A REFORMULATION OF MACROECONOMIC THEORY

By

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INTRODUCTION

This paper is a reformulation of macroeconomic theory designed to overcome four basic difficulties in the received theory.

The primary difficulty is the logical inconsistency of received macro-economic theory with the marginal productivity theory of factor pricing. Since received macroeconomic theory has a marginal product of labor equal to the real wage and a diminishing marginal product of labor, there must be another factor present to absorb the surplus product. We can call this factor "capital" and, to maintain an economy of variables, assume it is physically homogeneous with the produced output. Then, simple marginal productivity theory says that the marginal product of this factor is equal to its real rental rate. This rate, plus the factor's expected rate of price appreciation, is the money rate of interest. But there is no reason for this rate of interest to equal the money rate of interest obtained from the liquidity preference and spendings functions of received theory. An inconsistency thus appears within the received theory once we recognize the necessity of a market for the services of a non-labor input, a recognition which amounts to adding an independent equilibrium equation without adding a corresponding variable.[1]

[1]Numerous authors have pointed out the inconsistency of Keynesian interest theory with neoclassical marginal productivity theory. But they have not seen the need for the extra equation describing equilibrium in the capital services market, and

We shall reformulate macroeconomic theory to remove this basic inconsistency. Our resulting macroeconomic model is protected against this kind of inconsistency as it is derived as a special case of a general model of temporary competitive equilibrium. It is the special case in which there is a single money market and production of a single output with two factors. Our derivation imples the irrelevance of Keynesian spendings functions in determining a macroeconomic equilibrium for a given rate of expected inflation. In order to determine such an equilibrium, one need know only an aggregate production function, the factor supply functions, and an excess demand function for money. Keynesian spendings variables are relevant only as parameters in determining the parametrically given, expected rate of inflation. This result reveals the second basic logical defect in Keynesian theory: an _equilibrium_ rate of aggregate spending (i.e., an equality of _ex ante_ savings and investment) is a logical possibility only

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thus they have not regarded the inconsistency as a direct logical threat to Keynesian models. Rather, they have unfortunately been satisfied, at least since the classic paper of Lerner, with a conjecture that the difference in interest rates vanishes when there are increasing costs of producing capital relative to consumption goods. The error in this conjecture, an error first suggested by Stockfish and fully exposed very recently by Floyd and Hynes, is simply that increasing costs of producing investment goods will not generally permit the interest rate determined by marginal productivity theory to vary in a Keynesian fashion.

A legitimate way to account for the difference in interest rates would be to follow Patinkin in assuming the presence of "bonds" which receive the "rate of interest" referred to in the standard theory, a rate of interest which differs from the money rate of return on real capital because of positive transaction costs in the process of lending to owners of capital. But received macroeconomic theory would still be inconsistent with marginal productivity theory because of arbitrage between the two interest rates, where the transaction costs in the process of lending to capital owners will determine the relationship between the rates. This arbitrage would provide a constraint on the behavior of the bond rate which, as shown in Section III of this paper, is generally not satisfied in standard formulations.

Finally, there would be no difference in interest rates, and no extra equation, if the implicit market excluded with Walras' law in a Keynesian model were simply a capital services market. However, this interpretation of a Keynesian model is inconsistent with the rest of the model, as we shall see in Section II of this paper.

in a model which also determines an <u>equilibrium</u> rate of inflation. Suggestions

of the same proposition are also found in Foley and Sidrauski.

Correcting the two basic logical errors in Keynesian theory -- a theory which

requires an equilibrium rate of spending -- thus requires adding to a standard

Keynesian model: (1) a new independent equation describing equilibrium in

the market for capital services and (2) a new equilibrating variable, the rate

of inflation. Although most macroeconomists, this one included, are unwilling

to admit sufficient foresight to allow an equilibrating rate of inflation for

empirical business cycle analysis, we shall examine such an environment

sufficiently to show that key, Keynesian, comparative-static conclusions

cannot hold even when we permit an equilibrium rate of aggregate spending in

a model consistent with marginal productivity theory.

Besides consistency with elementary capital theory, the important advantages

of our basic macromodel over the received models in describing a modern money

economy are that:

o It is relatively easy to estimate;

o It explains Gibson's Paradox, the observation that interest rates and
   prices move together over business cycles even though at least some
   of the cycles have monetary causes;

o It reveals the existence of a dangerously unstable equilibrium (or
   the non-existence of an equilibrium with a positive price level) that
   does not appear in received models, showing at the same time the
   desirability of secular inflation in reducing the chances of a vicious
   plunge toward a zero price level;

o It can determine the effects of a shift in the supply of non-labor
   factors such as the recent backward shift in foreign oil supplies.

The third basic difficulty with macroeconomic theory is its inability to

evaluate the relative dynamic efficiency of alternative monetary systems. By

describing how various competitive monetary institutions enter into a

macroeconomic model, we are able to specify a type of competitive monetary

system which is <u>both</u> statically and dynamically superior to <u>both</u> a classical, commodity standard system and the modern system in which there is an exogenously controlled money supply and a constraint on the payment of interest on money.

The fourth difficulty with received theory (where "received theory" includes the recent models of rational unemployment based upon the pioneering work of Alchian and Allen, 1964) is its inability to explain several obvious empirical observations concerning unemployment. First, it fails to explain why many developed countries have imposed a secular subsidy to unemployment, observed in the United States in the form of mandatory, fixed-premium, unemployment insurance. Second, the received theory of unemployment fails to explain the behavior of employment and real wages in the U.S. during the Great Depression; it explains neither the persistence of the high level of unemployment throughout the Great Depression (1930-1936), the absence of any significant increase in real wages during the rapid decline in output from 1930 to 1933, nor the ensuing dramatic increase in real wages from 1933 to 1936.[2] Our reformulation of macroeconomics contains a theory of rational unemployment which can explain these observations.

The paper will proceed as a reconstruction of simple macroeconomic theory which, in the process of reconstruction, overcomes these four basic difficulties in the received theory.

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[2] These observations on real wages would be consistent with current macroeconomic thought if employers were unduly pessimistic about output prices during the period of decline, which would make realized competitive wages fall short of expected marginal products during that period, and if employers were unduly optimistic about output prices during the period of advance, which would make realized competitive wages exceed expected marginal products during that period. However, such an expectation hypothesis is the opposite of what appears to be reasonable.

I. A TEMPORARY EQUILIBRIUM WITH KEYNESIAN UNEMPLOYMENT

The Definition of Temporary Equilibrium

Let X_{tj} be the excess market demand in the tth period for the jth commodity, P_{tjis} the ith individual's expected money price of commodity j in period t in state s, and I_{ti} the ith individual's information set in period t regarding the various possible future states of nature (where $t = 1,...,T$; $i = 1,...,N$; and $j = 1,...,M$). P_t and I_t are, respectively, the sets of all current prices and all information sets in period t.

A temporary equilibrium is a non-negative set of present prices, P_1^*, such that

$$(1) \qquad X_{1j}[P_1^*, P_2(P_1^*),...,P_T(P_1^*), I_1(P_1^*)] \leq 0 \text{ for all j.}$$

The initial state of nature, s_1, is known to all, and all possible temporary equilibrium prices are the same to all individuals. Hence, the set of all possible, temporary equilibrium prices is described by $P_{1jis_1} = P_{1j}$ for all i. It also follows from the fact that all possible temporary equilibrium prices are the same for all individuals that the aggregate of the individual budget identities for the first period yields Walras' Identity for the period. Hence,

$$(2) \qquad \Sigma_{j=1}^M P_{1j} X_{1j}(P_1) \equiv 0.$$

The existence of a temporary equilibrium, given (2) and the continuity of $X_{1j}(P_1)$, follows from the general existence theorem of Arrow and Hahn.

Inefficient Temporary Equilibria

If individuals are all rational, have the same information regarding future states of nature, and know which temporary equilibrium prices will result under each possible state of nature, then the resulting sequence of temporary equilibria, which can be called a "full equilibrium", is a Pareto optimum under an appropriate legal system (Thompson, 1974). Conversely, the temporary

equilibrium which results when individuals have different information on the state of nature or have incorrect price expectations for a given state of nature is generally inefficient [see Hirshleifer or Thompson (1966)]. These two results suggest that economic policy should be devised to alter the parameters of a temporary equilibrium in order to induce behavior equivalent to that which occurs in a full equilibrium. It is this policy framework that motivates our construction of simple macroeconomic models.

