the assumptions made about the relationships between the aggregates. . ." (Leijonhufvud 1968, 111).

[6] In the appendix on Keynes it is demonstrated that these are not identities.

[7] Introduction of this lag requires a redefinition of terms so that aggregate demand and aggregate supply can assume different values. For example, $Z(t) = C_t + I_t$, where consumption is $C_t = C(Y_{t-1})$, and the equilibrium condition.., $I_t = S_t$ implies $Y_t = Y_{t-1}$.

[8] An exception is Allen in his mathematical economics textbook of an earlier generation, who suggests the possibility of a production lag, but does not pursue it (Allen 1968, 16-18).

[9] Use of mark-up pricing in models is found in Eichner and Kregel (1975). Macroeconomic treatments with constrained variables are sometimes called "fixed price models". An early version is found in Muellbauer and Portes (1978).

[1] After making no mention of an aggregation problem, Parkin wrote, "This completes the definition of the short-run aggregate production function" (Parkin 1984, 112). Dernburg was considerably more careful (Dernberg 1985, 145-8.) Bronfenbrenner, whose text included non-neoclassical treatments of macroeconomics, made no mention of the aggregation problem when he presented the aggregate production function. (Bronfenbrenner 1979, 220-21).

[2] If all income is made up of wages and profits, then it is obvious that Y = Wn + rK (wages plus profits measured in current prices). The neoclassical adding-up condition asserts more than this definitional identity. Its assertion is that the equality will hold if one substitutes for the commodity wage, w, the value which brings equilibrium to the labour market ($n_s = n_d$) and the interest rate uniquely implied by that equilibrium w. It is this conditional equality which requires the assumption of constant returns to scale.

[3] This is in contrast to the models of Nicholas Kaldor, in which workers have saving rate of zero (from wages) and capitalists save all their incomes (from profits). In the models the latter advance their entire profits on the inputs for the next production period. These models yielded Kaldor's then-famous conclusion, "workers spend what they get, and capitalists get what they spend". Keynes agreed with this fundamental insight, which neoclassical economics ignores.

In the early 1950s, two pioneers of econometrics, Lawrence Klein and Arthur Goldberger, estimated consumption functions in which income data were divided by functional groups - employees, entrepreneurs and farmers. Such studies subsequently were victim to considerable ridicule, with it suggested that distinguishing consumption behaviour by economic class was no more theoretically valid than doing so on the basis of hair colour.

[4] See the seminal article by Smith and a similar treatment by Ackley. In both of these the commodity market equilibrium is treated by use of "IS-LM" curves, which are discussed in Chapter 5 (Smith 1956 and Ackley 1978).

[5] The market-clearing difficulty presented here is in addition to the equally problematical restriction that any exchanges at non-equilibrium prices preclude an equilibrium solution. This difficulty, involving the intervention of the "Walrasian auctioneer", is considered in the next chapter.

[6] Overtime work does not contradict the all-or-nothing character of employment contracts, since one must work full-time before one can work overtime. Part-time work characterizes a minority of the labour force in developed capitalist countries, though it increased at the end of the twentieth century as a result of labour market deregulation.

[7] The usual way of writing the "IS" curve is y = c(y, r) + i(y, r). Chick comments, "... the distinction between consumption and investment…was virtually obliterated..." in the neoclassical model (Chick, 1983, p. 4).

[8] In other words, that it is an object of utility, which we have presumed throughout the discussion.

[9] For an elaboration of the implications of this definition, see Weeks (1981, chapter 2).

[1] Referring to Roy Harrod's definition, Baumol writes, "dynamics should be confined to the analysis of continuing changes as against once-and-for-all changes", and goes on to say,

"Economic dynamics is the study of economic phenomena in relation to preceding and succeeding events" (Baumol 1959, 4).

[2] "[T]here is no theoretical evidence to suggest that the invisible hand performs better 'asymptotically' than it does 'momentarily'. . ." (Hahn 1984. 98). "Momentarily" here means instantaneous market clearing.

[3] Some have concluded "none", arguing that the synthesis model is formulated in a way which makes money useless as a theoretical concept (Harris 1981, 289ff.).

