A Keynesian View of the Relationship Between Accumulation, Money and the Money Wage-Rate

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A KEYNESIAN VIEW OF THE RELATIONSHIP BETWEEN ACCUMULATION, MONEY AND THE MONEY WAGE-RATE[1]

THIS is yet another contribution to the perennial and controversial subject, namely, the well-springs of the demand for capital goods. Capital goods, by their very definition, are a factor of production. This view is associated primarily, but not solely, with the name of Böhm-Bawerk, and of the " higher " order in time of capital goods. Nevertheless, capital goods also enjoy characteristics equivalent to those possessed by money and other financial assets (*e.g.*, stocks, bonds) which make them eligible as a store of value. This quality of *durability* [2] makes them a primary form of wealth and a capitalised source of income in a temporal view, and the demand for capital primarily as a store of value has sometimes been emphasised [*e.g.*, 18].

It is the contention of this paper that in this dichotomy lies much of the confusion in current literature that has made much controversy barren and sterile. On the interpretation offered here, it is this peculiar dual role of capital as a factor of production *vs.* a store of value, as opposed to the dual role of money as a medium of exchange *and* a store of value which Keynes wrestled with in the obscure and oft-neglected Chapters 16 and 17 of *The General Theory* [11].

It is the durability of assets which links the economic future with the present, as Keynes noted even in his preface; it can be contended that it was in these particular chapters that Keynes sought to extricate himself from the static framework of *The General Theory*. " The essence of the problem," according to Turvey, " . . . involves economic growth, since Keynes is concerned with the accumulation of assets " [19, p. 166]. Joan Robinson has also noted that the incohate Chapter 17 of *The General Theory* is primarily concerned with the problem of *financing* additional investment as the real wealth of the community accumulates [17, p. 597].

Mrs. Robinson also contends that the liquidity preference approach of *The General Theory*, which highlights why people may want to hold wealth in the form of money, is much less explicit in answer to the question " why is anyone willing to offer interest? " [17, p. 598]. It is this latter question in the context of a long-run growth analysis which Chapter 17 is attempting

[1] The author is Professor of Economics at Rutgers—The State University. He is extremely grateful for the many helpful comments of Sidney Weintraub and Miles Fleming on earlier drafts of this paper.

[2] In fact, if slavery was an acceptable institution in capitalist countries, then all the factors of production—land, labour and capital—could serve both as inputs in the production process *and* stores of value.

to explain; for Keynes was taking it for granted, as all of us commonly do, that the primary reason for borrowing is the expectation of profit on investment. Hence the familiar conclusion that as long as the expected rate of profit for a new investment was greater than the rate of interest charged for borrowing funds to finance that investment, borrowers would be willing to incur the interest charges.

There remain, however, many important insights, going well behind this near-tautology, that are still unexploited in this part of Keynes' work. Earlier writers, however, have perhaps been imprisoned by a too literal interpretation of " own rates of own interest " [see 2, 7, 14, 17, 19]; instead they should have undertaken a translation of Keynes' more suggestive ideas into a more familiar format. Inevitably, some essential aspects for capital theory and growth have gone virtually unrecognised.

One of the most important of the neglected contributions buried in the largely ignored Chapter 17, involves a key insight on a *necessary* property of money. It is in this place that Keynes anticipated those " modern classicists " who aver that a flexible wage and price structure would automatically assure full-employment equilibrium. Keynes' argument on this is simply devastating—which may explain why so many have chosen to ignore it.[1] Failure to comprehend his rationale has not only obscured the analysis of why the money rate of interest " rules the roost," and why the demand for money can meet a " bottomless sink "—a liquidity trap—but most significantly it has made post-Keynesians oblivious to a signal message of *The General Theory*—a notable warning which—though continually ignored—was cogently restated by Lerner. In his words:

> " wage and price rigidity is not an appendage that can be removed without harm. *Wage and price rigidity is an essential property of money* and the most successful of operations to remove it would mean the death of the patient so transformed. Any money which was completely cured of wage and price rigidity would not be able to survive as money " [14, p. 193, italics mine].

In the light of present economic problems it is more than timely, therefore, to review Keynes' analysis in terms of a stock-flow demand and supply model. What emerges are some clear and important insights about: (1) the rate of capital accumulation in a monetary, market-oriented economy, and (2) the " essential properties " of any item which performs the dual functions of money, to wit, to use as a store of value and as a medium of exchange.