One might, however, reasonably doubt that government policy makers have systematically better information than private decision makers regarding future states of nature or prices. Such doubting would be particularly strong for commodity markets, where, in the real world, market specialists normally arbitrage between present and future markets. This will be reflected in our subsequent assumption that commodity prices are a martingale. But laws prohibiting long-term labor contracts have effectively prevented human capital from coming under the control of market specialists. As a consequence, the typical laborer, who is not naturally an expert in the market for his kind of service, makes his own employment decisions despite his relative ignorance about this market.[3/]

A Temporary Equilibrium with Keynesian Unemployment

In a temporary equilibrium with Keynesian unemployment, laborers are overly optimistic regarding their future job opportunities within their present occupations and thereby devote too much present time to resting or searching for high-wage jobs and too little time to present employment (as originally described

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[3]We are not implying any criticism of the observed government policies. The deadweight social losses in terms of transaction costs resulting from ownership transfers between parties with different information may not be worth the possible allocative improvement resulting from such transfers [see Hirshleifer or Thompson (1966)]. Government restrictions on such tranfers are then in order.

by Alchian and Allen).[4] Obversely, in a temporary equilibrium with "Keynesian" overemployment, laborers as a group are overly pessimistic about their future wage offers in their present occupations and thereby spend too little present time resting or seaching out other employment opportunites.

Starting from a position of full equilibrium, an exogenous shift creates a temporary equilibrium with Keynesian unemployment when there would be an overall excess supply of labor at the original wage rates and some laborers mistakenly believe that the resulting lower wage offers from their present employers may be a result of a shift which lowers the value of their products in their present firms relative to other firms who hire workers in their occupations. As a consequence, some of these laborers refuse the lower wage offers from their present employers and spend their present labor service inefficiently searching for higher-wage jobs in their present occupation or resting in wait for what they expect to be the higher future wages. [See Lucas or Thompson (1973)]

Since monetary shifts, which are apparently observed to induce inefficient adjustments in employment, also change the temporary equilibrium level of prices of current outputs, we must assume that some workers do not know of the present change in the price level. Otherwise, all workers, in responding to a monetary shift, would be able to observe the price level change which accompanied the change in their wage offers and would not make the mistake of assuming that wage offers elsewhere have not similarly changed. An additional indication of the accuracy of this assumption can be found in the widespread impression that workers feel worse off in recessions and better off in booms.

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[4] While this perhaps should be called "Alchianian unemployment," we can see no other rationale in a competitive temporary equilibrium for what Keynes considered to be inefficient unemployment.

If workers did not systematically undervalue price level changes during normal business cycles, they would feel better off in a normal recession than in a normal boom.

Corresponding to the above discussion, a function determining the supply of current labor to a given occupation appropriate to a model of temporary equilibrium admitting Keynesian unemployment is

$$(3) \qquad L_S = L(W_1, W_2(W_1), \ldots; P_1^{-W}(P_0, W_1), P_2^{-W}(P_0, W_1), \ldots) = L[W_1],$$

where L_S is the current quantity of labor supplied, W_t is the expected wage in period t, and P_t^{-W} is the set of expected prices other than wages in period t. Assuming a positive derivative of $L[W_1]$, this can also be written as

$$(3') \qquad W_1 = W[L],$$

where $W[\cdot]$ defines a supply-price function.

The price level of current outputs is only an expectation function for these laborers, as they cannot be assumed to know the actual price level in the current period. This/represented in (3) by allowing labors' perception of current non-labor prices to depend only on last period's prices, which are parameters rather than variables to be determined, and on current wage offers.[5]

The fact that workers believe that an overall shift in demand for labor may be only an inter-firm shift is expressed in an inelasticity of expected future wages, and other expected prices, with respect to W_1. Since the effect of

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[5] This could be weakened to allow laborers to know some current prices (especially the prices of goods they may buy in the current period), but we retain the unnecessarily strong specification to facilitate later aggregation to a single output. We could also allow some workers to know the current price level. But such a generalization would add nothing but notational complexity to our subsequent model.

a change in W_1 on non-labor price expectations and the effect of a change in non-labor prices on L_S are <u>both</u> likely to be fairly small, we can ignore the effect of a change in W_1 on L_S through the effect which W_1 has on expected non-labor prices. But because the percentage change in the expected wage, W_t, $t \geq 2$, is significantly less than the percentage change in $W_{,1}$ for several workers, a decrease in W_1 will induce, rather than the insignificant effect on L_S which would occur if all workers knew that the shift were overall, a significant increase in several workers' expected values of future work relative to present work and thus a significant substitution of expected future work for present work. Thus, from the standpoint of labor's reaction to overall shifts in demand for labor, the supply of labor is too elastic.

II. TEMPORARY EQUILIBRIA RESULTING FROM A KEYNESIAN LEVEL OF AGGREGATION

We now aggregate our temporary equilibrium model to a Keynesian level
to facilitate comparisons with standard Keynesian models. Besides money,
the model so aggregated contains a single labor aggregate which produces a
single capital output. Also, as noted in the introduction, the diminishing
marginal product of labor essential to any Keynesian environment implies
the existence of a non-labor input, which, for an economy of variables, we
take to be the services of capital. Thus, imposing a Keynesian level of
aggregation, the minimum number of goods in the model is four, money (M),
capital goods (C), labor (L) and capital services (K). There is a current
market and price for each good. The price of current money is set at unity,
the price of current labor is W, the price of renting capital is R, and the
price of current capital goods, the "price level," is P. Using Walras' Law
to eliminate the market for C, and assuming that all equilibrium prices are
positive, we can use the following three equations to determine competitive
prices:

$$(4) \qquad X_K(W,P,R) = 0$$

$$(5) \qquad X_L(W,P,R) = 0$$

$$(6) \qquad X_M(W,P,R) = 0.$$

Our four equation system differs from the standard, abstract, four-equation
representation of the Keynesian system, as described by Patinkin, in that it
replaces the standard bond market with a market for capital services. Since
there are no compelling a priori restrictions on the nature of the excess demand
function for bonds, the usual formulation omits the bond market with Walras' Law
and retains the market for capital goods--representing equilibrium in this

commodity market with an equality between savings and investment. Thus, the above set of three equations which we use to solve our system differs from the standard, three-equation set simply in that ours replaces the savings-investment equality with an equality of the demand and supply of capital services. Our recognition of the necessity of a capital services market thus allows us to substitute the powerful prior economic restrictions on input markets implied by neoclassical production theory for the familiar Keynesian conjectures regarding savings and investment behavior. Later, in attempting to resolve the difference between our results and Keynesian results, we shall find a major capital theoretic fallacy in Keynes' treatment of savings and investment. This will indicate that a second distinguishing feature of our temporary equilibrium model is that the commodity market describes a market for commodity stocks rather than flows as long as the rate of inflation remains a parameter rather than an equilibrating variable.

Equilibrium in the Factor Markets

Assuming that the markets for the factors of production are perfectly competitive and that the aggregate production function, $F(K,L)$, has positive first derivatives and negative second derivatives, we can represent equations (4) and (5) by

$$(4') \qquad R = P \frac{\partial F(K^*,L)}{\partial K}$$

$$(5') \qquad W(L) = P \frac{\partial F(K^*,L)}{\partial L} \text{,}$$

where K^* is the fixed endowment of capital and $\frac{dW(L)}{dL} \geq 0$, which reflects the presence of sticky, and possibly rigid, money wages resulting from the erroneously inelastic future wage-level expectations discussed in Section I.

The one-period money rate of interest is given by

$$(7) \qquad r = \frac{R}{P} + \frac{P^e - P}{P},$$

where P^e is the expected level of prices in the next period.[6] We assume, as

is conventional, that P^e varies in proportion to P so that $\frac{P^e - P}{P}$, the

expected rate of inflation, is constant.[7]

Using (5'), a given P will determine an equilibrium level of L; then,

using (4'), this level of L will determine an equilibrium R for the given P.

In this manner equilibrium R is determined for each possible level of P.