[4] Once we explicitly introduce Walrasian general equilibrium mechanisms into the model, it will no longer be possible for only one market not to clear.

[5] One might argue that the disappointment of buyers takes the form of labour services which go unsold, since a shortfall in the barter of the single commodity must correspond to a shortfall in the barter of labour services to produce the unbuttered commodity. However, this ignores the notional demand of employers for the single commodity, as an item of present and future consumption.

[6] See Begg (1982), where "continuous market clearing" is used throughout.

[7] This is explained in Toulmin and Goodfield (1961, chapter 7).

[8] One must keep in mind that disequilibrium does not refer to a situation in which trades have taken place, but to a situation in which some agents are dissatisfied, but no one has committed himself or herself.

[9] Leijonhufvud argues that Walras' Law and Say's Law, which is Walras' Law defined over commodity markets only, do not imply anything about market clearing. However, if the Law is accompanied by the omniscient auctioneer, market clearing is implied.

[10] "[T]he recent meaning given to equilibrium (and disequilibrium) has had quite disastrous effects. Equilibrium is defined as Walrasian competitive equilibrium or a rational expectations equilibrium. All other states are said to be in disequilibrium." (Hahn, 1984, pp. 8-9.).

[11] See for example, Arrow and Debreu (1954) and Debreu (1959). Hahn wrote, "The main conclusion [about Walrasian general equilibrium] is rather pessimistic: we have no good reason to suppose that there are forces which lead the economy to equilibrium. By that I mean we have no good theory" (Hahn, 1984, p. 13).

[12] Except in rare cases, the utility functions of consumer theory invoke the homogeneity postulate, as does the theory of the firm. Aggregates based upon such micro foundations must also incorporate the postulate. While Walras' Law need not involve the homogeneity postulate, if it does not it is inconsistent with the usual supply and demand analysis.

[13] Despite the artificial and ideal character of the Walrasian solution to market clearing, the mechanism is treated with considerable respect in the economics profession. Leijonhufvud, a severe and sometimes polemical critic of Walrasian general equilibrium models, writes,

"Walras, Marshall, *et al.* had left a by-and-large satisfactory solution to the problem of the determination of prices for “final” outputs and factor services and the allocation of resource flows under the (arbitrary) condition of “fixed” resource endowments." (Leijonhufvud, 1968, 214, quotation marks around "final" in original)

[1] The definition is taken from Harris (1981) p. 43. We have added only the words "full employment" to make more explicit the nature of the equilibrium state.

[2] Neoclassical writers define money as anything generally accepted as "means of payment". We do not employ this term in this book, for it was used in the quite differently by Ricardo and Marx. See Weeks (1981).

[3] In Ackley (1978) one finds only passing reference to any controversy over the money supply. Branson (1972) has a three-page treatment of the relationship between central bank lending and commercial bank response, a method of approach a leading monetary theorist called "a mechanistic analysis of the determination of the money supply, very similar to the outmoded treatment of velocity" (Johnson, 1974, p. 41). No reference to the controversy is found in Shapiro (1974) or Gordon (1981).

[4] See the report commissioned by the British government on the effectiveness of monetary policy, the Radcliff Committee report (Radcliff Committee 1959).

[5] This will be discussed later in this chapter. The proportional relationship between prices and the money supply need not imply that the homogeneity postulate holds

[1] "…[A] theory of money, if it is to be consistent, requires that supply be determined independently of the demand for money. And if the theory is to be of use, it must allow that the central bank (“monetary authorities”) can control the quantity of money in the hands of the public" (Johnson 1972, 136). This independence of supply is necessary for a demand theory of *valueless* money, not a general requirement of a theory of money.

[2] If capital is mobile across industries, then there will be a tendency for the rate of return to equalize for all commodities. This theoretical rule would also apply to the commodity serving as money. Thus, all other commodities would have to exchange against the money commodity such as to bring about this equalization. An increase in the cost of producing money would then lower all prices and vice versa.

[3] The contradiction between Walras' Law and the quantity equation was first pointed out by Patinkin (1965, chapter VIII).

