INTRODUCTION

TO ABRIDGED EDITION OF

MONEY, INTEREST, AND PRICES

by

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Abstract

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Introduction to Abridged Edition[1]

It is gratifying that a quarter-of-a-century after the publication of the second edition of this book, it continues to be on reading lists of graduate courses in macroeconomics. The book having gone out of print, it is now reprinted to make it available once again to students. In order to make the book more accessible to them, the third part of the original book -- namely, the "Supplementary Notes and Studies in the Literature," which constituted about one-fifth of it, and which experience has shown was not much consulted by students -- has been omitted. At the same time, the contents of this part are still listed in the Table of Contents so that the student who wishes to do so can pursue his interests in them in the library. I shall accordingly feel free to refer to some of them in what follows. With the exception of Note K on "Keynes' General Theory" -- a subject on which I have written much in the past years (see my 1976 and 1982 books) -- I have not done any further work on the subject matter of these Notes, and hence have little to change or add to them today.[2]

This reprint thus consists of the text and Mathematical Appendix of the original work, reproduced unchanged. To attempt to revise them so as to take account of the far-reaching changes that have taken place in macroeconomic theory during the past twenty years would mean to write a new and different book, and this book as it stands has assumed a life of its own which I do not in the present context wish to disturb. The primary purpose of this introduction is instead the limited one of indicating the major ways in which -- within the conceptual framework of this book -- I have subsequently revised or supplemented its analysis. I shall also discuss issues that have arisen with reference to my disequilibrium approach to macroeconomics, as well as to my use of the money-in-the-utility-function approach to the demand for money.

Though this Introduction is not a survey of developments in macroeconomic theory since the publication of the second edition, I cannot refrain from expressing a disappointment about them that is undoubtedly shared by many others: namely, the disappointment that many of the macroeconomic issues about which differences of opinion existed at that time, as well as others which have subsequently arisen, still remain unresolved. That is *la condition scientifique* of our discipline: its inability in all too many cases to reach definitive conclusions about theoretical questions on the basis of empirical studies, an inability which increases directly with the political significance of the question at issue.

1. *Disequilibrium macroeconomics*. I begin with the first of the aforementioned issues, and with some recollections. I think it fair to say that this book is best known in the profession for its development of the notion of the real-balance effect, and for the systematic integration of this effect into both micro- and macroeconomics theory. In the Introduction to the first (1956) edition, however, I stated that "there is a second major theme which deals with the monetary theory of an economy with involuntary unemployment ... developed by Chapters XIII-XIV," a statement repeated in the Introduction to the second edition as well (see below). For a long period before the writing of the first edition I had been puzzled by the apparent contradiction between the intuitive feeling, on the one hand, that there was a connection between a firm's product-output and its labor-input; and the traditional demand curve for labor, on the other hand, which did not depend explicitly on output and whose sole independent variable was the real

wage rate. The answer that I finally proposed in Chapter XIII of that edition (a chapter which was reproduced unchanged in the second edition, and hence in this one as well), and which in part goes back to an earlier (1949) article, was that the traditional curve -- that is, the firm's demand curve for labor derived from profit maximization under conditions of perfect competition -- reflects its assumption that just as it can buy any amount of labor it desires at the prevailing wage rate, so can it sell all of the resulting output at the prevailing price. Correspondingly, when because of inadequate aggregate demand this assumption is not fulfilled and firms can only sell a smaller output (i.e., when, in the terminology which subsequently developed, firms are faced with a quantity constraint on the amounts they can sell), they will also purchase a smaller labor-input than that indicated by the demand curve generated under conditions of perfect competition, which is a major factor in the generation of unemployment (see especially pp. 318-23 below). And despite the analytical problem which it entailed (see p. 323, n. 9), I at the time considered that proposition to be a major contribution of the book; and in the second edition (1965, p. 670), I expressed my regret that this problem had not yet been solved.

In graphical terms, this situation is represented in Figure XIII-1 (p. 316 below) by the difference between the firms' hypothetical perfect-competition profit-maximizing demand curve for labor $N^d = Q(w/p, K_0)$ and their effective demand as described by the kinked curve TAN_1 (see pp. 321-22 below). Chapters XIII:2 and XIV:1 then make use of this diagram to elaborate upon the basic view that I had expressed in a yet earlier work: namely that the Keynesian theory of unemployment must be interpreted as dealing not with a situation of static equilibrium, but with one of dynamic disequilibrium (see Patinkin, 1951).

It was therefore a source of disappointment to me that what I considered to be a major novelty and contribution of the book found little echo in the literature of the years which followed. This situation, however, began to change with the related publication of Robert Clower's "The Keynesian Counterrevolution: A Theoretical Appraisal" (1965) and Axel Leijonhufvud's On Keynesian Economics and the Economics of Keynes (1968). The contention of Chapter XIII about the relation between the inability of firms to sell planned product-output and their consequent unwillingness to carry out planned labor-input became a central theme of Leijonhufvud's book (ibid., Chapter 2). On the other hand, Clower's article (which to a large extent took the 1956 edition of this book as its point of departure) was in effect devoted to the obverse side of this contention: namely, that if workers were not able to sell all the labor they planned to sell at the existing wage rate as indicated by their "notional" supply curve of labor (which was Clower's term for what in Chapter XIII:1 is called the perfect-competition curve as depicted by $N^s = R(w/p)$ in Figure XIII-2), then they would also not have the means that would enable them to buy the quantities of commodities indicated by their "notional" demand curves for them.

Clower also rightly emphasized that it is this situation which provides a rationale for the consumption function of Keynes' General Theory, in which income appears as an independent variable (see also Lindbeck, 1963, pp. 33-34). Under perfect competition the individual's income is also a dependent variable, determined by the optimum quantity of labor he decides to sell at the given real wage rate; and he makes this decision simultaneously with the one with respect to the optimum quantities of commodities to buy. If, however, circumstances prevent him from selling his optimum quantity of labor, the individual can decide on his demands for commodities only after learning what quantity of labor he has succeeded in selling: that is, only after his level of income has been determined. This is the so-called "dual decision hypothesis" (Clower, ibid.) To this I would add that this situation also provides a rationale for the form of the Keynesian liquidity-preference function, which of course also depends on income.

In any event, Barro and Grossman (1971, 1976) subsequently combined the labor-market analysis of Chapter XIII with Clower's commodity-market analysis to provide a more rigorous analysis of a disequilibrium economy. This was further developed by Benassy (1975), Grandmont and Laroque (1976), and Malinvaud (1977). More generally, there grew up at this time a whole literature -- most of it highly technical -- on the determination of equilibrium under quantity constraints, and on the related question of economic behavior in a regime of fixed prices (see the surveys of this literature by, e.g., Drazen [1980] and Benassy [1987]).

Admittedly, disequilibrium macroeconomics is confronted with a dilemma: on the one hand, it conforms with our observations of a real world with prolonged periods of unemployment at significantly higher rates than what might reasonably be considered to be (in Friedman's [1968] term) the "natural rate of unemployment" (cf., e.g., Murphy and Topel, 1987); on the other hand, it suffers from basic analytical problems exemplified by the one described on p. 323 (fn. 9) below: namely, that it seemingly violates the assumption of rational economic behavior. This last consideration has led to its rejection by the "new classical macroeconomics". In the past decade, however, there has been a "New Keynesian Revival" which on the basis of various assumptions has rationalized the seemingly irrational.[3]

Thus analyses based on the assumption of imperfect competition have shown how the level of aggregate demand can influence output and hence

Again, the "efficiency wage," "insider-outsider," or other approaches that attempt to explain rigidity of real wages, together with some empirical studies which conclude that the real wage is indeed more or less constant over the cycle,[4] might be interpreted as reflecting the existence of a demand curve for labor as a function of the real wage which is horizontal over the relevant range. The actual level of employment would then be determined (particularly under the assumption of imperfect competition) as the one necessary to satisfy the aggregate demand for output. This would accord with the "more Keynesian than Keynes" interpretation of involuntary unemployment described on pp. 340-41 below. Note that in this case flexibility of money wages does not imply flexibility of real wages: that is, if a decline in money wages and prices generates an increase in aggregate demand and hence employment (via the effect of the increased real money balances on the rate of interest and/or via the real-balance effect itself), the real wage as determined by the demand curve for labor would remain unchanged.

Another example of this "Revival" is the application by Cooper and John (1988) of a game-theoretic approach to demonstrate rigorously how lack of coordination can generate unemployment. I find this particularly interesting because the problem caused by lack of coordination was a recurrent theme of Keynes' writings from the 1920s on (for details, see Patinkin, 1976, pp. 122-23; 1987a, p. 32). Thus in the <u>General Theory</u> Keynes emphasized that in a free-market economy it is unrealistic to expect "concerted action" by labor to reduce money wages "to whatever point was required to make money so abundant relative to the wage-unit that the rate of interest would fall to a level compatible with full employment," and that accordingly "it is only in a highly authoritarian society, where sudden, substantial, all-round changes could be decreed that a flexible wage-policy could function with success" (*ibid.*, pp. 267, 269).[5] For (Keynes felt) were it possible to carry out such a coordinated and instantaneous wage reduction, then at no instant of time would there be a change in relative wage rates as between workers in different industries, a change which they would resist; and the reduction would be over before it could create adverse expectations (*ibid.*, pp. 14 and 265). In brief, the "authoritarian government" could improve upon the Walrasian auctioneer by instantly bringing the economy to full-employment equilibrium, without the aid of a *tâtonnement*!