I. The Money-less Property of Real Capital

Keynes noted three attributes which all durable assets possess in different degrees: (1) q, the money value of the output which can be obtained by " assisting some process of production or supplying services to a consumer ";

[1] Curiously, Keynes is rarely if ever referred to on this crucial matter.

(2) c, the costs (including wastage) of carrying the asset over the period; and (3) l, the liquidity premium which arises from the power of disposal [11, pp. 225–6]. Further, with q, c and l expressed in money terms there is another factor which Keynes introduces: (4) a, the expected appreciation (or depreciation) in the money price of the asset at the end of the period.[1]

With respect to l, Kaldor prefers to treat the " power of disposal " as a marginal-risk premium, r, due to illiquidity and represent it as a deduction from the yield of any assets where " the uncertainty of future value (or return) in terms of money, or on account of their imperfect marketability, carry a risk premium for which this yield must compensate " [7, p. 60]. To Kaldor, the illiquidity premium of money is, by definition, necessarily zero, so that this sets an unchanging standard against which other assets can be measured. To Mrs. Robinson, when money is held as a store of value, q, c and a are all, by definition, zero. Since r is also zero for money, the total return to holding money is zero [17, pp. 597–8].

Explicit in the Kaldor formulation is the fact of a " convenience yield " to the holding of money. Uncertainty about the future asset values, plus the imperfections in the market-place involving the costs of getting buyers and sellers together, involve risks in holding any assets other than money as a store of value. For our immediate purpose it is a matter of indifference whether the l concept or Kaldor's r is utilised, since they are essentially mirror images of each other.

Since all durable goods possess some q, c and l (or r) attributes, it would seem that they all might serve equally well as a store of value. Nevertheless, since for physical assets l is normally very small (r is very large) as compared to the liquidity premiums associated with the claims (financial assets) to capital goods, claims will normally be preferred to the capital goods as a store of value. For as long as there are organised securities markets, there is—as explained below—less of an imperfection in the " titles " market than in the capital-goods market itself. As a consequence, financial assets will normally be attractive to wealth-holding households, for the asset-titles will be more liquid and therefore have a premium which exceeds the yield minus the carrying cost of the physical asset itself.

Investors are, by definition, not primarily interested in titles to wealth; their object is to acquire the services of capital goods as inputs for the production process. To obtain these services, it is true that normally investors must acquire the physical presence of the capital stock; but what is relevant to the firm's cost calculations is the *marginal supply price per unit of the service* of the capital factor. Investors do not *necessarily* want title to the stock of capital. (Similarly, firms do not care whether they own their own labour force [slaves] or allow others to hold title to the factor called labour; what is relevant is the marginal supply price of labour services.)

[1] Expected appreciation (or depreciation) in the money price of an asset will be important only if money wages and prices are freely flexible. This aspect will be discussed in Section VI below.

Although the value of the future productivity of a capital good ordinarily exceeds its carrying costs over its useful life, its liquidity premium is negligible. Consequently, if a saver possessed a physical capital instrument and intended to convert his store of value (*e.g.*, a sausage machine) into future consumption goods in a different time pattern than the stream of anticipated earnings over the life of his physical capital asset, he would, at some point of time, have to find a sausage-machine buyer. In selling, he would almost certainly disrupt the machine's physical (and value) productivity yield and incur delivery costs, if he must physically dismantle and transport the equipment to the buyer. Moreover, since real capital assets are normally large, indivisible physical units, the saver may be required to search out a buyer of the whole unit, in a future period, even if he desires only to increase his consumption in that period by some amount smaller than the expected value of the whole physical asset. The smaller the unit of asset, therefore, the greater its saleability is likely to be. Thus, as Makower and Marschak have shown, sales of large units " not only increase the dispersion of future yields, but also reduce their actuarial values " [15, p. 279].

Accordingly, the problem of finding a buyer for a machine is likely to be complex and costly. It is here that financial titles rather than the physical assets are superior. With a minimum of search costs for a buyer, and without disrupting productivity and incurring delivery costs, the title to either the entire asset or to some fraction of the asset can be transformed as the saver's needs arise. Hence, he will, *ceteris paribus*, be better off.