[4] See the discussion of the debate over the real balance effect in Johnson (1974, 17-21). Notwithstanding the virtually universal agreement among neoclassical monetary theorists that the real balance effect in some form (e.g. as the Pigou effect, considered in Chapter 4) is critical for logical consistency in adjustment to equilibrium, it is not unusual for textbooks in macroeconomics to ignore it and proceed on the basis of internally inconsistent models. See

Branson (1974 107ff), where the demand for cash balance is defined in real terms (M/p), but consumption and investment are functions of the level of output/income and the interest rate only.

[5] The quotation is from Branson (1972, 62). This quotation is a latter-day version of Pigou's famous reference to money as a "veil". (Pigou 1941, 20-27.)

[6] And the inconsistency takes yet a third form when the Pigou effect replaces the real balance effect.

[7] Referring to this, Chick wrote,

> The definition of the money supply. . . is neither a question of abstract principle, to be decided by theoretical controversy, nor an empirical matter, to be decided on the basis of statistical estimates of substitutability [among different empirical categories of money]. It is a practical matter, a free and always somewhat arbitrary choice, based on the judgment of the investigator, of the aggregate most relevant to the problem he is attempting to answer (Chick, 1979, 13-14).

Among books on monetary theory, Chick's still provides the clearest and most thorough treatment of the controversies surrounding the presumption of an autonomous money supply.

[1] See, for example, Ackley (1961, chapter VI); and Shapiro (1974, chapter 17). The inconsistency goes unmentioned in more recent textbooks as well, as shown in the treatment of inflation.

[2] Since the exponents add to one, $[a + (1 - a)] = 1$, the function is characterized by "constant returns to scale"; i.e. if from any initial level, the inputs are doubled, output/income also doubles. This implies $y = wn + rk$, and that $py = Wn + rpk$. Refer back to the discussion of the "adding up" equation in Chapter 2.

[3] A firm takes the market price as given if there is perfect competition. Walrasian markets presume perfect competition.

[4] The simplicity of the solution derives from the special property of the Cobb-Douglas function that the exponents are equal to the income shares of the variables they are associated with; i.e., $wn/y = Wn/py = (1 - a)$, and $rk/y = rK/py = a$.

[5] Also implied is a negative relationship between employment and the money wage. This "trade-off" is the result of diminishing returns combined with the quantity equation.

[6] This has been established in the Cambridge Capital Controversy, treated in Chapter 10.

[7] The new classical economics would appear to deny that increasing the money supply can raise the level of employment. However, their conclusion is the result of arbitrarily assuming that all markets quickly and instantaneously equilibrate. Obviously, if the labour market is always in full employment equilibrium, increasing the money supply will not increase employment. This approach is dealt with in Chapter 9.

[8] The other two exceptions are rigid money wages, discussed above, and the "liquidity trap", considered in Section 6.3. Leijonhufvud argued that neither of these two can be found in *The General Theory* (Leijonhufvud 1981, 53-4).

[9] In Figure 5.4 it is assumed that saving was interest inelastic and investment is unrelated to current income. The same point can be demonstrated if both saving and investment are interest elastic. A clear, if rather old, treatment is found in Ackley (1961, 193-95).

[1] "Money illusion" is defined as behaviour by an agent in which a real variable (M*/p in this case) is affected by a change in a nominal variable (p or M* in this case). Leijonhufvud has a low opinion of the concept of money illusion, calling it a "fudge-phrase". His objections are treated in Chapter 11.

[2] The consistency is demonstrated below for the Real Balance Effect model, using the same notation and framework as in note 2, above. The Classical (real balance effect) case is:

$M_d = vpy - fM_*$ $\qquad$ $y_d = c + i$

$M_{xd} = vpy + fM_* - M_*$ $\qquad$ $M_{xd} = py_{xd}$

$M_{xd} = vpy - [1 - f]M_*$ $\qquad$ $M_{xd} = py - p[c_* + by + gM_*/p + i]$

$M_{xd} = p[vy] - [1 - f]M_*$ $\qquad$ $M_{xd} = p[y(1 – b) + (c^* + i)] – gM^*$

In both cases a change in the price level affects the first term and leaves the second term involving M* untouched.

[3] Clower and other post-Keynesians argued that in disequilibrium unemployment can result even when the real wage is at the level consistent with full employment general equilibrium; i.e. when notional supply and notional demand are equal. This is explained in Chapter 11.