Hence, we can construct the following curve, the FF curve, describing equili-
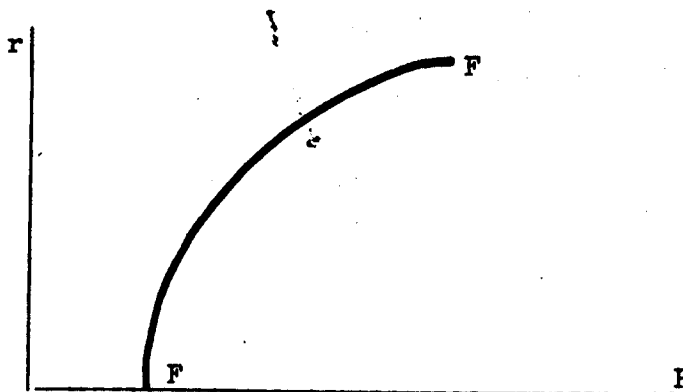
brium in the factor markets:

Figure 1. Equilibrium in the Factor Markets

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[6] Equations (4'), (5'), and (7) are familiar, simplifying approximations to
the economically correct conditions. (4') and (5') are approximate because the
output of a production process comes after the inputs are employed so that a
slight, possibly arbitrarily small, discount factor should be applied to P in
computing the values of the marginal products. (7) is an approximation of the
money rate of return on capital because R is received in the beginning of the
period and may be reinvested for compound interest, adding a "second order of
smalls" term, $\left(\frac{R}{P}\right)r$, to the definition of r in (7). None of these simplifica-
tions is crucial to our argument.

[7] More generally, $(P^e-P)/P$ is a wealth-weighted average of individual inflationary
expectation rates. The assumed absence of any significant effect of present
prices on this average rate of expected inflation is a reflection of a world in
which, roughly speaking, the number of times that a given commodity price change
is followed by another step in the same direction is not significantly different
than the number of times that the given change is followed by a step in the
opposite direction. Evidence for this property of commodity prices is abundant
(See, for example the review of Fama).

That r rises with P is due to the fact that when there are only two factors of production and a linearly homogeneous aggregate production function with a diminishing marginal product of labor (i.e., $\frac{\partial^2 F}{\partial L^2} < 0$), the factors of production must be complementary. Under these conditions the increase in L induced by an increase in P will, by increasing $\frac{\partial F(K^*,L)}{\partial K}$, increase R more than in proportion to the increase in P. It is plausible to assume a rising supply price of labor and an elasticity of substitution between labor and capital which is no greater than unity; thus, the FF curve is drawn concave from below. Also, it is plausible that there is some positive money wage at which no labor will be supplied and an upper bound to the marginal product of labor; so the FF curve becomes vertical at sufficiently low price levels, indicating that real wages are so high that no production is profitable. Finally, a physical limit to the quantity of labor service possible during the time period implies that the FF curve is bounded from above.

Equilibrium in the Money Market

We turn now to the combination of P and r that will produce an equilibrium in the money market. In a Modern Money Economy, money is a non-interest bearing asset whose supply may be taken as an exogenously determined constant. With such monetary institutions, the greater P and higher demand for money implies an excess demand for money. Therefore, a higher interest rate is required to reduce the demand for money sufficiently to restore equilibrium in the money market.[8/] The curve showing the levels of r and P consistent with equilibrium in the money market, the standard LM curve, is as shown in Figure 2.

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[8] We may adopt here the standard simplification that the aggregate demand for money is insensitive to the wage rate. Without this assumption, and without a rigid money wage, the r-P combination generating "equilibrium in the money market" should be interpreted as the r-P combination generating equilibrium in both the money and labor markets. And the conceptual experiment described in the text would be more completely described as follows: A greater P implies a greater W to achieve equilibrium in the labor market. The greater P,W pair then implies a greater r in a Modern Money Economy in order to reduce the demand for money back to the original supply of money. The result is again an LM curve with the standard curvature.
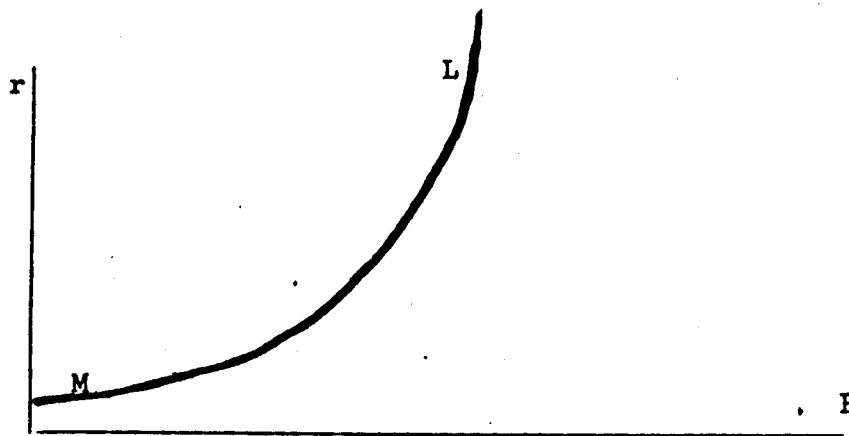
Figure 2. Equilibrium in the Modern Money Market

This curve displays the values of P and r which simultaneously satisfy equations (6) and (7) (and also equation (5') if X_M is sensitive to W and W is not rigid). The curve shows a positive lower bound on r because of the plausibility of a liquidity trap and is drawn convex from below because of the weight of numerous theoretical and empirical studies.

In a Classical Money Economy (Thompson, 1973), money is competitively supplied and varies with the demand for money so as to keep the price level constant at a predetermined conversion rate of money into commodities. The resulting LM curve is shown in Figure 3.
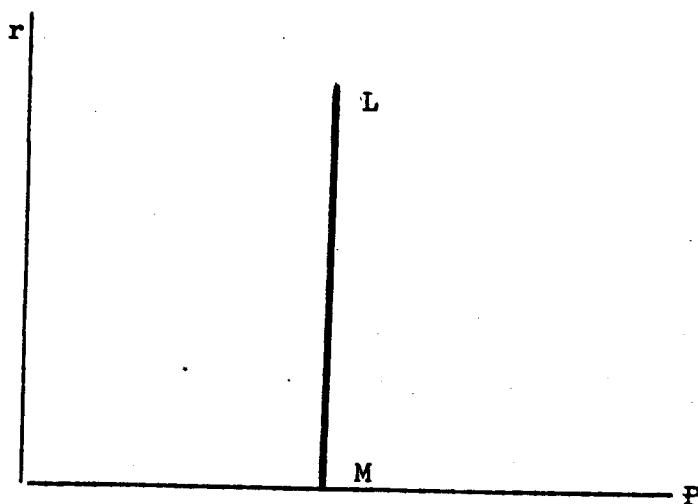

Figure 3. Equilibrium in the Classical Money Market

Temporary Equilibrium for a Modern Money Economy

1. Graph of the Solutions

The FF curve and the LM curve for a Modern Money Economy are superimposed in Figure 4 to determine the pairs of r and P that are consistent with a temporary equilibrium in all markets in a Modern Money Economy.

The equilibrium points in the commodity market for a Modern Money Economy, the CC curve (as implied by Walras' Law), are also shown in Figure 4. By Walras'
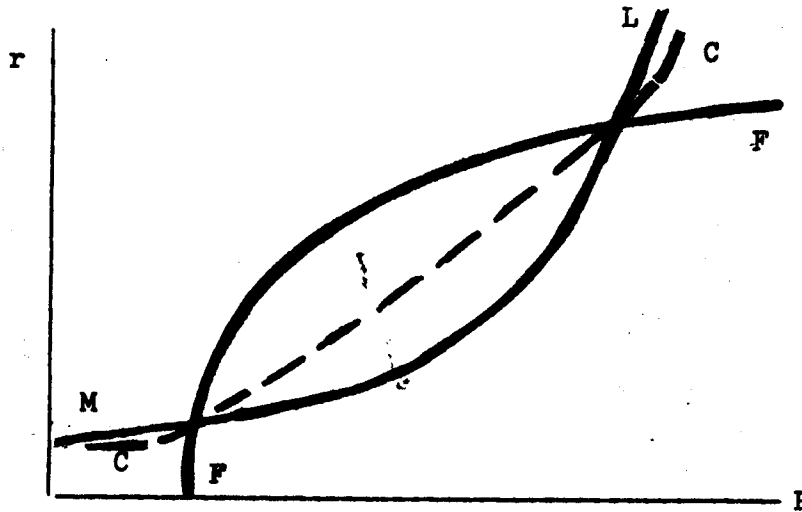

Figure 4. Temporary Equilibrium Points for a Modern
Money Economy

Law, the curve must connect the equilibrium points and stay between the FF and LM curves, the latter following from the fact that the excess demand for both money and resources are of the same sign for points which are not between the LM and FF curves. The economic rationale behind the positive slope of the CC curve is that, starting from a commodity market equilibrium, a higher price level will reduce the demand for the existing stock of commodities so that a higher rate of return to owning commodities will be required to restore the original level of demand for them. Our CC curve contrasts sharply with the familiar IS curve in conventional macrotheory, a curve which has a negative slope and is generally supposed to represent points of equilibrium in the

commodity market. The source of the difference is that the conventional IS curve is an attempt, albeit misplaced, to determine an equilibrium _flow_ rate of spending on commodities rather than an equilibrium in the market for owning a _stock_ of commodities. While equilibrium in the latter market is described by our CC curve, equilibrium in the former, flow market requires that we go beyond a simple, single-period, temporary equilibrium model with a parametrically given rate of inflation, which we do in Section III.