Having referred to the "natural rate of unemployment", I would like to point out the misleading nature of this now widely-accepted term: for it has the connotation of a rate that is "naturally" -- that is, in the natural course of events, and without too much difficulty -- established by the automatic workings of the economic system. But this implication is at variance with the prolonged periods of high unemployment that have already been noted. Thus the term "natural rate of unemployment" begs the basic policy question which Keynes raised in the *General Theory* and which is elaborated upon in Chapters XIII-XIV below: namely, whether one can in practice rely on the "self-adjusting character of the economic system" for the achievement of full employment, a question which (for reasons explained in Chapter 19 of his book) Keynes answered in the negative.[6]

2. *Walras' Law*. There is one further point about disequilibrium macroeconomic models that I would like to make. In footnote 22 on p. 333 below, I expressed some hesitation about applying Walras' Law to such a situation. In his 1965 paper, Clower went further and claimed that it then no longer held (*ibid.*, pp. 122-23). Only recently, however, have I returned to this question, and as a result have realized that there was no reason for

my hesitation: that a proper formulation of Walras' Law holds in all situations. What I mean by such a formulation is one that sums up over all markets in the economy excess-demand equations that are consistently derived from the same type of budget constraint: that is, excess-demand equations all of which reflect the possible influence of quantity constraints, to the extent that they exist. If this is done, then no matter at what point the economy is -- that is, whether in equilibrium or not -- the sum of excess demands will be zero, which is Walras' Law. In contrast, it would be inconsistent, to sum up excess-demand equations, some of which are notional and some quantity-constrained (for a demonstration, see Patinkin, 1987b).

What Clower apparently had in mind, however, is not Walras' Law as usually defined (which is the definition of the preceding paragraph), but an argument akin to that expressed with reference to the labor market on p. 321 below. Specifically, I would interpret Clower's argument as stating that there is a difference between the quantity constraints in the commodity and labor markets: that whereas workers do not regard these constraints as absolute and indeed try to bring about their relaxation by offering to lower their money wages (which means that even the notional excess supply of labor exerts an influence on the market), there is no direct action that households can undertake which would bring about a relaxation of the constraints on their incomes and thus enable them to exert an expansionary pressure on the commodity market (which means that, in contrast, the notional excess demand for commodities exerts no influence on the market). Thus, from the viewpoint of dynamic market pressures, there exists no <u>effective</u> excess demand for commodities to match the <u>effective</u> excess supply of labor. Accordingly, no "signal" to the commodity market is generated that could lead to the expansion of output and consequent reduction of unemployment (cf. also

Leijonhufvud, 1968, pp. 81-91). And it is the absence of such a "signal" that Leijonhufvud (1981, chs. 2 and 6) subsequently termed "effective demand failure," generated by the Keynesian lack of coordination between saving and investment decisions.

Complete absence of a signal, and hence a complete "failure" of this kind, would of course be the familiar consequence of complete rigidity of money wages, prices, and interest, If, however, the notional excess supply of labor is indeed effective, which means that it actually causes a decline in money wages; and if (as contended on pp. 318 and 324, below) the notional excess supply of commodities similarly causes a decline in prices, then indirect signals for expansion in the commodity market will be generated. In particular (as in Chapter 19 of the General Theory), such declines will increase the real quantity of money, hence (*inter alia*) generate an *effective* excess demand for bonds, hence cause a decrease in the rate of interest, hence an increase in investment and accordingly in the aggregate demand for commodities. And this signal might be reinforced by the real-balance effect. Thus in theory -- as shown in Chapter XIII:3 below -- these signals can ultimately overcome the initial "failure" and raise effective demand to the full-employment level. As, however, Keynes goes on to argue in Chapter 19 of the General Theory, in practice there are many weak and possibly perverse links in this causal chain; and Chapter XIV:1 below contends that this remains the case even after account is taken of the real-balance effect.

3. *The real-balance effect*. I turn now to the real-balance effect. If we assume consumption to be a function of permanent income, and if we assume that the rate of interest which the individual uses to compute the permanent income flowing from his wealth to be 6 percent and the marginal

propensity to consume out of permanent income to be 0.70, then the marginal propensity to consume out of wealth (and out of real balances in particular) is the product of these two figures, or approximately 0.04 (Mayer 1959). However, in the case of consumers' durables (in the very broad sense that includes -- besides household appliances -- automobiles, housing, and the like), the operation of the acceleration principle implies an additional real-balance effect in the short run which has not been taken account of in this book.[7]

In particular, assume that when the individual decides on the optimum composition of the portfolio of assets in which to hold his real wealth, W, he also considers the proportion, q, of these assets that he wishes to hold in the form of consumers durables, K_d, so that his demand for the stock of consumer-durable goods is $K_d = qW$. Assume now that wealth increases solely as a result of an increase in real balances, M/p, generated either by an increase in M or a decrease in p. This leaves the representative individual with more money balances in relation to his other assets than he considers optimal. As a result he will attempt to shift out of money and into these other assets until he once again achieves an optimum portfolio. In the case of consumers' durables, this means that in addition to his preceding demand for new consumer-durable goods, he has a demand for

$$C_d = \Delta K_d = q[\Delta(M/p)] = q[(M/p)_t - (M/p)_{t-1}]$$

units, where $(M/p)_t$ represents real balances at time t. In general, the individual will plan to spread this additional demand over a few periods. In any event, once an optimally composed portfolio is again achieved, this additional effect disappears, so that the demand for new consumers' durables (which in the case of a stationary state is solely a replacement demand) will once again depend only on the ordinary real-balance effect as described at the beginning of this paragraph (Patinkin, 1967, pp. 156-62).

It is, of course, true that the process of portfolio adjustment generated by the monetary increase will cause a reduction in the respective rates of return on the other assets in the portfolio, so that the initial wealth effect of the monetary increase will be followed by substitution effects. Now, Keynes limited his analysis in the General Theory to portfolios consisting only of money and securities; hence an increase in the quantity of money could increase the demand for goods only indirectly through the substitution effect created by the downward pressure on the rate of interest. But once one takes account of the broader spectrum of assets held by individuals, one must also take account of the direct real-balance effect on the purchase of these other assets as well.

Various empirical studies have shown that the real-balance effect as here defined (viz., as part of the wealth effect) is statistically significant (Patinkin, 1965, Supplementary Note M; Tanner, 1970; Thirwall, 1972). Other studies have demonstrated the statistical significance of yet another concept of this effect: namely, as the effect on the demand for commodities of an excess supply of money, defined as the excess of the existing stock of money over its "desired" or "long-run" level (Jonson, 1976; Laidler and Bentley, 1983). It seems to me, however, that such a demand function is incompletely specified: for though (as indicated above) the excess supply of money has a role to play in the consumption function (and particularly in that for consumers' durables), the complete exclusion of the real-balance effect *cum* wealth effect from the aforementioned demand function implies that in equilibrium there is no real-balance effect -- an implication that is contradicted by the form of demand functions as derived from utility maximization subject to the budget constraint (see below, pp. 433-8, 457-60; see also Fischer,1981).

Two further issues involving the real-balance effect _qua_ wealth effect that have received much attention since the original publication of this book are, first, whether this effect should also take account of the volume of inside money; and, second, whether it should take account of government debt. Chapter XII:5 applied a mechanical aggregation of balance sheets of banks to follow Kalecki and Gurley-and-Shaw in answering the first question in the negative. A more economically meaningful demonstration was, however, subsequently presented in my 1969 review article of Pesek and Saving's _Money, Wealth and Economic Theory_ (1967), which had given the opposite answer. In Chapter 9 of my _Studies in Monetary Economics_ (1972a) I then elaborated upon the argument of my review article.

The Pesek-Saving argument is essentially that individuals who hold bank deposits fully consider them to be an asset. On the other hand, the extent to which banks consider them to be a liability is indicated by their "revealed preference" for the volume of reserves against them that they choose to hold. In particular, this volume is determined by the banks' expectations with respect to the net stream of withdrawals and deposits, as well as by their evaluation of the costs of being caught illiquid. Hence the Pesek-Saving conclusion that demand deposits _less_ reserves are a net asset of the economy.

This formulation has the advantage of permitting an equally simple demonstration of the fallacy of the Pesek-Saving argument: namely, the holding of reserves is not the only liability incurred by banks in maintaining their stock of outstanding deposits. Indeed, by focusing on what happens to the net worth of banks (an item that does not even appear in the balance sheets of the private banking sector on p. 296 below!) I demonstrated in my review article that if perfect competition prevails in the banking system, the present value of the costs of maintaining its demand deposits equals the value of these deposits, so that the latter cannot be considered as a component of net wealth. This is also the case if imperfect competition with free entry prevails in the system. On the other hand, if -- because of restricted entry -- the banking sector enjoys abnormal profits, then the present value of these profits should be included in net wealth for the purpose of measuring the real-balance effect.

The treatment of government debt in Chapter XII is also somewhat mechanical. The vast literature that has subsequently developed on this question was stimulated by Barro's seminal 1974 analysis of the conditions under which an individual would not consider such debt to constitute part of his wealth. Clearly, as already pointed out in this chapter (p. 289 below), this would be the case in a world of infinitely lived individuals with perfect foresight: for the discounted value of the tax payments which the representative individual must make in order to service and repay the debt obviously equals the discounted value of the payments on account of interest and principal that he will receive. What Barro then demonstrates is that if in making his own consumption plans, the representative individual with perfect foresight is enough concerned with the welfare of the next generation to leave a bequest for it, he is acting as if he were infinitely lived.

More specifically, Barro's argument is as follows: Assume that an individual of the present generation achieves his optimum position by consuming C_o during his lifetime and leaving a positive bequest of B_o for the next generation. Clearly, such an individual could have increased his consumption to $C_o + \Delta C_o$ and reduced his bequest to $B_o - \Delta C_o$ -- but preferred not to do so. Assume now that the individual is given a government bond payable by the next generation. The revealed preference of the present generation for the consumption-bequest combination C_o, B_o implies that this increase in its holdings of government interest-bearing debt will not cause it to increase its consumption at the expense of the next generation. In brief, government debt in this case is effectively not a component of wealth and hence of the real-balance effect.[8] And the elegance of Barro's demonstration lies in the fact that it does not require any assumption about the extent to which the present generation values the utility of the next generation as compared to its own: it requires only that the present generation leave a bequest for the next one.