[4] Recall that p(e) = [1 - f]M./vy(e). The intercept of the consumption function can have only one value given the marginal propensity to consume, which is its slope). This is shown below.

$$c(e) = C_* + by(e) + gM^*/p(e)$$

$$c^* = c(e) - by(e) – gM^*/p(e)$$

The intercept of the saving function is -[c*], which is not a true parameter. It changes with the variables of the model and has a unique and non-arbitrary value in equilibrium.

[5] The model presented in this section is virtually identical to that in Smith (1956). Smith's diagrammatic technique subsequently became common usage until replaced by IS-LM diagrams. The model is neither complete nor Keynesian, as will be shown in this section.

[6] Assume one buys a bond for $100 that has a yield of 5 per cent. If the interest rate on bonds rises to 10 per cent, then one can purchase a 5 per cent yield for $50. As a consequence, the owner of the original 5 per cent bond will find that while that bond has a face value of $100, it

will fetch only $50 when sold in competition with 10 per cent bonds. This assumes all other factors unchanged, of course.

[7] In "portfolio theory" there is an *a priori* determination of the optimal composition of an individual's wealth holding (money, bonds, etc.) on the assumption of utility maximization. See Harris (1981, chapter 10), for a treatment of the transactions, precautionary, and speculative demands for money within this framework.

[8] As in the case of the familiar supply and demand curves for a single commodity, the stability of an equilibrium point for the IS and LM curves depends upon the slope of each, presuming the parameters to be given. If one curve is downward sloping and the other upward sloping, the equilibrium is stable without qualification. If both have a positive slope or both have a negative slope, stability depends upon the slope of one curve relatively to the other.

[9] Keynes explicitly deals with the fundamental differences between a barter system and a money economy in Chapter 17 of *The General Theory*. Some would argue that this is the most important chapter of the book.

[10] As in the previous section, the two are compared below. The demand for bonds is B_d and the supply B*, where the latter is given. For a fixed money supply implies a fixed supply of bonds.

$M_d = pvy + p[h - jr]$ $\qquad$ $py_d + B_d = p[c + i] + B_d$

$M_{xd} = pvy + p[h - jr] - M^*$ $\qquad$ $- py_{xd} + B_{xd} = py - p[c + i] + [B^* - B_d]$

$M_{xd} = pvy - p[jr + h] - M^*$ $\qquad$ $M_{xd} = p[y(1 - b) - (c^* + i^*)] - [B_d + B^*]$

In the last equations both respond in the same way to changes in the price level, the interest rate, and the supply of money, because a change in M* is a result of a change in B*.

[11] The algebraic solution begins by substituting the demand for labour equation,

$$n_o = (1 - a)y_o[p_o/W^*]$$

into the production function, thus eliminating n_o for the moment. With y_o a function of a number of parameters and the yet-to-be-determined price of the single commodity, one moves on to the IS curve where y_o is eliminated. The IS curve provides the substitution for the interest rate, with the result that the LM curve directly yields price as a function of many parameters, among which M* and W* are the most crucial.

[12] The inequality of saving and investment does not directly bring about a rise in the interest rate in this model. Interest rate adjustment is elaborated below, in the discussion of the liquidity trap.

[1] The Liquidity Trap concept is commonly attributed to Keynes. As noted above, Leijonhufvud argues that it is not to be found in *The General Theory.* Be that as it may, its inspiration comes from Keynes's stress upon the volatility of the demand for money.

[2] The liquidity trap concept fell about of favour in the 1970s (or earlier), tending to be viewed as a Keynesian curiosity. However, it would return to haunt the neoclassicals in the 1990s when interest rates in Japan fell to zero, and at the end of the 2000s when interest rates in the United States also approach zero. In neither case did these negative real interest rates rejuvenate investment.

[3] The relevance of the liquidity trap to the global financial crisis at the end of the 2000s is discussed by Liejohufvud (Liejonhufvud 2008, 2).

[1] Central to the debate is whether economic agents discount the future stream of taxation necessary to finance the interest payments on state bonds. If so, bonds are "inside". Such an analysis involves a truly heroic presumption about the absence of distributional effects, since in general bond holders (the wealthy) are better at evading taxes than non-bond holders.