2. _The role of aggregate spending and the Keynesian Stock-Flow Fallacy_

All of this is not to say that the flow of aggregate spending is irrelevant to our temporary equilibrium. The expected rate of inflation may depend parametrically upon the expected rate of spending. Then, an increase in the expected rate of spending on consumption or investment (or, more generally, an increase in the expected _future_ excess demand for goods at the originally expected prices) would, by increasing P^e and thus r for a given R/P, shift up the FF curve. In a Modern Money Economy, this shift induces a movement out of money in the current market (a movement along the LM curve) and a higher current price level. This exogenous treatment of spendings variables, while perhaps most practical from the standpoint of business cycle policy, does not capture the Keynesian concept of an _equilibrium_ rate of expenditures.

In order to obtain an equilibrium rate of expenditures -- and thus an equilibrium rate of capital accumulation -- a corresponding price variable must be added. The only economically natural price to introduce to equilibrate the demand and supply of next period's capital goods is the price of next period's capital goods. This converts P^e into an equilibrating variable. Indeed, Section III below will show that if P^e is made the equilibrating price variable, making the rate of inflation an independently equilibrating variable rather than an expectations parameter determined by other variables in the system and extending the

temporary equilibrium to a two-period equilibrium model in which only prices

in the third and later periods may be incorrectly expected in the current period,

the Keynesian expenditures condition, the equality of ex ante savings and

investment, is indeed achieved. However, Section III will also show that the

familiar Keynesian comparative-static results that are based upon a negatively

sloped IS curve fail to hold in the extended model just as they fail in the

above, single-period model.

3. Stability

In Figure 5, E_s denotes a "stable" equilibrium, and E_u denotes an "unstable"
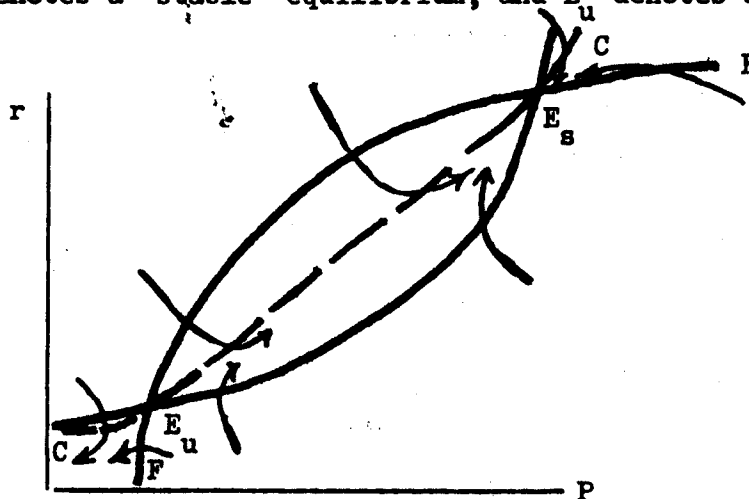
equilibrium.

Figure 5. Possible within-period dynamic paths for a
Modern Money Economy.

An equilibrium is "stable" when any sufficiently small change in prices away

from the equilibrium implies prices changes which return the economy to that

equilibrium. The dynamic price adjustment conditions are:

(7) $\quad \frac{dP}{dt} = f_C(X_C), \quad f_C(0) = 0 \quad$ and $\quad f_C' > 0, \quad$ and

(8) $\quad \frac{dr}{dt} = f_K(X_K), \quad f_K(0) = 0 \quad$ and $\quad f_K' > 0,$

where the labor market is assumed to remain in temporary equilibrium, as necessarily occurs when the supply price of labor is constant, indicating rigid, rather than just sticky, money wages. The possible dynamic paths are indicated by the arrows in Figure 5. There is an unstable equilibrium at low output prices and interest rates which points out the dangerous possibility of a vicious decline toward zero production in a Modern Money Economy. When output prices fall, capital rentals fall, which induces increases in the demand for money, which makes output prices fall even faster, etc.

4. A Dynamical Advantage of Secular Inflation in a Modern Money Economy

The above analysis can be used to establish a dynamical advantage of secular inflation in a Modern Money Economy. Suppose we reduce the rate of secular inflation, shifting down the FF curve by the reduced rate of inflation (and then shifting it part of the way back up, because of the induced reduction in full equilibrium money wages, so that employment and thus real interest rates remain unchanged). Since the distance between the stable and unstable equilibrium points is now smaller, and the danger zone of Figure 5 in which prices and production plunge toward zero is now larger, the likelihood of the plunge towards zero is increased. Furthermore, a sufficiently large reduction in the rate of secular inflation in a Modern Money Economy will shift down the FF curve to where it will not   touch   the LM curve. The dynamic adjustment conditions in (7) and (8) then imply an inevitable decline towards zero output prices and production.[9] This is illustrated in Figure 6.

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[9] If our aggregative model allowed the possibility of some zero prices, as admitted in our general temporary equilibrium model specified in part I, there would be a stable equilibrium at a zero P and positive r, where the LM curve would cross the vertical axis. The FF curve would move left along the P axis until it hit the origin, at which point it would rise to meet the LM and CC curves at a stable equilibrium.
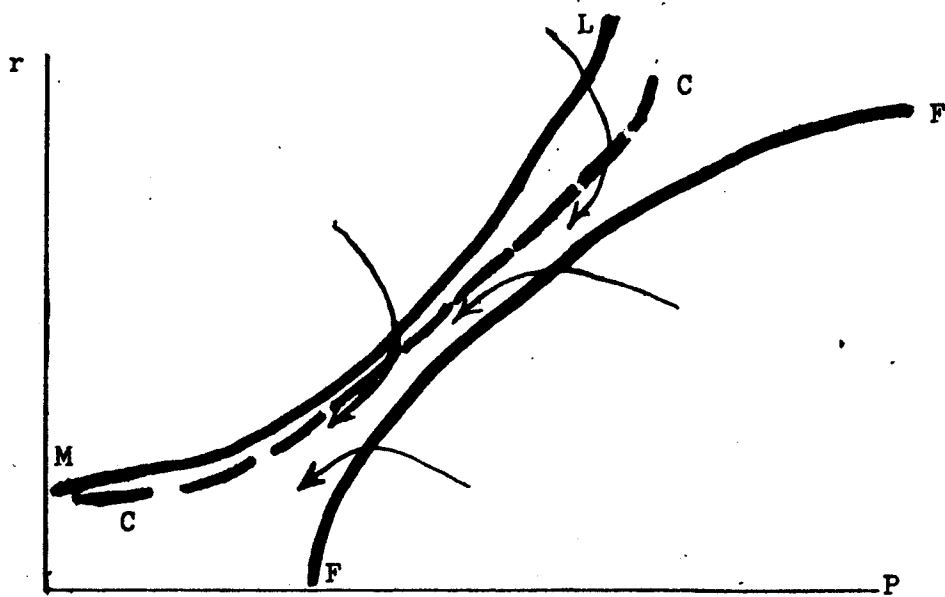
Figure 6. The Extreme Danger of a Sufficiently Low Rate of Secular Inflation

Our assumption that there is a stable temporary equilibrium at strictly positive prices implies that the rate of expected inflation in a Modern Money Economy is sufficiently high that the FF and LM curves intersect. Our subsequent discussion of comparative statics in a Modern Money Economy will assume that this stable equilibrium is achieved.

5. Comparative Statics and Gibson's Paradox

Our temporary equilibrium model implies that a leftward shift of the LM curve, which occurs in a Modern Money Economy when there is a shift up in the excess demand for money, will lower both the stable equilibrium price level and interest rate. In contrast, in a standard Keynesian model, a leftward shift in the LM curve will increase the equilibrium interest rate while it lowers the equilibrium price level because of the negatively sloped IS curve. Of course, a downward shift in the FF curve, like a downward shift in the Keynesian IS curve, will reduce both the price level and interest rate in stable temporary equilibrium. Our model thus implies that the stable equilibrium interest rate

and price level will be positively related for <u>all</u> business cycles while the Keynesian model implies that business cycles induced by monetary shifts will be characterized by opposite movements of the equilibrium interest rate and the price level. "Gibson's Paradox" is the historical observation that interest rates are low during all periods of low prices and high during all periods of high prices while the observed fluctuations are at least sometimes due to monetary shifts. This observation is implied by our model of temporary equilibrium but is inconsistent with, and is indeed a "paradox" within, conventional Keynesian Models.