Obviously, the development of *placements*, *i.e.*, equity and loan securities, have thus allowed savers to store value over time in small saleable packages, with a minimum of fuss—and costs. Hence, the liquidity premium attached to fractionalised titles to capital goods exceeds the liquidity premium of the physical capital goods themselves. Accordingly, in economies with developed securities markets, money and " placements " become the most desirable stores of value. Real capital is thus freed for service as an input in the production process. The development of markets for placements, however, has not been without some major side effects, for " finance-capitalism " has severed the link between the demand for capital decision (involving production control or management of the services of the factor) and the portfolio balance decision (involving ownership of the factor) [cf. 11, p. 150]. Here, of course, is the major institutional conflict of managerial capitalism.[1]

Since savers are interested in titles to wealth only as a store of value, while entrepreneurs desire the flow of productive services from capital goods, portfolio balance decisions and investment decisions will look out towards different price levels. Capital investment decisions depend on the market-demand price relative to the minimum flow-supply price of capital goods. Financial accumulation, however, depends on the price of securities. The

[1] Galbraith's scathing indictment of *The New Industrial State* develops from this institutional conflict [6].

sole direct relation between them consists of the interest-rate mechanism [8, p. 249].

The analysis which follows concentrates only on the investment decision, for *it* is the one which determines the rate of capital accumulation! The portfolio balance decision is touched on only lightly. It is assumed that all increments in household wealth are retained only in money or placements. Allotments of personal wealth between these forms rest on a balancing of the usual liquidity propensities.

II. The Accumulation of Capital

The market demand price for any capital goods depends primarily on the expected money yield net of carrying costs [1] $(q - c)$. Normally, its liquidity premium is so small as to be *almost* negligible. If the demand price for any reproducible physical asset exceeds the minimum flow supply price which is necessary to bring additional units of that asset forward, then these capital items will be newly produced [11, p. 128]. This mechanism deserves some elaboration.

As firms require the services of capital goods as inputs in the production process, they must acquire the physical capital goods. Accordingly, the firms' demand for the flow of capital services leads to a *demand for a stock of capital goods*, and for any given set of contemplated output circumstances there will be an optimum size of capital for each firm. This demand for capital goods for a given firm is readily determined, for as Keynes indicated, the estimated prospective yield, Q_r, for each unit of capital at time r is multiplied by d_r, which is the present value of \$1 " deferred r years *at the current rate of interest*, [so that] $\Sigma Q_r d_r$ is the demand price of the investment " [11, p. 137]. Plotting these estimated demand prices on the ordinate axis and the quantity of capital (K) on the abscissa will yield the stock demand curve for capital for a given firm. The aggregate demand for capital goods is derived from the summation of the demand curves of all firms. Thus in Fig. 1 (a) a capital-stock demand curve, D_k (for a given set of profit expectations and the rate of interest), relates the maximum quantity of the capital good desired to be held by firms at any given market price of capital goods. This stock demand curve for capital, D_k, includes the Wicksteedian reservation demand of holders of existing capital at each moment of time. The demand function can be specified as

$$D_k = f_1(p_k, i, \phi, E) \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

where D_k is the stock demand for capital, p_k is the market price of capital

[1] For the moment we are ignoring the possibility of expected price inflation (or deflation) which would make expected money yield $= (a + q - c)$. If a is greater than c we would observe entrepreneurs accumulating stocks of goods for inventory speculative reasons. Thus expected price inflation will, *ceteris paribus*, increase the demand price for capital goods. This will be discussed in Section VI below.

goods, i is the rate of interest, ϕ is a set of profit expectations and E represents the number of entrepreneurial investors who can obtain finance for their demand for capital goods where $f'_{1p_k} < 0$, $f'_{1i} > 0$, $f'_{1\phi} > 0$, $f'_{1E} > 0$.