[2] If the supply of labour were a function of the interest rate it would be no less valid to presume full employment, but full employment output/income would no longer be unique. This point will be clear later in the discussion of neutrality.

[3] To reduce complications, we have ignored the impact of price upon the demand for money and bond schedules.

[4] This assumes that the money supply is exogenous. See discussion in Chapter 4.

[5] The normal operation of a capitalist economy no more dictates that bonds be indexed than that money itself should be. Were a government to pass a law making the issuance of non-indexed outside bonds a criminal offence, the wealth variable would be as follows:

$$q = M_*/p + pB^*/rp$$

In this case in which the state attempts to legislate the neutrality of money, a doubling of the nominal money supply and price leaves q unchanged. However, if M. is increased by the purchase of bonds, then B_* decreases (people sell them to the state), so q is changed by virtue of increasing the money supply. To legislate neutrality, the state must not only prevent the issuance of non-indexed bonds, but amend the charter of the Central Bank to restrict "open market operations".

[6] Hahn provides a clear and concise discussion of the implications of bankruptcies. At the end of the treatment, he writes, "I conclude from all this that the assertion that the "Pigou effect" ensures the existence of an equilibrium is unproven" (Hahn 1965, 135*).*

[7] Kenen agreed, albeit in milder words:

> [T]he [portfolio] model…is still too simple to be realistic. There is no capital formation (investment). The government balances its budget…Interest payments are ignored…The demand for money depends on interest rates and wealth but not on income. (Kenen 1994, 449)

[8] It is beyond the scope of this book to discuss such models. Their essential feature is that the outputs of one period become the inputs of the next period (see Weeks 1981, and Sraffa 1960).

[1] Leijonhufvud provides a humorous critique of the tendency of economists to ignore their theoretical forebears in his satirical essay, "Life among the Econ" (Leijonhufvud, 1981).

[2] Speaking of the economics profession, Keynes wrote,

> [A]lthough the [theoretical) doctrine itself has remained unquestioned by orthodox economists up to a late date, its signal failure for purposes of scientific prediction has greatly impaired, in the course of time, the prestige of its practitioners. F or professional economists. . . were apparently unmoved by the lack of correspondence between the results of their theory and the facts of observation; a discrepancy which the ordinary man has not failed to observe, with the result of his growing unwillingness to accord to economists that measure of respect which he gives to other groups of scientists. . . (Keynes,1936, p. 33)

[3] Keynes did not make himself popular among his opinions by his liberal use of ridicule. For example,

> The celebrated optimism of traditional economic theory, which has led to economists being looked upon as Candides, who, having left this world for the cultivation of their gardens, teach that all is for the best in the best of all possible worlds provided we will let well alone. . . . It may we11 be that the classical theory represents the way in which we should like our Economy to behave. But to assume that it actually does so is to assume our difficulties away. (Keynes, 1936, 33-4)

[4] Marx used the terms "exchange value" and "use value".

[5] It could be called the *aggregation* problem. While I have no desire to contribute to the proliferation of unnecessary terms, "aggregation problem" is a phase commonly used in mainstream economics in a quite narrow and restricted sense. My use of an alternative term avoids potential confusion.

[6] The problem is not one of finding a common unit of measure. Wheat and beer could be weighed and added together, but the resultant "aggregate" measure would be nonsense except for purposes such as ensuring a vehicle was not overloaded.

[7] Derivation of community indifference curves is unnecessary for the current discussion. The simplest conceptualization is to assume that all economic agents have the same utility function, so a community of people can be treated as an individual.

[8] [8] Theoretical objections to the apparent incompatibility of macro- and microeconomics resulted in the "micro foundations" literature. This literature sought to construct a macro

theory consistent with microeconomics (and certainly not the reverse), and can be seen as a precursor to the new classical economics. Particularly influential was Phelps *et al.* (1970).

[9] The rest of this chapter draws upon a longer treatment of Keynes's views on valuation and aggregation. See Weeks (1988). The chapter is mis-titled, "Value and Protection in the *General Theory"*, rather than the correct, "Value and Production in the *General Theory*".