Temporary Equilibrium in a Classical Money Economy

1. Graph of the solution with a Classical Money Economy

Figure 7 shows the solution r,P for a Classical Money Economy.
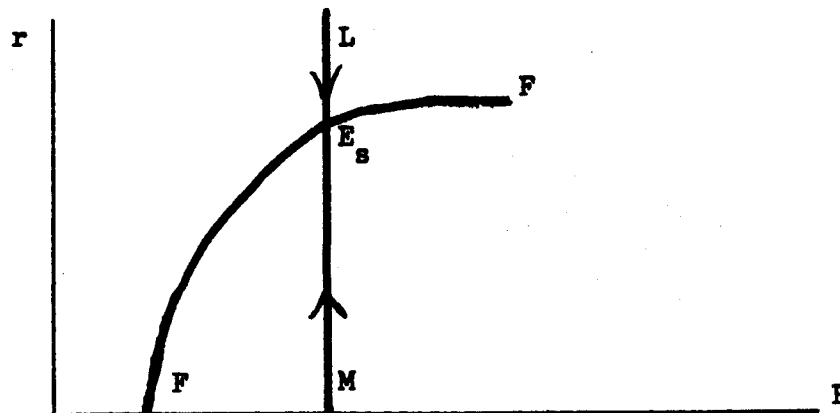

Figure 7.   The Temporary Equilibrium in a Classical
Money Economy

Market adjustments in the classical model are simple. Convertibility of money into commodities insures a given price level P*; this P* is taken over to the real markets to determine employment and then the interest rate. As illustrated in Figure 7, there is no possibility of an unstable equilibrium in this model.

2. <u>The superiority of the Classical Money Economy in a single output economy</u>

So far, two kinds of dynamical superiority of a single-commodity, Classical over a single-commodity Modern Money Economy are readily apparent. First, the Classical Model has no unstable equilibrium. Second, the Classical Economy does not admit the unsystematic welfare losses due to errors with respect to forecasting future price-levels. These price-levels are given by the conversion rate in a Classical Money Model. A third kind of dynamical superiority also exists. This single-commodity Classical Money Economy also has superior overall responses to exogenous shifts.

In a Classical Money Model, any upward shift in the excess demand for money induces an equal increase in the competitive supply, with no resulting change in the LM curve. The same upward shift in a Modern Money Economy shifts the LM curve to the left, inducing lower prices, interest rates, and employment in the stable temporary equilibrium. A downward shift in the marginal product of capital, which shifts down the FF curve, produces no change in the price level or employment in the Classical Money Economy (See Figure 7) but lowers the stable equilibrium price, interest and employment levels in a Modern Money Economy (See Figure 4). Finally, a reduction in the marginal physical product of labor or an increase in the supply of labor (given the laborers' future wage expectations) will increase unemployment in both types of economies and yield no systematic difference in the magnitudes of the induced unemployment in the two types of economies. Also, shifts in the capital stock produce no unambiguously superior employment response in one system over the other.

Ruling out these latter shifts in order to clearly exclude these unsystematic differences from our formal analysis, we find an unambiguous dynamical superiority of Classical over Modern Money Economies in a single-output, temporary equilibrium model. That is, the Classical temporary equilibrium is

uniformly superior with respect to both stability characteristics, price-level certainty, and employment responses to exogenous shifts.[10]

3. The failure of the Classical commodity standard

However, when another output is added to the economy, the unemployment induced by certain exogenous shifts, those which alter relative output prices, may be substantially greater in a Classical Money Economy than in a Modern Money Economy. This occurs when private money suppliers make money convertible into a single real output, say gold, at an intertemporally fixed conversion rate rather than into a price-weighted index of real outputs. Then a shift up in the demand for gold lowers the money prices of all other outputs and employment more than would occur in an economy with a fixed money supply (Thompson, 1973). In terms of our graph, such a shift in gold demand shifts the Classical LM curve defined for the price of non-gold assets to the left. An example of such a shift was the large increase in gold demand in 1926-28 which accompanied the gradual return of Europe to the gold standard at the pre-WWI conversion rate despite the approximate 50% jump in non-gold prices and money supplies which had occurred since they had abandoned the gold standard during the war. The restoration of the traditional, pre-war demand and relative price of gold thus implied a return to the pre-war level of non-gold prices, and thus a hugh, 33%, shift back in the LM curve defined in terms of non-gold prices. The resulting depression in the gold-standard countries led to the final abandonment of the Classical gold standard, despite its otherwise salutory properties, and to the birth of the modern monetary system.

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[10] This complements the _statical_ superiority of the Classical Money Economy, a superiority which arises from the fact that a full competitive equilibrium in a Classical Money Economy is Pareto optimal, while a full equilibrium in a Modern Money Economy is generally Pareto nonoptimal (Thompson, 1973, 1974). The general nonoptimality of the latter equilibrium results both from the well-known "tax on money balances" (Bailey, Friedman) implied by the modern, legal restriction that no interest be paid on money _and_ from the fact that any Modern Money Economy admits a full equilibrium with a zero price of money.

Another disadvantage of the Classical gold standard relative to a Modern Money Economy is its relative inflexibility in altering prices and employment with monetary policy. The money supply in a Modern Money Economy is an easily controlled variable while there is no corresponding variable in an economy with a Classical gold standard. (Central banks during the gold standard era had some effect on the price of non-gold commodities relative to gold by altering the transaction costs of private borrowing or lending, but clearly the effect was limited in scope and costly to achieve.) A reduction in the conversion rate, since it is known with certainty to the laborers, is ineffective: The FF curve shifts down with the shift out in the LM curve so as to leave the rate of interest unchanged.

4. The gradually emerging Classical Money Economy

The modern monetary system is itself, fortunately, being gradually replaced by a new kind of Classical Money Economy, one without the critical, dynamical defects of the earlier Classical system. In the emerging Classical Money Economy, costlessly produced, non-interest-bearing, government currency, rather than gold, is the backing for competitively produced money. Currency in the emerging system, which is frequently labelled "the cashless society," receives no premium for its ability to serve as a medium of exchange; it acquires positive value, even though it has no real social cost of production and no consumptive or productive value, by way of a non-monetary function contrived by the government. In particular, the government limits the supply of currency and requires individuals to pay taxes -- we assume proportional income taxes -- with currency. Thus, the government controls the demand for currency by controlling the tax rate and the supply of currency by controlling the government's cumulative rate of currency expenditure. The price levels at some tax payment

dates are then determined by

$$(9) \qquad c = tPF(K^*, L)$$

and (5'), where c is the supply of government currency immediately before tax collections at those dates, PF is national income over the tax period, and t is the income tax rate.[11] The real value of money is thereby determined by the private non-monetary value of currency as an asset required for paying taxes, and money receives no premium for its liquidity because sufficient quantities are always costlessly and competitively supplied.

Since currency bears no direct interest, receives no liquidity premium, and generates no real services prior to tax-payment dates, individuals must be given a discount to induce them to purchase currency with productive real goods before a tax-payment date. That is, a holder of currency prior to a tax-payment date must gain through the real appreciation of his currency relative to capital goods at a rate equal to the rental rate on capital, $\frac{R}{P}$, in order to induce them to hold the currency. The resulting expected short term deflation makes the money rate of interest, as defined in equation (7), equal to zero. Money thus receives no liquidity premium reflecting a con- trived scarcity of money in this, as in any, Classical Money Economy. When the upcoming date of tax payment satisfying the above equality arrives, the government will receive all of the currency. Hence, a jump in the entire price level (including wages) immediately following such dates implies no cost

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[11] Equation (9) should not be taken to represent a "currency-quantity theory" because: (1) It only holds at certain dates so that the "velocity" term does not represent a rate of turnover of a given stock of money over time (currency supplies between tax collection dates are irrelevant), (2) the "velocity" term is set by the government (as the income tax rate) rather than determined by the complex workings of the private economy, and (3) quantity theories -- whether represented by price-specie-flow mechanisms, the English Currency School, or the monetary theories of Marshall, Fisher, or Friedman -- all assume away any independent, non-monetary determination of the price level or aggregate income; our causal relation is from the independently determined price level to the total money supply rather than vice versa.

to anyone since no one is a net owner of currency when the price jumps. (Competitive suppliers of money which is convertible into currency at a fixed intertemporal rate must, however, compensate anyone who holds their monies through such periods with an interest payment equal to the percentage jump in the price level.) Such jumps in the entire price level are generally required in order to climb onto a new deflationary price path to the price level which is expected satisfy (9) and (5') at the next relevant tax payment date. Thus, the price (and wage) level solution to this model is a function over continuous time which falls at a rate equal to the marginal product of capital up to a certain tax payment date, at which time it jumps discontinuously and then again follows the deflationary path to the price which is expected to rule at the next tax payment date for which the equality will again hold.[12]

It is apparent from our equation describing equilibrium in the currency market (which is not the money market) that equilibrium income is determined by (5') and the currency supply and tax rate as long as all taxes are income taxes. This is a direct way of showing that the Keynesian shifts, shifts in the excess demand for money, in the marginal product of capital, and in aggregate expenditures and thus the expected rate of inflation, have no effect on equilibrium income in this model.