Needless to say, the absence of perfect foresight, and the fact that individuals might not leave bequests (as is indeed assumed by the life-cycle theory of consumption) means that government interest-bearing debt should to a certain extent be taken account of in measuring the real-balance effect -- or what in this context is more appropriately labelled (as on pp. 288-94 below) the "net-real-financial-asset effect."

4. <u>The microeconomic basis of the demand for money</u>.[9] The demand function for money is derived in Chapter 5 from a utility function which includes real money balances as one of its arguments and which rationalizes this inclusion as a representation of the "liquidity service" of such balances in providing "insurance" against the "financial embarrassment" that might otherwise be caused by the assumed stochastic payment process. An alternative rationale could have been presented in terms of the time and effort that would have to be devoted to finding the "double coincidence of

wants" -- or some other kind of bother (see p. 80 below) -- that such balances obviate.

Before discussing some of the issues that have been raised about this approach, I would like to make two observations. First, the stochastic payment process as the rationale for holding money is not wedded to the money-in-the-utility-function approach. Thus Whalen (1966) replaced my imprecise notion of "embarrassment" with a specific cost that the individual then incurs. Whalen then derived the demand function for money from the minimization with respect to M of the cost function

$$M \cdot r + p \cdot c,$$

where M represents the quantity of money; r the rate of interest; p the probability of running out of money; and c the cost of so doing. The first of these terms is thus an increasing function of M, while the second a decreasing one. Thus this cost function is analogous to that of the Baumol-Tobin inventory approach. Like that approach, as well as the one used here, it also yields a square-root formula for the demand for money (see also Miller and Orr, 1966, and Orr, 1970).

My second observation has to do with Mathematical Appendix 8:a, to which I would now add the demonstration by Peter Howitt and myself (1980) that (contrary to a contention that had been made with respect to the money-in-the-utility-function approach) a necessary and sufficient condition for demand functions to be free of money illusion is that they be derivable from a utility function which is homogeneous of degree zero in the nominal quantity of money and in prices.

I turn now to basic issues. Though the money-in-the-utility-function approach has a long history which begins with Walras' Elements and continues through Samuelson's Foundations and afterwards (see Supplementary Notes C and D), it has been the subject of criticism, particularly in recent years (cf., e.g., Hahn 1982, p. 2; Kareken and Wallace, 1980a, pp. 4-5). Nevertheless, despite differences in their nature (see end of this section), I regard the liquidity services of real money balances as justification for placing them in the utility function like any other good which provides a service. In any event, I feel that this approach is preferable to the two alternatives that have been offered and which have become increasingly popular since the original publication of this book: namely, the overlapping-generations and cash-in-advance approaches, respectively.

Let me begin with the first of these[10] and say that I share the reservations of James Tobin (1980) and others (cf., e.g., McCallum 1983) about the attempt (well-illustrated by several of the papers in the 1980 Kareken and Wallace volume) to present the overlapping-generations model as the basic model for the analysis of monetary phenomena, and indeed as "the best available model" for this purpose (so Wallace, 1980, p. 50). Thus my fundamental criticism is the familiar one that this model treats money only as a store of value (which is the least important function of money in any economy with savings deposits, or even low-risk interest-bearing securities) and hence does not represent its basic function as a medium of exchange. For this function is primarily, not to make possible transactions that would otherwise be technically impossible (in this case, between the present and future generations), but to carry out in a more efficient and convenient way transactions that could in principle be carried out at greater cost in terms of time and effort if one had to resort to barter. And it would be an evasion of the issue to say that such costs also exist in the overlapping generations model, except that they are then infinite.

Second, many of the properties of what is called "money" in this model simply reflect the fact that it is the only asset that can be carried over from one period to another. This is the reason there is a demand for it even though it provides no direct utility -- just as in the traditional Fisherine two-period time-preference model individuals have a demand for bonds (the only instrument by means of which they can carry out the lending that enables them to transfer purchasing power to the second period) even though such bonds have no direct utility.

I can bring out this argument most simply by noting that if, in analogy to the overlapping-generations model, we assume in Mathematical Appendix 6:a below that (1) though the individual makes concrete plans for only three periods, he expects the world to continue afterwards (see p. 67 and especially p. 460, fn. 7, below); (2) the individual receives an endowment only in the first period; (3) there are no bonds; and (4) the only asset that can be carried over from one period to the next is non-interest-bearing money which does <u>not</u> appear in the utility function -- then the utility-maximizing conditions (6.6)-(6.8) reduce to

(6.6a) $$\frac{1}{p}\frac{\partial w(\ )}{\partial Z_h} - \lambda_h = 0 \qquad (h = 1,2,3),$$

(6.8a) $$-\lambda_k + \lambda_{k+1} = 0 \qquad (k = 1,2),$$

where p is expected to be the same in all periods.[11] These equations, together with equations (6.2)-(6.4) -- with $B_0 = B_1 = B_2 = 0$ -- constitute 8 equations in the 8 unknowns Z_h $(h = 1,2,3)$, M_k/p $(k = 1,2)$, and λ_k $(k = 1,2,3)$. Assume then that they can be solved for the demand functions for commodities Z_h, as well as for real money balances to carry over from the first to the second period (M_1/p) and from the second to the third (M_2/p).[12] Thus this model -- which has the essential features of the overlapping-generations model -- generates a positive demand for an asset that is called "money," but which actually serves only as a store of value and fails to possess the essential characteristic of money as a medium of exchange. To repeat, in both this and the overlapping-generations models, "money" fulfills the role that bonds do in the Fisherine time-preference model, with the only differences being that the asset which carries over purchasing power from one period to the next (i.e., "money") does not bear interest and (by the structure of the respective models) must be non-negative.[13]

Note that in this case equations (6.8a) can be rewritten as

$$\lambda_1 = \lambda_2 = \lambda_3,$$

reflecting the fact that since there is no rate of interest, utility-maximization requires that the marginal utility of a dollar's expenditure be the same every week. Correspondingly, the marginal rates of substitution between commodities in one period and the succeeding one as described in equation (6.10) below reduce to

$$\frac{\frac{\partial w(\ )}{\partial Z_k}}{\frac{\partial w(\ )}{\partial Z_{k+1}}} = 1 \qquad (k = 1,2),$$

whose difference from the familiar Fisherine result simply reflects the absence of a rate of interest.

Third, and related to my first two reservations, the fact that there is only one durable asset also means that the overlapping-generations model cannot deal with one of the basic questions of monetary theory: namely, why individuals in the real world choose to hold money when they can instead hold assets that yield a higher market rate of return. Furthermore, any generalization of the model to deal with this question has to resort to the kind of approaches that have been used in the past for this purpose: namely, to attribute to money not only the function of a store of value that can be carried over from one period to another, but also the function of providing (in one sense or another) a "liquidity service" as a medium of exchange (as, for example, in Chapters V-VII below). And then -- in contrast with the frequent contention of advocates of the overlapping-generations model that it is the only model that provides a rigorous explanation of the positive value of money -- the question would become to what extent it makes a marginal contribution to our understanding of the nature of the demand for money.

The cash-in-advance approach as originally presented by Clower (1967) is as problematic as the overlapping-generations one. Though there is an extensive literature which attempts to explain the emergence of money in an economy, most discussions of monetary theory take this for granted and simply assume (as I too do in this book) that money exists and serves as a unique medium of exchange in the economy. Clower also takes this for granted, and then (in explicit criticism of the approach of this book as an example of "the general theory of money and prices on Walrasian foundations" [ibid., p. 1]) goes on to claim that since the Walrasian budget constraint does not distinguish "the role of money in economic activity ... from that of any other commodity," a theory based on this constraint cannot serve as a theory of money: that accordingly "what presently passes as a theory of a money economy is in truth descriptive of a barter economy" (ibid., p. 3).

This, however, is a non sequitur. For it is not the purpose of the budget constraint to distinguish between the roles of any of the goods (defined as on p. 13 below, as including both commodities and money) which it encompasses. In particular, just as this constraint does not distinguish between the role of money, on the one hand, and that of commodities, on the other, so does it not distinguish between that of one commodity and another. Instead, the only property of a good that is relevant to the budget constraint is whether it is a source of net expenditure or net income. The other properties of goods -- what distinguishes one from another with respect to the qualities which affect an individual's demand decisions -- are what is generally described in the theory of consumers' behavior by the utility function.

Thus it is precisely the distinctive role of money as a medium of exchange that is represented by the appearance of real money balances as a separate argument in the utility function as a reflection of the stochastic payment process, as in Chapters V-VI below. Alternatively, it is precisely this distinctive role which is the basis of the Baumol-Tobin inventory-theoretic approach, which can also be interpreted (as in Chapter VII below) as an approach which puts money in the production function (cf. in this context Levhari and Patinkin, 1968, sec. III; Fischer 1974). Furthermore, both approaches take it for granted that *ultimately* payments for goods must be made with money. In particular, in Chapters V-VI below the individual who runs out of cash in the course of the week incurs a cost in terms of "embarrassment", but succeeds in making the necessary cash payment by the end of the week at the latest. Similarly, in the Baumol-Tobin approach, the individual confronted with a cash-flow problem solves it at the cost of an additional "brokerage fee". In contrast with these approaches, Clower models the distinctive rôle of money by adding a constraint which states that in order for an individual to commit himself to purchase a good he must -- not *ultimately*, but *to begin with* -- have the necessary cash at hand.