[10] Keynes wrote,

> So long as economists are concerned with what is called the Theory of Value, they have been accustomed to teach that prices are governed by the conditions of supply and demand. . . . But when they pass. . . to the Theory of Money and Prices, we hear no more of these homely but intelligible concepts. . . (Keynes, 1936, 292)

[11] Referring to "real" variables and using the terminology of his time, Keynes wrote,

> The National Dividend, as defined by Marshall and Professor Pigou, measures the volume of current output or real income, and not the value of output or money income. . . . But it is a grave objection to this definition for such a purpose [use in economic models] that the community's output of goods and services is a non-homogeneous complex which cannot be measured, strictly speaking, except in certain special cases, as for example when all the items of one output are included in the same proportions in another output. (Keynes, 1936, pp. 37-8)

[12] In a characteristic display of his rather wry sense of humour, Keynes wrote,

> To say that net output to-day is greater, but the price-level lower, than ten years ago or one year ago, is a proposition of a similar character to the statement that Queen Victoria was a better queen but not a happier woman than Queen Elizabeth - a proposition not without meaning and not without interest, but unsuitable as material for the differential calculus. Our precision will be a mock precision if we try to use such partly vague and non-quantitative concepts as the basis of a quantitative analysis. (Keynes, 1936, p. 40)

[13] He also rejected the closely-related concept of the "general price level" (Keynes, 1936, 39).

[14] There are no units, including units of labour, which will produce well behaved aggregate capital-labour substitution, i.e. no re-switching, in response to changes in the real wage. A non-technical explanation is found in Fine (1980, chapter 5).

[15] The chapter in which Keynes discusses aggregation and valuation is called "The Choice of Units", but would be more accurately be entitled "Choice of Method".

[16] In the discussion which follows a simplified version of Keynes's procedure will be presented in order not to raise unnecessary complications.

[17] This phenomenon, which Marx called the "moral depreciation of capital", is discussed in detail in Chapters IX and X of Weeks (2011).

[18] Devaluation of the capital stock as a consequence of technical change plays a major role in Marx's treatment of demand failures. See the discussion in Weeks (1982, chapters VII and VIII).

[19] When neoclassical economists carry out empirical studies at the firm or industry level they may include intermediate commodities on the supply side and treat output in the usual sense. The point is that the abstract theory of price teaches one to think of price determination in general as if each firm produced only value added.

[20] Use of labour as the basic ingredient of value theory involves certain analytical difficulties which led some non-neoclassical economists to abandon it in favour of a price theory based upon inputs (including labour) which cannot be directly aggregated. This approach, which sometimes referred to as "the production of commodities by means of commodities", involves measuring total output in terms of a concept called "the standard commodity". The standard commodity is a collection of commodities such that when it is introduced into an input-output system as an input, yields an output precisely like the input with regard to the proportions of each commodity in the collection. See Sraffa (1960).

[21] Keynes concludes the quoted paragraph by saying that his sympathy for the doctrine that everything is produced by labour "partly explains why we have been able to take the unit of labour as the sole physical unit which we require in our economic system, apart from units of money and time" (Keynes, 1936, 214).

[22] Keynes wrote:

> [I]n so far as different grades and kinds of labour and salaried assistance enjoy a more or less fixed relative remuneration, the quantity of employment can be sufficiently defined for our purposes by taking an hour's employment of ordinary labour in proportion to its remuneration…We shall call the unit in which the quantity of employment is measured the labour-unit… (Keynes 1936, 41)

[23] For example, Joan Robinson agreed with Keynes about neoclassical "real" aggregate, "*The* volume of output and *the* purchasing power of money are metaphysical concepts". However, in her famous book on growth theory, she does not use the labour unit, but assumes that consumption and investment commodities are produced in an unchanging proportion (Robinson 1969, 22).

[24] The definition of Z given by Keynes is confusing: "…where Z is the return the expectation of which will induce a level of employment N" (Keynes 1936, 44). The sentence structure suggests that one should write, N = N(Z).

[25] The supply curve for the firm under perfect competition is the marginal (labour) cost curve above the "break-even" point. The industry curve is the sum of all firm supply curves.