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[12] This continues on until the last date of tax payment, when the equality must hold because there is no use for currency beyond this date. Assuming a full equilibrium, the tax payment date at which the equality must hold immediately preceding the last tax payment date is, moving backwards in time, the first date for which the currency supply is less than the taxes which would be payable if we used the price level implied by the deflationary path to the last tax period -- i.e., for which the rate of growth of aggregate real taxes to the last tax date exceeds the sum of the corresponding real rate of interest and the growth rate of the currency supply. If such a tax date exists, then the immediately preceding tax date at which the equality must hold would be the first tax date, again moving back in time, for which the growth rate of real taxes to this date exceeds the sum of the corresponding real rate of interest and the growth rate of the currency supply. This procedure continues on back to the present period to determine all of the dates in which the equality must hold. For any other date, the supply of currency is greater than or equal to the demand for currency to pay current taxes given the price level function derived above.

To construct a vertical LM curve for this model, which is necessary for us
to represent it as a Classical Money Model, first use equation (9) to construct
a negatively sloped curve relating the price level to the employment level.
Then use equation (5') to construct a positive relation between the price and
employment levels. The intersection of these curves determines the price level
used in constructing the vertical LM curve. (Recall that an LM curve is properly
derived as a curve representing equilibrium in both the money and labor markets.)

This Classical Money Economy does not have the pair of dynamical weaknesses
of the Classical system with fixed convertibility into a particular commodity
in that: (1) A price index rather than a particular price is being exogenously
determined so that shifts which alter relative output prices do not create
systematically higher or systematically lower money prices, such as occurred
in the 1920's, and (2) the currency supply or tax rate may be controlled by
the government in order to freely combat changes in employment due to shifts
in the marginal physical product or supply of labor. Yet this gradually emerging
Classical Money Economy has all of the important strengths of Classical systems:
stability, imperviousness to Keynesian shifts, and static efficiency.

III. A TWO-PERIOD GENERALIZATION OF THE TEMPORARY EQUILIBRIUM MODEL
FOR A MODERN MONEY ECONOMY

We now allow all individuals to have perfect foresight of the price which will equilibrate the demand and supply for commodities and money in the second period. This gives us a solution price of goods in the second period which is perceived in the present (first) period and, thus, an equilibrium rate of inflation. That is, we add

$$(10) \qquad X_{2C}(W,R,P,P_2) = 0$$

to the above system, as described in equations (4), (5'), (6), and (7), replacing p^e in this system with P_2.[13/] Walras' Law for period 2 is used to omit the money market for this period. The reason for this is that we wish to employ the a priori information contained in the Keynesian view of the world, a priori information regarding the time rate of change in commodity demands and supplies rather than in money demands and supplies.

Consumption is the source of decreased commodity supply and net output is a source of increased supply. For an equilibrium in the period 2 commodity market as well as the current-period market, the planned increase in commodity supply, net output minus consumption, must equal the planned increase in commodity holdings. In other words, planned savings must equal planned investment in a two-period generalization of our temporary equilibrium model. To illustrate the workings of the model, consider an increase in planned consumption or investment. This shift

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[13]For the sake of simplicity and realism -- and in order to better approximate a Keynesian view of the world -- we are not assuming a second round of equilibrating production decisions. We thereby assume neither an equilibrating market for labor in the future nor an equilibrating future interest rate. It is only our attempt to better approximate a Keynesian view that motivates our current assumption of an equilibrating future price-level; we do not believe this assumption to be a useful one for practical macroeconomic analysis.

will equivalently increase the excess demand for capital goods in the second period and, since this market equilibrates, will raise the price level in the second period. This in turn produces a shift up in the initial-period FF curve and thus also raises the present price level and rental rate.

While this extended model has a more Keynesian flavor than our basic temporary equilibrium model above, the necessity of an endogenous inflation rate and a parameter representing the rate of growth of the money supply, together with the necessity of a capital services market, make it distinctly non-Keynesian, both in form and in spirit. Nevertheless, this model enables us to employ the Keynesian concept of an equilibrium rate of spending. So we shall pursue the model a bit further to see whether its comparative static properties match those of our basic model or those of the standard Keynesian model.

The Effect of a Monetary Expansion on the interest rate

Suppose now there is a shift producing larger money supplies in both periods which increases the successive output prices in the two-period equilibrium by the same percentage, thereby leaving the inflation rate unaffected. We then can use our basic one-period model to show that the shift only moves the initial-period LM curve to the right. This implies an increase in the interest rate as well as the above increase in the initial period's output price. In contrast, in the standard Keynesian model, a uniform increase in the money supply lowers the interest rate. Thus, the standard Keynesian model, by failing to be disciplined by the implied market for capital services, and correspondingly failing to allow for the determination of an equilibrium rate of inflation, produces economically incorrect comparative statics.

Loanable Funds Theory

Like the Keynesian equality of savings and investment, the pre-Keynesian equality of the supply and demand for "loanable funds" occurs in a special case of an extension of our basic model to two periods. Adding either equality, in our world where bonds and capital goods act as perfect substitutes, amounts to simply adding an equality of the demand and supply for capital goods in the next period. As above, such an equilibrium serves to determine an equilibrium rate of inflation and thus an equilibrium money rate of interest. From our standpoint, then, loanable funds theory is neither the competitor to, nor the equivalent of, liquidity preference theory that it is represented to be in the conventional macroeconomics literature. Rather, the loanable funds equality is a substitute for the savings-investment equality as a representation of the equality of the demand for and supply of commodities in the following period. Either equality, if used, complements liquidity preference theory in it gives us an equilibrium inflation rate -- in place of a parametrically given inflation rate -- to add to the capital rental rate in determining the interest rate.

One might have expected the stock-flow literature of the 1950's to discover that an equilibrium inflation rate is implied in a Keynesian equilibrium consistent with capital thoery, just as it is implied in any stock-flow equilibrium. But the literature stopped short of this, arguing through an unfortunate misapplication of stationary equilibrium analysis that a stock-flow equilibrium requires a zero rate of price appreciation.

The Effect of an Imperfect Capital Market

It might appear that the Keynesian comparative static result that an increase in the money supply decreases the rate of interest could be

recovered by the introduction of a bond market whose interest rate, i, is less than r by the cost of borrowing per dollar, a cost which rises with the amount of borrowing and lending in the period. Then we could make the increased money supply go into bonds, increasing the volume of lending and widening the spread between the two rates of interest, r-i. This could, conceivably, reduce the rate of interest on bonds even though it increased r. But the reduction would apply only to the initial temporary equilibrium. Since the additional loans contracted in the initial period would rationally extend through at least two production periods, the amount of new lending in the second period would not expand. Hence, r-i would return to its pre-shift value in the second period. Extending the second period to allow production, both r and i would increase in the second period by an amount equal to the increase in the marginal product of capital induced by the higher price and employment levels. Viewing the first period as merely a transition period, we would still be left with the non-Keynesian conclusion that a one-shot increase in a stationary supply of money will increase equilibrium interest rates.