The similarities and differences between these three approaches -- stochastic-payment-process-cum-money-in-the-utility-function, inventory-theoretic, and cash-in-advance -- can then be summarized as follows. All three assume that payments must be made in cash. Similarly, all three assume that, for one reason or another, there is a lack of synchronization between payments and receipts of cash: the first and third approaches do so explicitly, the second implicitly. But whereas the first and second approaches assume that the individual can solve a temporary cash-flow problem by incurring a cost, the cash-in-advance approach (like the overlapping-generations one) assumes that there is no finite cost that the individual can incur that will enable him to do so. I should also note that the foregoing statement about the first and second approaches holds also in the special case where the individual begins the period without any cash at all: here too the individual can -- at a cost -- commit himself to make a purchase, and depend on the fact that during the period he will receive the necessary cash. Nor would it be inconsistent with the basic assumptions of these two approaches to generalize them (as they have been in this book) to include the possibility of purchasing on credit.

My objection to the cash-in-advance approach is, then, not on grounds of logic, but that it does not take this possibility into account. It is therefore a most unrealistic model to describe a world in which the statement "only credit cards can buy goods" is an increasingly more accurate description than the Clower dictum that "only money can buy goods". Similarly, this approach most unrealistically implies that the velocity of circulation is constant.[14]

Though Clower presented his cash-in-advance approach in 1967, it received little attention until its use by Lucas in a series of articles which began with the one in the influential 1980 Kareken-Wallace volume.[15]

Lucas' model is more rigorous and is based on the analysis of an individual with a multi-period horizon (indeed, an infinite one) who maximizes utility subject to the Walrasian budget constraint, to which is added a cash-in-advance constraint. Needless to say, unless an individual takes account of future needs, he will not have any demand for money to hold at the end of the period. At the same time, Lucas' article is subject to the same criticisms levelled in the preceding paragraph.

In an attempt to answer the criticism about the failure of the cash-in-advance approach to take account of the possibility of purchasing on credit, Kohn (1980, pp. 181-84) has contended that though the cash-in-advance constraint (or what he more generally terms the "finance constraint") is then not operative with respect to any individual, it is operative in the aggregate. In particular, on the assumption that bonds are completely liquid,[16] its aggregate form in Kohn's model is

$$E_t \leq M_t,$$

where E_t represents total money expenditures during the period and M_t the quantity of money at its beginning. This attempt, however, can be faulted on two basic grounds. First (to use the terminology of p. 12 below), if the cash-in-advance constraint does not exist at the level of the individual-experiment, then Kohn's model fails to accomplish the basic objective of the cash-in-advance approach, which is to explain why the <u>individual</u> holds money.

Second, though Kohn recognizes that his "aggregate finance constraint" operates through market forces acting on prices, he does not draw the full implications of this fact. In order to bring them out, let me assume that the foregoing constraint is binding, and let me also make use of the notation of Mathematical Appendix 2:a below to rewrite it as

$$\sum_{j=1}^{n-1} p_j Z_j = M_t .$$

In the case with a constant greater-than-unity velocity (ibid., p. 185, equation [16]), the right-hand side becomes $M_t V$. Thus, Kohn's "aggregate finance constraint" is a misleading term for what is simply a statement of the quantity theory. On the assumption that money is neutral, the existence of a smaller quantity of money will then not have any influence on equilibrium quantities, but will simply cause a proportionate change in equilibrium money prices. To the extent that it is appropriate to use the term "constraint" in this context, it is a constraint on prices, and not on quantities. In brief, what is involved in the aggregate is a conceptual market-experiment, in which prices are dependent variables; this differs fundamentally from the conceptual individual-experiment of the cash-in-advance approach, in which prices are fixed, so that the individual's initial quantity of money constitutes a constraint on his quantities demanded.

Of course, money need not be neutral, in which case the market-experiment would result in changes in equilibrium quantities as well as prices. But these changes in quantities would then be a reflection of the causes of the non-neutrality as discussed, for example, in Chapter XII below; not a reflection of a "finance constraint." Similarly, if in the case of neutral money we were to examine the economy in disequilibrium -- that is, before it reached the new equilibrium corresponding to the smaller quantity of money -- then many constraints (e.g., rationing, in the case of a commodity for which there exists an excess demand) would exist, and there would be no special significance to a possible "finance constraint" generated by an excess demand for money.

There have also been attempts in the literature to deal with the criticism that cash-in-advance implies a constant velocity of circulation. Thus in a later article, Lucas (together with Stokey [1987]) has attempted to introduce variable velocity into the model by classifying goods into two distinct categories -- namely, those that are bought with cash and those that are bought with credit -- and representing each of these categories by a separate argument in the utility function. However, as Fischer (1988, p. 300) has pointed out, this distinction is not an exogenous one, but itself depends on the rate of interest and on the anticipated rate of inflation. A similar criticism holds for the attempt by Grandmont and Younes (1972, p. 357) to introduce "viscosity" into the cash-in-advance constraint by assuming that the individual need hold in cash only a fixed proportion of his planned purchases.

Another attempt to introduce variable velocity into the model has been made by Svensson (1985), who generates a positive demand for precautionary balances on the assumptions that commodities can be purchased only with cash, that this is the only liquid asset, and that there is a stochastic process which leaves the individual uncertain as to his future income (ibid., p. 923). The individual is also assumed to maximize the expected value of his utility over an infinite horizon. Thus Svensson's results can be interpreted as reflecting the fact that the holding of precautionary balances enables the individual to adhere more closely to his optimum pattern of consumption over time and thereby minimize the loss of expected utility that the stochastic process would otherwise cause.[17]

This is clearly analogous to the precautionary balances held by the individual in Chapters V-VI (who also has no other liquid asset: see p. 82 below) in order to avoid the loss of utility ("embarrassment") that would be involved if the stochastic payment process left him without the cash to meet a payment. Correspondingly, Svensson's assumptions could just as well have been modeled by putting money into the utility function. Indeed, Svensson (1985, p. 941) recognizes this possibility, but rejects it on the grounds that it requires "ad hoc assumptions about cross partials of the utility function." As an example of such an assumption, Svensson cites an article by LeRoy (1984): but the assumption that LeRoy makes is that the utility function of commodities and money is additive and separable in these variables -- which is precisely the standard type of assumption, adopted also by Svensson, used to describe the total utility derived by a multi-period individual from his consumption in present and future periods! More generally, the cash-in-advance assumption seems to me to be far more "ad hocish" than that of money-in-the-utility function. Indeed, Feenstra (1986) has shown that, under certain conditions, the cash-in-advance model can be regarded as a special case of a money-in-the-utility-function model: namely, one which assumes that there is a zero elasticity of substitution between money and commodities.

My impression from all this is that the original attraction of the cash-in-advance model lay in its simplicity. But as attempts have been made to remedy its unrealistic aspects, it has lost its simplicity and has indeed become increasingly complex. At the same time, it has acquired some of the attributes of the traditional approaches to the demand for money. Thus, for example, Svensson (ibid., p. 920, 925-26, 941) repeatedly describes the role of money in his model as that of providing a "liquidity service". Accordingly, in view of its ad hoc and unrealistic nature, I do not see what is gained by supplementing the traditional type of analyses of the demand for money by means of the utility or production function with the cash-in-advance approach.

In brief, because of the convenience of cash for carrying out small everyday purchases, the cash-in-advance constraint (generally, in a nonbinding form!) is relevant for determining an individual's demand for currency. It is of little relevance for determining the demand for money in the sense that is the major concern of monetary theory -- namely, M_1, and *a fortiori* M_2. And least of all (Ostroy and Starr, 1988, notwithstanding) is it relevant -- in an economy with credit facilities -- as a constraint on the amounts of commodities that an individual can purchase: that constraint (i.e., the individual's credit limit) is instead essentially determined by a representative creditor's estimate of the individual's Walrasian budget constraint properly discounted over the present and future, with careful consideration also given to his past record of payments as an indication of the degree of moral hazard involved.

In concluding this section, let me say that I am fully aware that the money-in-the-utility-function approach as a reflection of underlying causes (e.g., the stochastic payment process, or obviating the need for a double coincidence of wants) also has its problematics. The advantage of this approach is that it is more general, as well as being in accord with standard demand theory. In particular, it generates demand functions for money which are continuous functions of the relevant "price" variables. The point that is frequently made, however, is that in order to obtain unambiguous answers in certain cases, this generality may be a disadvantage. But as just indicated, it seems to me that the solution to this problem lies in making specific assumptions about the properties of the utility function --

assumptions that are no more arbitrary than those made in the alternative approaches to the demand for money.

A valid, specific criticism has, however, been made by Ostroy and Starr (1988, sec. 1.2), who point out that in order to determine the utility of such balances, the household must first have a general notion of the volume of transactions that these balances will have to perform; and this can be known only after the household has determined the outcome of the process of utility-maximization itself. Thus, for example, in the extreme case in which the composition of the household's initial endowment is the same as its optimum one, it will not plan to carry out any transactions, and hence the holding of money balances will not generate any utility. The force of this criticism is, however, much diminished by departing from the general assumption of this book about the composition of the household's initial endowment, and assuming that (as is generally true in a modern economy) it consists solely of one good (namely, labor services) which the household sells in order to finance its purchases of all the commodities which it consumes. Alternatively, and more generally, the arguments of the household's utility function can be replaced by net purchases (positive or negative) of the respective commodities (ibid.).

5. Rational expectations. In reflection of the times in which it was written -- a time of deep depression and severe restrictions on international trade and capital movements -- Keynes' General Theory is concerned with a closed economy which is not growing and whose overriding problem is achieving the full employment of its given labor force. And though the General Theory attributes great importance to expectations, it does not develop a formal theory of the way in which they are formed. These

assumptions, which characterized macroeconomics well into the 1950s, also characterized the first edition of this book, and (with the exception of growth) the second one as well. Correspondingly, the respective converses of these assumptions characterize the nature of modern macroeconomics, whose concern is with an open economy with growth, and whose analysis depends crucially on the theory of the formation of expectations which is adopted.

With the exception of the last one, these developments too were a reflection of the times. This was clearly the case with reference to growth models, which reflected the growing concern of the post-World-War-II world with the challenge and problems of growth. Similarly, though the Mundell-Fleming model had been published in the early 1960s, and Meade's (1951) work even before that, the "opening of macroeconomics" did not really occur until the breakdown of Bretton Woods in the early 1970s created a world of flexible exchange rates in which problems of international trade and, especially, capital movements became paramount. In contrast, the development with respect to expectations -- namely, the "rational expectations revolution" -- was primarily a result of the internal dynamics of our discipline itself, motivated at least in part by the failure of macroeconomic econometric models in the 1970s to predict correctly (Lucas and Sargent, 1978).[18]

This section is somewhat of a digression from the limited purpose of this Introduction, and is devoted to some general observations about the assumption of rational expectations. The next section gives a brief indication of how the macroeconomic analysis of a full-employment economy in Chapters IX-XII below can be extended to an open economy. Section 7 then analyzes at some length the workings of a money-and-growth model, which is the only one of the aforementioned three developments on which I have done work since the publication of the second edition.

I think that it is fair to say that there is today a consensus in the profession that the assumption of rational expectations has had a salutary effect in calling into question the mechanical application of adaptive expectations. At the same time, an essential implication of such expectations has frequently been retained by substituting lags attributed to long-term contracts for those that had been attributed to the lagged adjustment of expectations (see Fischer 1977 and Taylor 1980). To this I must add that there is also a consensus which, on the basis of both theoretical and empirical considerations (see the literature cited in Patinkin 1987c, pp. 640-41), rejects the original overenthusiastic and doctrinaire application of rational expectations that led to the related contentions of a vertical Phillips curve even in the short run and the absolute neutrality of anticipated monetary policy.

A major implication of Cagan's (1956) classic study of hyperinflations -- which introduced adaptive expectations into the literature -- was that most of the cases which he studied involved stable processes: that is, inflationary processes which would have come to an end, were it not for the continued expansion of the money supply (see pp. 310-12 below). In contrast, a major implication of rational expectations is that expectations of this nature might well create a "bubble": that is, a situation in which -- even with a constant money supply -- self-justifying expectations would generate an indefinitely continuing and exponentially increasing inflationary process which would ultimately lead to the demonetization of money. As against this theoretical possibility, however, we have the interesting paper by Flood and Garber (1980), who have used rational expectations to carry out an empirical analysis of the post-World-War-I German hyperinflation, and who conclude that the results do not enable them to reject Cagan's findings.

The assumption of rational expectations has also made an important contribution in making us take more account of the fact that government is not a deus ex machina whose policy actions are unexpected: on the contrary, the rational individual will have anticipations about these policies which will in turn impinge upon their efficacy; and in this connection the credibility of government policy declarations is of great importance. I feel, however, that the analysis of credibility has suffered from the simplistic assumption that government is a single, monolithic decision-making unit. A democratic government is generally a coalition of forces and interests, sometimes formally (as in most Western European countries and Israel) and sometimes informally (as in the United States, for which it is a commonplace that each of the major parties is actually a coalition of different interests). Indeed, as experience has shown us, even the non-democratic governments of Eastern Europe are frequently coalitions of conflicting interests. So -- in technical terms -- the question of credibility should be viewed within the conceptual framework, not of a two-person game between the government and the public, but an n-person one, with the game sometimes being played within the government itself. Thus, for example, inflation might in some cases be viewed as the outcome of a situation in which a finance minister, unable because of coalition considerations to restrict the nominal budgets of his fellow ministers, effectively levies a tax on them by reluctantly agreeing to a nominal budget which will generate inflation, and thus reduce the real value of their respective budgetary allocations. (For the purpose of this example, drawn in part from real life, we must assume that the other ministers suffer -- at least temporarily -- from money illusion!) Indeed, since this amounts to an across-the-board reduction, it may be the path of least resistance for him (Patinkin, 1981b, p. 33).

At this point I would like to suggest that the increased interest in the question of credibility of government policy declarations is also a product of the times. The replacement in the early 1970s of the regime of fixed exchange rates by one of dirtily floating ones, increased the scope of government policy declarations ("the exchange rate of the dollar will be maintained at...," and so forth), and with it the frequency with which they were within a short time contradicted by the facts . At the same time, the horizon of an increasing number of economists became extended beyond the Western world to include countries (e.g., of Latin America) with prolonged and rapid rates of inflation, and with a succession of finance ministers and/or governors of central banks, each of whom ceremoniously proclaimed the inauguration of "a new economic policy" of budgetary and monetary restrictions "to bring inflation to an end" -- only to fail within a short time to maintain or even begin carrying out such restrictive policies, thus resulting in a resurgence of inflation. In brief, whether because governments are indeed less credible than they once were, or because of the wider horizon of economists, the issue of credibility has become an important one in the theory of macroeconomic policy.

Let me turn finally to the problematic aspects of the assumption of rational expectations, a subject that has been much discussed in the literature (see, e.g., Brown and Maital 1981, Lovell 1986, Jonung and Laidler 1988, and various articles in the 1986 volume edited by Hogarth and Reder). I would like to add to this discussion from a different perspective, one which I presumptuously feel should emerge from the collective introspection of our profession. For this purpose I start not with the technical definition of rational expectations, but with the common-sense justification that has frequently been given for this assumption: namely, that individuals "take account of all the information available to them" and that they do not make "systematic errors". In Chapter VIII:3 below -- documented by Supplementary Note I:3 -- I show how for at least two decades distinguished economists at one and the same time recognized the existence of a real-balance effect, and yet espoused a "homogeneity postulate" and a related dichotomy that contradicted it. Surely that warrants the term "systematic error".

A better example is provided by the brief history of the Phillips curve. Its publication in 1958 generated a veritable industry, in which economists staked their professional reputations -- and with it their rate of ascent up the ladder of academic positions and salaries -- by publishing articles showing the inverse relationship between the rate of change of nominal wages and unemployment; and this is what most of us (myself included) were also teaching our students. And on what, after all, was Friedman's criticism a decade later based, if not on one of the elementary principles that we had ourselves all learned as students from the indifference-curve analysis of the choice between leisure and consumption-commodities: namely, that the individual's decision was based not on the nominal wage rate, but on the real one; that, to use one of the basic concepts of this book (which I too subsequently ignored in my teaching of the Phillips curve), the individual was free of money illusion. Surely that is a failure to "take advantage of all available information"; surely that is the perpetration of a "systematic error".

Why should we economists assume that <u>homines economici</u> behave so differently?

6. <u>Open-economy macroeconomics</u>. In the last several years, open-economy macroeconomics has become a field in its own right. The limited purpose of the present section is to adapt the Mundell-Fleming model (which was originally formulated for an economy with unemployment) to an economy which is at the full-employment level Y_0, and use it to generalize to a small open economy the analysis of the neutrality of a change in the quantity of money in Chapters IX-XII below. Needless to say, this is a minor aspect of the vast literature that has grown up in this field.

Let us begin by modifying system (19)-(21) on p. 300 below as follows:

$$(19') \qquad F\left(Y_0, r, \frac{M_0''}{p}, \frac{ep_F}{p}\right) = Y_0,$$

$$(20') \qquad B\left(Y_0, r, r_F, \frac{M_0''}{p}, \frac{ep_F}{p}\right) + h\frac{M_0''}{p} = 0,$$

$$(21') \qquad L\left(Y_0, r, \frac{M_0''}{p}\right) = v\frac{M_0''}{p},$$

where e represents the nominal exchange rate; p_F the foreign price level (assumed fixed); r_F the international rate of interest (also assumed fixed); h and v the respective constant coefficients of M'' (the monetary base) in equations (20) and (21) below; and where all other variables are the same as in the original model. (As will be pointed out in the final section of the Introduction, v is what is now generally called the money multiplier.) Thus ep_F/p represents the real exchange rate, R. As usual, an increase in R is assumed to increase net exports and hence the aggregate demand for commodities, $F(\ )$. Similarly, since it makes domestic bonds cheaper for foreign investor, it increases the net demand for bonds, $B(\ )$. Finally, the more the domestic rate of interest, r, exceeds the international one, r_F, the greater the foreign demand for domestic bonds: i.e., the greater the inflow of capital. And the opposite is true (i.e., the greater the domestic demand for foreign bonds and outflow of capital) the more r_F exceeds r.

In addition to the foregoing three excess-demand equations, there is a fourth one for foreign exchange, which -- by virtue of Walras' Law -- can be disregarded. In the case of a flexible exchange rate, e is an endogenously determined variable and $M"$ is an exogenously fixed one; in the case of a fixed exchange rate, the roles of these two variables are reversed. Thus in both cases our system consists of three independent equations in three unknowns (but see fn. 12 above).

Consider now an economy with flexible exchange rates in which this system is in an initial position of equilibrium. Assume now that the monetary base -- and hence the quantity of money -- is doubled. One need only inspect the equations to see that a new equilibrium will obtain at double the price level, p, and nominal exchange rate, e, and with an unchanged rate of interest, r. In brief, money is neutral in this open economy as well.