On Related Models in the Literature

Several capital-theory-oriented macromodels -- notably those of Tobin, Foley-Sidrauski, and Floyd-Hynes -- have incorporated an equality of the marginal product of capital with the real interest rate and noted at least the possibility that increases in the money supply would increase the interest rate. However, minor technical defects in each of these models prevented these authors from recognizing that the Keynesian equality of ex ante savings and investment implies an equilibrating rate of inflation. As a result, their models, which are all

implicitly single-period temporary equilibrium models, suffer from an irrelevant (in Tobin's case) or misleading Keynesian inclusion of consumption functions.[14]

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[14] Foley-Sidrauski and Floyd-Hynes use the consumption function to determine the split between consumption and investment in a two-sector, one-period model. This is misleading because Keynesians do not use the consumption function this way. They use it to obtain an ex ante equality of savings and investment. The authors do not recognize, although Foley-Sidrauski certainly come close, that their equilibria are not Keynesian as ex ante savings are not generally equal to ex ante investment in their equilibria.

IV. AN EXPLANATION OF RECENT BUSINESS FLUCTUATIONS

Recent business fluctuations have been largely due to sudden, exogenous shifts, and thereby provide a valuable series of experiments with which we may test our general model.

First, in late 1971, the sudden refusal of the U.S. to exchange gold for U.S. dollars held by foreign governments at the historical conversion rate led to a rapid decline in the demand for U.S. dollars relative to U.S. goods, evinced by the sharp drop in the dollar's value in world currency markets in early 1972. In terms of Figure 4, the downward shift in demand for dollars implied a rightward shift in the LM curve and an increase in U.S. prices and interest rates, which indeed occurred during 1972 and 1973. The Keynesian model, with its downward sloping IS curve, would predict lower interest rates, which did not occur during those years.

The sudden, downward shift in the world supply of oil output near the end of 1973 constitutes another shock with which we may test our theory. An analysis of the effects of this shift illustrates the usefulness of our model of a two-period equilibrium discussed in Section III. We represent the shift as a simple decrease in the marginal product of labor. Our rationale is the following: Since oil is surely an input which is complementary with labor and capital, the shift reduced the marginal products of both labor and capital outside of the oil and related industries. Inside the domestic oil and related industries, which are extremely capital intensive, we can ignore the observed increase in the marginal product of the few specialized laborers in those industries but must consider the increase in the marginal product of capital in those industries to be a significant offset to the decline in the marginal product of the capital elsewhere in the economy.

Hence, aggregating the marginal product changes over all industries, we approximate the shift by representing it in our model as a simple decrease in the marginal product of labor. Such a shift results in a shift to the right in the FF curve by an amount equal to the increase in the price level required to restore the original demand for labor and, thus, the original marginal product of capital. This is shown in Figure 8 as a shift from the $F^{73}F^{73}$ to the $F'F'$ curve. Without an increase in the money supply to combat the unemployment resulting from this shift, the temporary equilibrium interest rate and price levels would drop (from r^{73}, P^{73} to r', P' in Figure 8). However, it is implausible, even to producers, that the monetary authorities would fail to combat the substantial unemployment. Hence, we assume that rational producer expectations were of an increase in the future price level sufficient to "pass on" the higher energy costs without any reduction in output, an increase sufficient to match the drop in the marginal physical product of labor. Thus the implicit expectation, as shown in Figure 8, was a rightward shift in the future LM curve (to L^eM^e) sufficient to arrive at a _future_ expected equilibrium interest rate and price level (r^e, P^e) which would maintain the pre-shift level of employment. Since producer expectations during the interim period before the date of the higher expected price, P^e, were of a much higher price level in the future than without the expansionary monetary policy, the interim FF curve shifts up significantly (from $F'F'$ to $F^{74}F^{74}$ on Figure 8). Since there is no shift in the interim LM curve, much higher interest rates result. A reasonable time interval for these expectations to apply would be the first three quarters of 1974, when we in fact observed a very sharp rise in short-term interest rates and a sharp rise in the price level, and an increase in unemployment.
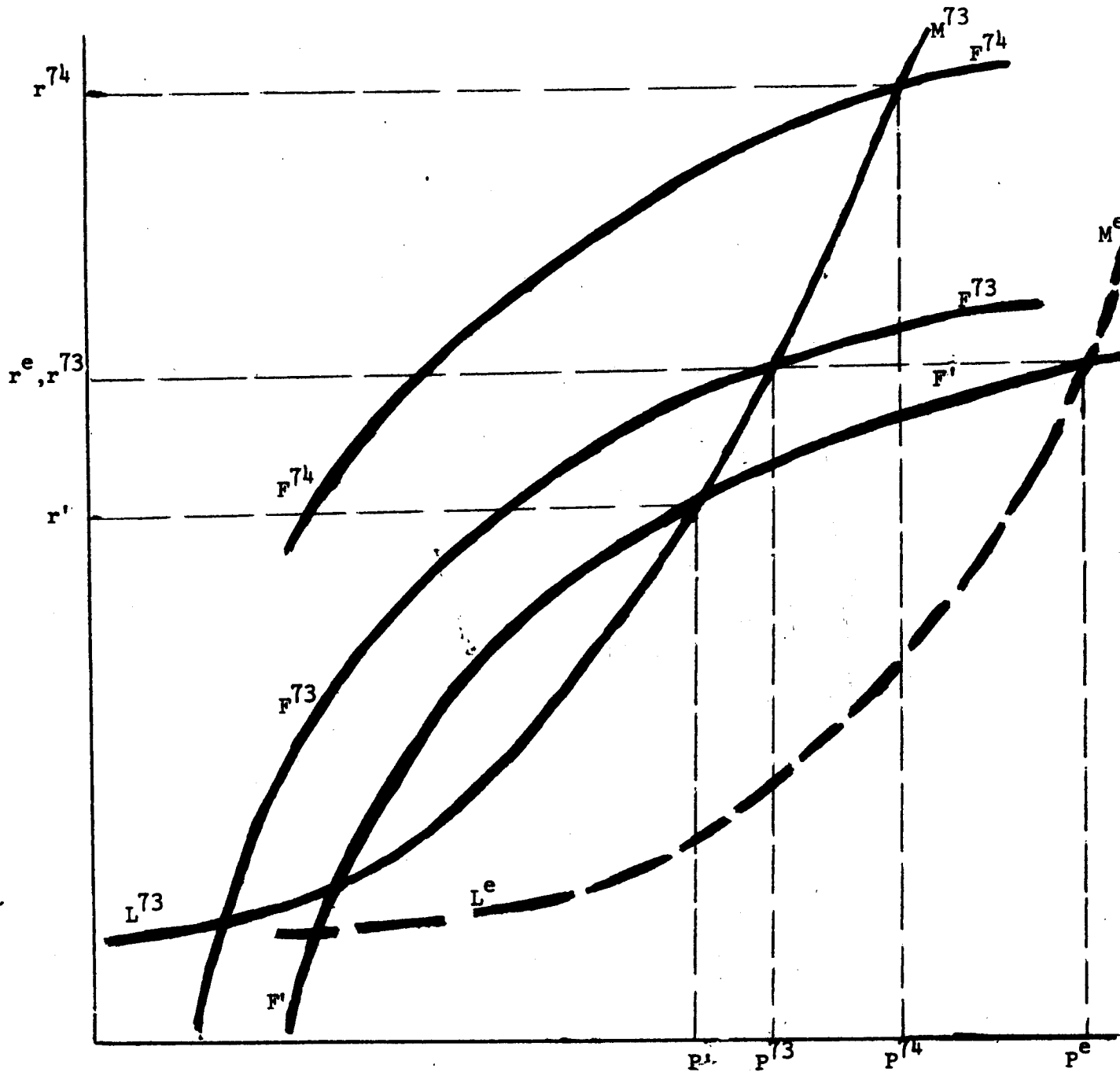
Figure 8. The Initial FF Shift Induced by Higher Oil Prices, the
Anticipated Future Monetary Reaction, the Interim FF Shift, and
the 1974 Equilibrium.