This argument can be presented less mechanically in terms of Figure O-1, which is adapted from Figure X-4 on p. 243 below. Assume that nominal exchange rate is e_0 and that the economy is initially in equilibrium at point g, determined by the intersection of curves CC and BB (not drawn). Assume that the quantity of money is doubled and that in the first instance the nominal exchange rate remains at e_0. Though the real-balance effect will cause both the CC and BB curves to shift to the right, they do not (unlike the situation in Figure X-4) shift immediately to C_1C_1 and B_1B_1 -- which for every interest rate are respectively twice as far to the right as the original curves. For the temporarily assumed constancy of the

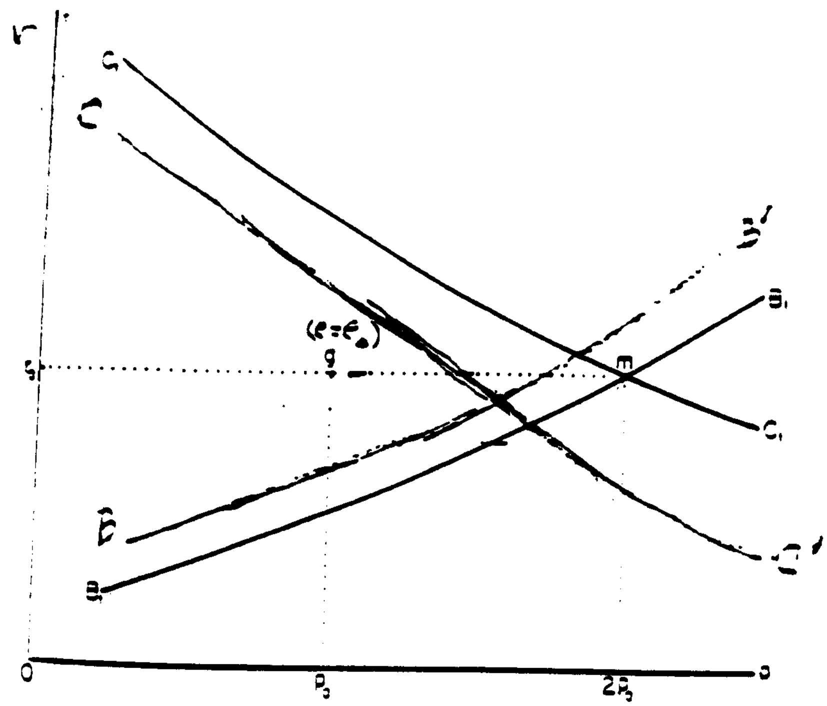

Figure 0-1

nominal exchange rate means that the real one at point m is less than it was at point g, so that net exports and hence the aggregate demand for commodities is also less; and a similar argument holds with respect to the real demand for bonds. Thus, both the CC and BB curves will shift somewhat less to the right -- say, to CC′ and BB′, respectively -- generating a rate of interest that is lower than the initial one.

At this point two forces exist to exert an upward pressure on the exchange rate. First, there is the decrease in net exports which decreases the supply of foreign exchange; second, the lower rate of interest will generate a capital outflow, and hence increase the demand for it. As a result the nominal exchange rate will begin to rise, thus stimulating exports again. This process will continue until this rate reaches $2e_0$, and the equilibrium curves accordingly shifted to the right until they reach C_1C_1 and B_1B_1, respectively. The neutrality of money is reflected in the fact that all the real quantities at the point of intersection m --

namely, the rate of interest, the real rate of exchange, the real quantity of money, and the respective components of the real national product (viz., consumption, investment, and net exports) -- are the same as they were at point g.

Note that if there is perfect international mobility of capital at the rate of interest r_0, then the BB curve will be a horizontal line at this rate. In this case the equilibrating increase in the nominal exchange rate from e_0 to $2e_0$, and the corresponding movement from point g to m, will be generated by the excess demand for foreign exchange caused by the decrease in net exports.

Assume now that the increase in the quantity of money takes place in an economy with fixed exchange rates and with accordingly a monetary base which consists at least in part of foreign exchange. The consequent shift of the equilibrium curves to CC′ and BB′ in Figure 0-1 will once again cause a capital outflow and decrease in net exports. The exchange rate being fixed, the result in this case, however, will be a drawing down of foreign exchange reserves and hence a decrease in the monetary base. This will cause the CC′ and BB′ curves to begin shifting back, and this process will continue until they return to their original positions and intersection point at g. This is an expression of the already-mentioned fact that in a world of fixed exchange rates, the quantity of money in any given economy is an endogenous variable. (In the gold standard world, this was the result of the "specie-flow mechanism.") It is also an expression of the only statement about an open economy that is to be found in the second edition of this book: namely, the statement on p. 309 below that the fixing of the price of gold (and hence the exchange rate) in a gold-standard economy provides the "anchor" that ties down the level of all nominal quantities, and prices in particular.

Consider again the fixed-exchange-rate economy and assume that it carries out a devaluation. Assume also that foreign exchange is and remains a constant proportion of its monetary base. In the present case this means that the central bank submits to the internal pressures for an accommodating increase in the money supply that are generated by the devaluation and (say) carries out open-market purchases which increase its holdings of governments securities in the same proportion as the devaluation. Inspection of the foregoing equations once again shows that equilibrium will be reestablished when all nominal quantities have increased in the same proportion as the devaluation. Indeed, this case is the same as the first one considered in this section, except for the fact that the causal chain is reversed: instead of the increase in the quantity of money causing an equiproportionate change in the exchange rate, it is the change in the exchange rate that causes an equiproportionate change in the quantity of money. The present case too is an expression of neutrality: namely, the well-known neutrality -- or rather ineffectiveness -- of a devaluation which generates a proportionate increase in domestic prices and hence leaves the real exchange rate unchanged. (For a general and more rigorous treatment of the issues discussed in this section, see, e.g., Allen and Kenen, 1980, Part II, and Branson and Henderson, 1985.)

7. Money and growth. . As already indicated, the great interest that developed in growth in the late 1950s and 1960s led me in the second edition to present a model of money and growth (Chapter XIV:5 below). This model, however, was a misguided one which is best ignored. I attempted to remedy this deficiency a few years later by presenting a simple model which accords with the general framework of this book and brings out the essential features of the problem (Patinkin 1972a, chap. 10). Foremost among these is the

question of superneutrality, which I define as the invariance of the steady-state values of all real quantities in the economy -- with the exception of the real quantity of money -- to changes in the rate of change of the nominal quantity of money. It is this model that I shall now briefly describe.

In accordance with Solow's classic article (1956), assume that the economy has a linearly homogeneous production function, $Y = F(K,L)$, where Y is output, K capital, and L labor, with the labor force assumed to be growing at the exogenous rate n. Let per capita output and capital be represented by y and k, respectively. The intensive form of the production function is then $y = f(k)$ and its derivative, $f'(k) > 0$, is accordingly the marginal productivity of capital, so that the equilibrium real rate of interest is $r = f'(k)$. Finally, let M represent the nominal quantity of money in the economy, p the price level, and

$$(1) \qquad m = \frac{M/p}{L},$$

the per capita quantity of real money balances.

Define the steady state of this economy as one in which both per capita capital, k, and per capita real balances, m, are constant. It then follows from the production function that in the steady state K and Y are each growing at the rate n. Similarly, it follows from (1) that in the steady state total real money balances, M/p, are also growing at the rate n. Letting μ represent the rate of change (assumed to be exogenous) of total nominal money balances, M, and π the rate of change of prices, this condition can be stated as

$$(2) \qquad \mu - \pi - n = 0.$$

Thus in the steady state the rate of change of prices equals the rate of change of the nominal money supply, corrected for the rate of increase of output. Note that this is not a statement of the quantity theory, but simply part of the definition of the steady state. Correspondingly, whether or not the quantity theory holds in this model in the long run depends on whether or not it converges to the steady state. It is assumed in this discussion that this convergence does indeed take place. It is accordingly concerned only with the effect of a change in μ on the steady-state values of k and m, and not with the dynamic adjustment process.

Following Mundell (1963a, 1965), the crucial assumption of this model is that whereas investment and saving (and hence consumption) decisions depend upon the real rate of interest, $r = i - \pi$, the decision with respect to the amount of real money balances to hold depends on the nominal rate of interest, i -- for the alternative cost of holding money instead of a bond is precisely this rate. The same is true if we measure this cost in terms of the alternative of holding physical capital: for the total yield on this capital is its marginal product (equal in equilibrium to the real rate of interest) plus the capital gain generated by the price change (π): that is, it is $r + \pi = i$. Alternatively, if we measure rates of return in real terms, the rate of return on money balances is $-\pi$ and that on physical capital r; hence the alternative cost of holding money is the difference between these two rates, or $r - (-\pi) = i$.

At first sight, it seems counterintuitive that this cost is the nominal, and not real, rate of interest. In part, this feeling stems from a somewhat misleading terminology: for unlike "nominal income", the "nominal" or "money" rate of interest does not have the dimensions of money; indeed, it has the same dimensions as the real rate of interest and the rate of inflation -- namely, 1/time. On the other hand, the total cost of holding money balances for a period of time is a real one -- namely $i \cdot (M/p)$ --

which clearly has the dimensions of commodities/time. Similarly, the real value of the seigniorage is $\pi \cdot (M/p)$.

Consider now the commodity market. Let E represent the aggregate real demand for consumption and investment commodities combined. For simplicity, assume that this demand is a certain proportion, α, of total real income, Y. Assume further that this proportion depends inversely on the real rate of interest and directly on the ratio of real money balances, M/p, to physical capital, K. The second dependence is a type of real-balance effect, reflecting the assumption that the greater the ratio of real money balances to physical capital in the portfolios of individuals, the more they will tend (for any given level of income) to shift out of money and into commodities. The equilibrium condition in the commodity market is then described by

$$(3) \qquad \alpha(i-\pi, \frac{M/p}{K}) \cdot Y = Y$$

By assumption, $\alpha_1(\ )$ is negative and $\alpha_2(\ )$ positive, where $\alpha_1(\alpha_2)$ is the partial derivative of $\alpha(\ )$ with respect to its first (second) argument.

Consider now the money market. Following Tobin (1965, p. 679), assume that the demand in this market depends on the volume of physical capital and the nominal rate of interest. More specifically, assume that the demand for money is a certain proportion, λ, of physical capital. Thus the larger K, the greater (other things equal) the total portfolio of the individuals, hence the greater the demand for money: this can be designated as the scale or wealth effect of the portfolio. Assume further that the proportion λ depends inversely on the nominal rate of interest. That is, the higher this rate, the smaller the proportion of money relative to physical capital which individuals wish to hold in their portfolios: this can be designated as the composition or substitution effect. The equilibrium condition in the money market is then

(4) $\lambda(i) \cdot K = M/p,$

where by assumption the derivative $\lambda'(\ )$ is negative.

Dividing equations (3) and (4) through by Y and K, respectively, and transforming them into per capita form, we then obtain the equations

(5) $\alpha(i-\pi,\ m/k) = 1$

(6) $\lambda(i) = m/k.$

From (2) we have that in the steady state, $\mu = \pi + n$. Since μ and n are both assumed to be exogenously determined, the same can be said for the steady-state value of π. Thus in steady states, equations (5) and (6) can be considered as a system of two equations in the two endogenous variables i and m/k, and in the exogenous variable π. Assuming solubility of these equations, the specific value of k (and hence m) can then be determined by making use of the additional equilibrium condition that the marginal productivity of capital equals the real rate of interest, or

(7) $f'(k) = i - \pi.$

In accordance with the usual assumption of diminishing marginal productivity, we also have

(8) $f''(k) < 0.$

The solution of system (5)-(6) can be presented diagrammatically in terms of Figure 0-2. The curve CC represent the locus of points of equilibrium in the commodity market for a given value of π. Its positive slope reflects the assumption made above about the respective influences of the real rate of interest $(i-\pi)$ and of the real-balance effect (as represented by m/k) on α. Specifically, a (say) increase in i increases the real rate of interest and thus tends to decrease α: hence the ratio m/k must increase in order to generate a compensating increase in α and thus restore equilibrium to the commodity market. On the other hand, LL -- the locus of points of equilibriums in the money market -- must be negatively sloped: an increase in the supply of money and hence in m/k must be

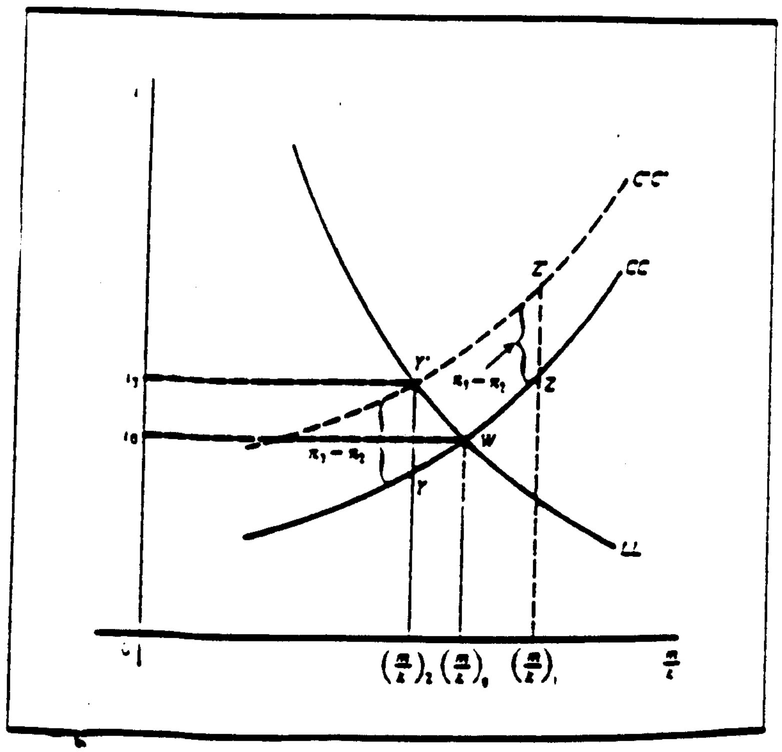

Figure 0-2

offset by a corresponding increase in the demand for money, which means that i must decline. The intersection of the two curves at W thus determines the steady-state position of the economy.

Assume for simplicity that the given value of π for which CC and LL are drawn is $\pi = \pi_2 > 0$, corresponding to the rate of monetary expansion μ_2. Assume now that this rate is exogenously increased to $\mu = \mu_3$, so that (by (2)) the steady=state value of π is increased accordingly to $\pi_3 = \mu_3 - n > \pi_2$. From the fact that π does not appear in (6), it is clear that LL remains invariant under this change. On the other hand, the curve CC must shift upwards in a parallel fashion by the distance $\pi_3 - \pi_2$: for at (say) the point Z′ on the curve C′C′ so constructed, the money/capital ratio m/k and the real rate of interest $i - \pi$ are the same as they were at point Z on the original curve CC; hence Z′ too must be a position of equilibrium in the commodity market.

We can therefore conclude from Figure 0-2 that the increase in the rate of monetary expansion (and hence rate of inflation) shifts the steady-state position of the economy from W to Y′. From the construction of C′C′ it is also clear that the real rate of interest at Y′ is $r_3 = i_3 - \pi_3$, which is less than the real rate at W, namely $r_0 = i_0 - \pi_2$. Thus the policy of increasing the rate of inflation decreases the steady-state real rate of interest, r; because of the diminishing marginal productivity of capital, this implies that the steady-state capital-labor ratio, k, increases. Thus the system is not superneutral.

On the other hand, the system is neutral. This can immediately be seen from the fact that M does not appear in it. It follows that a one-time instantaneous (say) 10% increase in M -- after which the money supply continues to grow at the same rate -- will not affect the steady-state values of m, k, and i as determined by the foregoing system for a given value of μ and hence π. The only difference will be that, at any point of time in this steady state, the price level will be 10% higher than it would have been in the absence of the one-time monetary increase.[19]

Note that in the absence of Keynesian-like interdependence between the commodity and money markets, the system would also be superneutral. This would be the case either if the demand for commodities depended only on the real rate of interest, and not on m/k (i.e., if there were no real-balance effect); or if the demand for money depended only on k, and not on the nominal rate of interest -- an unrealistic assumption, particularly in inflationary situations which cause this rate to increase greatly.

The first of these cases is analogous to the dichotomized case of stationary macroeconomic models discussed below (pp. 242; 251, n. 19; and 297-8). It would be represented in Figure 0-2 by a CC curve which was horizontal to the abscissa. Correspondingly, the upward shift generated by the rate of inflation would cause the new CC curve to intersect the unchanged LL curve at a money rate of interest which was $\pi_3 - \pi_2$ greater than the original one, and hence at a real rate of interest (and hence value of k) which was unchanged: the value of m, however, would unequivocally decline. The second of these cases would be represented by a vertical LL curve. Hence the upward parallel shift in the CC curve generated by inflation would once again shift the intersection point to one which represented an unchanged real rate of interest. In this case (which, as already noted, is an unrealistic one) the value of m also remains unchanged.

Needless to say, the foregoing conclusion that money is generally not superneutral, and that an increase in the rate of inflation will increase the capital/labor ratio, is a product of the model used. It is the same conclusion reached by Tobin (1965) in his seminal article. As shown, however, by Levhari and Patinkin (1968), reasonable changes in Tobin's savings function will render the effect on this ratio indeterminate -- and this is true for the model here developed as well. Similarly, while Sidrauski's model (1967) -- which, unlike all of the foregoing, derives the savings function from utility maximization instead of postulating it -- implies that money is superneutral, Brock (1974) has shown that this result too is not robust.[20]

In concluding this section let me express the general view that whereas there is a firm theoretical basis for attributing long-run neutrality to money (but see Gale, 1982, pp. 7-58, and Grandmont, 1983, pp. 38-45, 91-5), there is no such basis for long-run superneutrality. For changes in the rate of growth of the nominal money supply and hence in the rate of inflation generally cause changes in the steady-state level of real balances; and if there are enough avenues of substitution between these balances and other real variables in the system (viz., commodities, physical capital, leisure), then the steady-state levels of these variables will also be affected. An exception to this generalization would obtain if money were to earn a rate of interest which varied one-to-one with the rate of inflation, so that the alternative cost of holding money balances would not be affected by changes in the latter rate; but though it is generally true that interest (though not necessarily at the foregoing rate) will eventually be paid on the inside money (i.e., bank deposits) of economies characterized by significant long-run inflation, this is not the case for the outside money which is a necessary (though in modern times quantitatively relatively small) component of any monetary system.

The discussion to this point has treated the economy's output as a single homogeneous quantity. A more detailed analysis which considers the sectoral composition of this output yields another manifestation of the absence of superneutrality. In particular, it is a commonplace that the higher the rate of inflation, the higher the so-called "shoe-leather costs" of running to and from the banks and other financial institutions in order to carry out economic activity with smaller real money balances. In the case of households, the resulting loss of leisure is denoted as the "welfare costs of inflation" as measured by the loss of consumers' surplus: that is, by the reduction in the triangular area under the demand curve for real money balances (cf. Bailey, 1956). In the case of businesses, the costs of inflation take the concrete form of the costs of the additional time and efforts devoted to managing the cash flow. What must now be emphasized is that the obverse side of the additional efforts of both households and businesses are the additional resources that must be diverted to the financial sector of the economy in order to enable it to meet the increased demand for its services. Thus the higher the rate of inflation, the higher (say) the proportion of the labor force of an economy employed in its financial sector as opposed to its "real" sectors, and hence the smaller its "real" output. This is a phenomenon that has been observed in economies with two- and especially three-digit inflation (cf., Kleiman, 1984, and Marom, 1988, on the Israeli experience). Viewing the phenomenon in this way implicitly regards the services of the financial sector, not as final products (which are a component of net national product), but as "intermediate" ones, whose function is "to eliminate friction in the productive system" and which accordingly are "not net contributions to ultimate consumption" (Kuznets, 1951, p. 162; see also Kuznets, 1941, pp. 34-45).