The magnitudes of the rises in prices and interest rates in the interim
period, and thus the equilibrium rate of inflation from P^{74} to P^e can be
derived as follows: For any given current price level, P, there is an implied

expected inflation rate to the given P^e, $\frac{P^e - P}{P}$, and thus an implied FF curve

and solution price level, P^s. We graph this P^s against P in Figure 9.
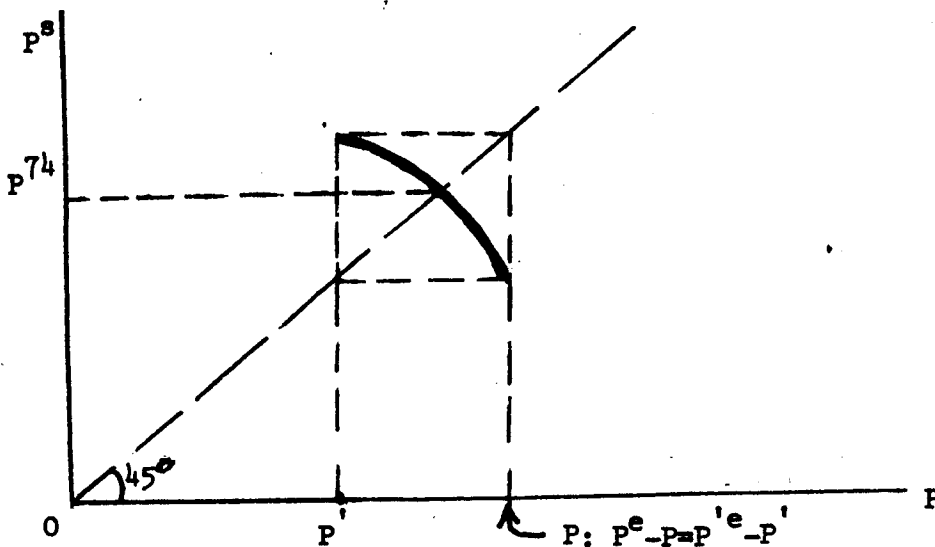
Figure 9.

The solution price level which would result if $P = P'$ is above P' because of

the shift up in the expected future price level and thus the higher expected

inflation rate from P'. The solution price level is P' when the current price

level rises to make the new expected rate of inflation, $P^e - P$, equal to the

pre-shift expected rate, $P'^e - P'$. It follows that there is an equilibrium

price level, P^{74}, between these boundaries. (From the convexity-from-below

of the graph of the solution function in Figure 9, $P^{74} > P' + \frac{P^e - P'^e}{2}$.)

Soon after the middle of 1974, U.S. monetary authorities, reacting to

the higher prices with a fear of inflation bordering on superstition, became

restrictive rather than attempting to fulfill the implicit price expectation

of the producers for the end of 1974 and 1975. The resulting equilibrium for

the last quarter of 1974 and the first half of 1975 -- which can be approximated

by an intersection of the F'F' curve (as most of the price level jump had already

occurred and the '75 supply curve of labor shifted back somewhat because of the

increase in prices in '74) with an LM curve significantly above $\overline{L^e M^e}$ but still

intersecting F'F' where $P^{75} > P^{74}$ -- had interest rates lower than $r^e = r^{73}$

and significant unemployment. As money-supply and tax policy have been loosening

from the second half of '75 to the present, the LM curve has finally been

shifting out toward $L^e M^e$, thus heading us toward r^e, P^e.

V. EXTENSIONS OF THE TEMPORARY EQUILIBRIUM MODEL OF INEFFICIENT EMPLOYMENT

Non-Keynesian Inefficient Unemployment and the Great Depression

The bulk of the inefficient unemployment during the Great Depression was clearly not the searching and resting of overoptimistic workers. If workers become unduly pessimistic about their future productivity in their initial occupations relative to other occupations, they will accept low-paying jobs as trainees in other occupations in the hopes of relatively rapid advancement, perhaps trying out several occupations. This inefficient occupation switching not only increases unemployment rates during the switching process, it reduces the real product of the employed labor force and produces relatively long periods of learning and readjustment. The behavior of employment and real wages during the Great Depression appear to fit this pattern. That is, during the output decline of the Great Depression, aggregate real wages barely rose whereas they would have increased significantly if there were merely Keynesian unemployment; similarly, real wages rose dramatically during the upturn whereas they would have fallen if the unemployment were merely Keynesian. This inefficient employment pattern was greatly exacerbated by President Hoover's policy of influencing many large firms to maintain the previous level of money wages. This policy led to a rationing of the higher-paying jobs and an influx of workers into lower-paying jobs in the same occupation. The resulting widening of the intra-occupational wage differential induced many of the unfavored workers to inefficiently switch occupations as their relatively low wage within the occupation deceived them into the belief that they had a substantial productive inferiority in their current occupation, and their relatively low wage compared to the average wage level in the economy made other occupations appear relatively attractive.

Competitive Inefficiencies Resulting From Inter-Firm Shifts

In the above model, Keynesian unemployment stems from labor's confusion of aggregative changes in the labor market with inter-firm changes. While only aggregative changes in the labor market have been considered since early in Section I, as is traditional in macroeconomic policy discussions, the necessary inability of some laborers to distinguish an aggregative change from an inter-firm change also has implications for efficient economic policy in response to inter-firm shifts in the demands for or supplies of labor.

Some of the laborers in firms which offer lower wages as a result of an inter-firm shift, believing erroneously that the lower offers may be the result of an aggregative shift, will search too little. And some of the laborers who are employed in the firms which are now offering higher wages and who would otherwise efficiently have quit to search for better jobs, may still quit in the erroneous belief that the shift may be aggregative, creating a group of workers who search <u>too much</u> as a result of their inability to distinguish inter-firm from aggregative shifts. But as we know that the percentage of workers who quit in order to search for better jobs during a normal search period, or business swing, in modern economies is a small fraction of those who do not, the latter effect is far outweighed by the former. Thus, the net value of resources devoted to job search is secularly too low as the dominant workers, those who should be induced to search by inter-firm shifts away from their current employments, erroneously believe that the reduction in their current wage offers may be the result of economy-wide shifts.

A policy to combat such an inefficiency is one which subsidizes a worker to quit his current job and search for another when he is faced with a reduced demand for his services from his current firm. Such a subsidy actually does appear in numerous modern economies in the form of "unemployment compensation." Since unemployment compensation is often regarded as "merely an insurance plan" even though it is involuntary, we should compare the implications of this view to that of our own. First, since job search normally results in re-employment, or at least gives the searcher an almost complete view of the market in a few months' time, a subsidy which compensates a worker according to our theory for time spent between jobs would normally end after a few months' time. But an insurance plan to protect a worker against extreme variations in wealth would not be so limited. In fact, observed unemployment compensation plans end the subsidy after a few months. Second, since our insufficient job search results from some workers' placing too high a value on work relative to search, an efficient system of unemployment compensation will tax work income in order to subsidize search. But contributions into an efficient insurance plan would be lump-sum payments rather than payments which further reduce one's incentive to work through their dependence on income from employment. In fact, observed unemployment compensation is financed by employment taxes. Finally, an insurance plan would increase the premiums to those individuals who are most frequently unemployed while a subsidy program would levy a fixed charge independent of his past unemployment record. In fact, observed unemployment compensation plans do not punish a worker who is frequently unemployed with a relatively high insurance premium.

SUMMARY

Section I presented a general description of any competitive economy with an underemployment equilibrium. In this description, any underemployment equilibrium is a "temporary equilibrium" (see, for example, Hicks, 1965, or Arrow-Hahn, 1971).

Section II used the general, temporary equilibrium model to derive the model which follows logically from a Keynesian level of aggregation and neo-classical production. The derived model with modern, or Keynesian, monetary institutions turned out to be a familiar Keynesian model with the important exception that the familiar equality of savings and investment, with all of the psychological conjecture underlying the savings and investment functions, was replaced with a simple equality of the demand for and the supply of capital services, which is derived from standard marginal productivity theory. The derived model was used to:

°   Contrast the comparative statics of the derived model with those
    of the standard Keynesian model, noting the superior ability of
    our model to explain Gibson's Paradox;

°   Contrast the stability characteristics of economies with modern
    and classical monetary institutions, noting a dangerous instability
    at low levels of interest rates in a modern money economy, a problem
    absent in the standard Keynesian misformulation;

°   Contrast the appropriate macroeconomics under competitive and modern
    monetary institutions, noting the existence of a financial system
    which is superior to both modern and classical monetary systems;

°   Expose a basic stock-flow fallacy in Keynesian models, a fallacy due
    to the fact that a savings-investment equilibrium is not possible
    without an equilibrating future price level and thus an equilibrating
    rate of inflation.

Section III briefly outlined a generalization of the temporary equilibrium model to a two-period equilibrium where equilibrium rates of expenditures and inflation can occur. There we showed that key, comparative-static results of

standard Keynesian theory fail even when we allow the inflation rate to vary in order to achieve an equilibrium rate of expenditures.

Section IV used our general model to explain the pattern of prices, employment and interest rates in the U.S. from 1971 through 1975, thus illustrating that our new tool can solve empirical problems that the old tool cannot.

Section V elaborated the basic, temporary equilibrium model of unemployment sufficiently to rationalize unemployment insurance as a possibly efficient government policy and to develop an explanation of the peculiar pattern of real wages and unemployment during the Great Depression.

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