8. Concluding remarks. The "veil of money." Needless to say, there are other errors of omission and commission in this book, some minor, some more significant. Thus under certain conditions the real-balance effect might not be strong enough to stabilize the system (Grandmont 1983, pp. 21-27). The phase diagram (as, following earlier mathematical terminology, it is now called in the economic literature as well) on p. 233, and corresponding diagrams on later pages, should all show a dynamic adjustment path which

crosses the CC curve vertically (reflecting the fact that at the point of intersection there is neither excess demand nor supply in the market for commodities) and the BB curve horizontally (reflecting the same for the bond market).[21] The analysis of the effect of an increase in the quantity of money in Chapter X:3 ignores the question of seigniorage (Bohanon and Van Cott, 1987). I realized too late to note the fact that though derived differently, the coefficient of M_0''/p in equation (21) on p. 300 below is a variant of Friedman and Schwartz's (1963, pp. 784 ff.) money multiplier (for further details, see Steindl 1982); and I would now (as in section 6 above) refer to M_0'' as the monetary base. The discussion on pp. 309-10 could have been fruitfully supplemented with a discussion of monetary policy directed at keeping the rate of interest constant, in which case the quantity of money is an endogenous variable. Thus a chance (say) increase in the price level would lead to a decrease in the real quantity of money, hence to an increase in the rate of interest, hence to an increase in the nominal quantity of money proportionate to the initial increase in the price level in order to restore the target value of the rate of interest. It follows that in this case too the price level is indeterminate, in the sense that a chance departure from any given level will not generate any market forces that will return it to its original level, but will instead generate an accommodating change in the nominal quantity of money.

And I have no doubt that the reader can find other examples of errors.

I conclude with a detective story. The mystery which Otto Steiger and I set out to solve (1989) was that of the origin of the term "neutrality of money" (which plays such an important role in this book), as well as of its cognate, "veil of money." The notion of neutrality, though not the term, goes back of course to early statements of the quantity theory, such as the classic one by David Hume in his 1752 essays "Of Money", "Of Interest" and "Of the Balance of Trade". One would have thought that an author who (in the spirit of Hume) made the famous statements that "the relations of commodities to one another remain unaltered by money" and that "There cannot, in short, be intrinsically a more insignificant thing, in the economy of society, than money" (Mill 1871, p. 488) would also have made use of one or both of these terms. We did not, however, succeed in finding them in any of Mill's writings. Indeed, the terms came into use only in the first third of the present century.

In particular, the term "neutrality of money" in its present sense first appeared in the writings of German and Dutch economists in the decade after World War I. It was introduced into the English-speaking world by Hayek in his 1931 lectures at the London School of Economics, who wrongly attributed the term to Wicksell (1898). Insofar as "veil of money" is concerned, it apparently first appeared (in its German equivalent, "Geldschleier" or "Schleier des Geldes") in the writings of Robert Liefmann (1917, p.73), a relatively well-known German economist of his time. Its first appearance in the English literature was in Dennis Robertson's Cambridge Economic Handbook on <u>Money</u> (1922, p.1). We have no evidence as to whether or not Robertson was influenced by the German literature.

But we ended our "quest for the holy veil" with a sense of incompleteness. For Liefmann (1919, p. 100) also referred to "innumerable political economists [who] have used the term." And in a book which actually bears the title <u>The Veil of Money</u> (1949), Pigou referred to its "common use among economists" before World War I (ibid., p.18). We have not, however, succeeded in finding instances of such earlier usage.[22]

ENDNOTES

[1]This Introduction was written while I was serving as a visiting professor at the University of California, Los Angeles, where I benefited greatly from the stimulating interactions with -- and criticisms and suggestions of -- Michele Boldrin, Sebastian Edwards, Roger Farmer, Gary Hansen, Axel Leijonhufvud, David Levine, Seonghwan Oh, Joseph Ostroy, Torsten Persson, and Guido Tabellini. I am also indebted for valuable comments and suggestions to William Baumol, Yoram Ben-Porath, Alan Blinder, Michael Bruno, Stanley Fischer, Elhanan Helpman, Peter Howitt, Ephraim Kleiman, David Laidler, and an anonymous referee.

The usual caveat holds that responsibility for the views expressed rests with me; indeed, anyone familiar with the writings of the aforementioned knows that some of them are in basic disagreement with some of these views.

I wish also to express my appreciation to Sumit Chadha for technical assistance which she carried out with great care and responsibility; and to Lorraine Grams for so patiently and most efficiently typing this Introduction through its successive drafts.

My thanks also to Terry Vaughn, Economics Editor of the M.I.T. Press, for his patient cooperation and constant encouragement.

Finally, I would like to express my thanks to the Central Research Fund of the Hebrew University of Jerusalem for financial support.

[2]I would, however, now add a separate Note to show that Friedman's (1956) "modern quantity theory" is a misnomer for a theory that is actually much closer to the Keynesian liquidity-preference theory than to the traditional quantity theory: for details, see Patinkin 1969a and 1972b.

[3] See Fischer's illuminating survey of this literature (1988, pp. 315-25). The term "New Keynesian Revival" is his. See also Howitt's 1986 paper on "The Keynesian Recovery." Included under the heading "seemingly irrational" is the assumption of sticky money wages in the face of unemployment, on whose rationalization the "new classical macroeconomics" has insisted. This insistence has stimulated much of the fruitful research carried out by the aforementioned "Revival".

[4] Cf., e.g., Geary and Kennan (1982) and references there cited. This however, remains a much debated question in empirical research on the labor market.

Note that the replacement on the vertical axis of the original Phillips curve of the rate of change of wages, by the rate of change of prices -- on the implicit or explicit assumption that price is a constant percentage markup of costs of production -- also implies that the real wage does not change with the level of employment.

[5] In the light of the experiences of Eastern European countries during the last two decades, we can now see that this is a naive view of what even a "highly authoritarian society" can do: but that is not relevant to my present point.

[6] The quotation is from the first paragraph of Chapter 19 of the <u>General Theory</u>; see also p. 266 of that chapter. See also p. 339 below.

In order to avoid any possible misunderstanding, I wish to emphasize that my point here has to do with the stability of the dynamic adjustment process and not with the fact that the so-called "natural rate" may itself change.

[7]The following paragraphs are taken from my 1967 Wicksell Lecture. For a recent detailed discussion of the real-balance effect qua wealth effect, see the monograph by Sweeney (1988).

[8]This is the intuitive interpretation of Barro's analysis that I heard many years ago from my colleague Nissan Liviatan. See also the elegant geometrical exposition of this analysis by Fershtman and Pirchi (forthcoming).

[9]The presentation in this section has benefited greatly -- and some errors in earlier drafts removed -- as a result of detailed discussions, and sometimes discussions-cum-disagreements, with Peter Howitt, David Levine, Seonghwan Oh, and Joseph Ostroy, to all of whom I am much indebted. In some cases, the discussions led to the resolution of disagreements; in others, basic disagreements with some of the above have remained.

[10]The following discussion of the overlapping-generations model draws freely on my contribution to the 1983 Samuelson Festchrift. In it I also pointed out that, significantly enough, neither in his seminal 1958 paper nor afterwards has Samuelson ever contended that his model constituted a microeconomic basis for monetary theory; he has regarded it instead as a contribution to capital theory. I think that we should give much weight to this "revealed preference"!

[11]This is the assumption that should have been specified at the beginning of Mathematical Appendix 6:a below, and on which the analysis there presented is actually based. The present misleading reference there to equiproportionate changes in prices was simply intended to justify the treatment of all commodities as a single, composite one.

[12]As noted on p. 37 below, "equality between the number of unknowns and independent equations is neither a necessary nor a sufficient condition for the existence of a solution." It is, however, a necessary -- but not sufficient -- condition for the peace-of-mind of those of us who do not aspire to the rigor of mathematical economists.

[13]Note that the first of the foregoing assumptions solves the "hot potato" problem to which Cass and Shell (1980, p. 252) refer: that is, since the individual assumes that there is a future after the third period, he also assumes that he will be able to exchange money for commodities during that period, and hence can rationally plan to hold money at the end of the second period to carry over to the third.

This footnote replaces the incorrect discussion of the "hot potato" problem in my contribution to the Samuelson Festschrift (1983, p. 161, bottom).

[14]Note too that if the period of time with respect to which velocity is measured coincides with the individual's planning period, then the constant velocity will equal unity. This specific value, however, is a result of our arbitrary choice of the unit of time.

[15]Thus Barro and Fischer' 1976 survey of "Recent Developments in Monetary Theory" (p. 247) barely mention Clower's 1967 article, and even then not in the section devoted to "The Theory of Money Demand".

[16]This assumption in itself is inconsistent with a theory of money. For it leaves Kohn's model open to Hicks' (1933) well-known and basic criticism of Walras' model: namely, that there is no reason to hold money if instead one can hold perfectly liquid interest-bearing bonds.

[17]The same interpretation, *mutatis mutandis*, can be given of the cash-in-advance-*cum*-precautionary-demand model that was earlier developed by Helpman and Razin (1982). In the case considered by them, the individual is assumed to be deciding on his holdings of domestic as against foreign currency in the face of uncertainty with respect to possible future differential movements of domestic and foreign price levels.

[18]On the distinction between internal and external stimuli for the development of science, see Laudan (1977), chapter 7.

[19]For diagrams which highlight the difference between this case and that of a change in the rate of change of the money supply, see Patinkin (1972a), pp. 202-04. These also show the difference between their respective dynamic adjustment paths from one steady state to the other.

[20]For further details, see Patinkin (1987c), pp. 643-44.

[21]For details, see Patinkin (1974).

[22]Another interesting aspect of the story is that Liefmann (1919, p. 100) likened the metaphor "veil of money" to "veil of the Maya" ("dem 'Schleier der Maja'", in the original German), which was the term that Schopenhauer (1818, pp. 253, 352, *et passim*) used to denote his basic philosophical view that what appears as the real world is actually an illusion. And the term "Maya" in turn goes back to Indian philosophy of the mid-second millenium B.C.! For further details, see *ibid.*, Appendix.

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