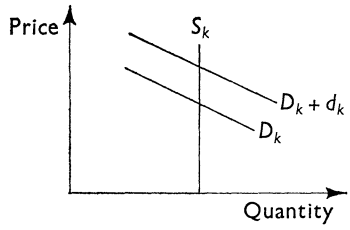

FIG. 1 (*a*)

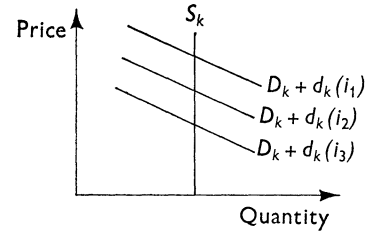

FIG. 1 (*b*)

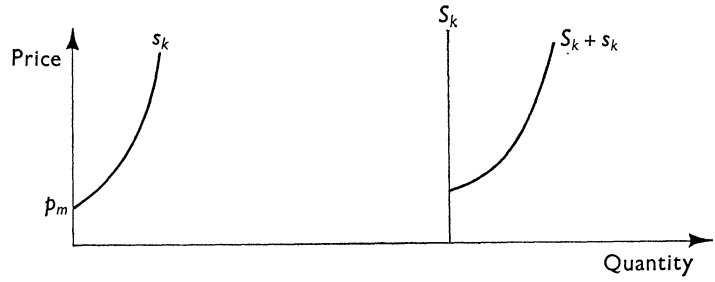

FIG. 2

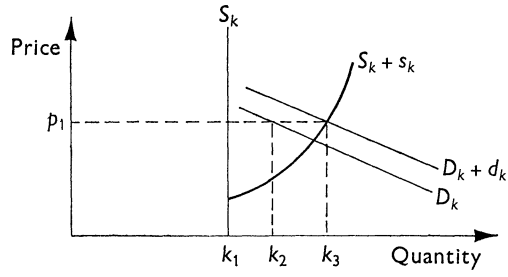

FIG. 3

The prevailing stock supply schedule for capital goods (S_k) can be drawn as vertical in Fig. 1 (*a*), since stock supply comprises the aggregate of existing capital goods inherited from the past. Thus, *at any point of time*,

$$S_k = a_k \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

where S_k is the stock supply of capital and a_k is a predetermined constant at any instant of time.

Barring production or depreciation of capital goods (*e.g.*, in a pure exchange economy), the resulting market price would, of course, be whatever is necessary to allocate the stock without remainder among demanders.

For a production economy, however, flow considerations must be added to the stock analysis of capital. Flow demand for capital is attributable to the depreciation per unit of time of the existing stock. For simplicity we will assume that depreciation is a (small) fraction, n, of the existing stock of capital per unit of time. Hence, the flow demand for capital is

$$d_k = nS_k = na_k \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (3)$$

where d_k is flow demand (depreciation) and $0 < n < 1$.

Combining equations (1) and (3) yields the total market demand for capital

$$D_k + d_k = f_1(p_k, i, \phi, E) + na_k \quad . \quad . \quad . \quad . \quad (4)$$

which, because of our simplifying assumption about the rate of depreciation, implies that the market demand curve, $D_k + d_k$, is parallel and to the right of the stock demand curve in Fig. 1(*a*). The horizontal difference between the two curves represents depreciation.

The flow supply schedule of capital goods indicates the output quantities which will be offered on the market by the capital-goods industry at alternative expected market prices, *i.e.*,

$$s_k = f_2(p_k) = I_g \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (5)$$

where s_k denotes the flow supply of capital and I_g represents gross investment. This schedule, like all supply schedules in a purely competitive environment, will reflect short-run rising marginal costs because of diminishing returns in the investment-goods industry, *i.e.*, $f'_{2p_k} > 0$. The flow supply curve, s_k, is represented in Fig. 2. The minimum flow-supply price, p_m in Fig. 2 represents the shut-down price for the industry. If the market price falls below p_m, then no flow-supply offering will be made, as capital-goods producers find that shutting down involves smaller losses than producing for market.

The market supply situation can be obtained by laterally summating the stock and flow supply schedules (Fig. 2), *i.e.*, by combining equations (2) and (5) to obtain

$$S_k + s_k = a_k + f_2(p_k) \quad . \quad . \quad . \quad . \quad . \quad . \quad (6)$$

The horizontal difference between the stock supply schedule and the market supply curve in Fig. 2 represents the gross output of the investment-goods industry at each market price in a given period of time.

Combining the market demand function $(D_k + d_k)$ with the market supply function $(S_k + s_k)$ in Fig. 3, the capital-goods market will clear at a market price of p_1. As Keynes argued, investment is carried to the point where the demand price equals the supply price [11, p. 137], so that

$$(D_k + d_k) - (S_k + s_k) = 0 \quad . \quad . \quad . \quad . \quad . \quad (7)$$

In Fig. 3, at the market price of p_1, the gross output of the investment-

goods industry will be $k_3 - k_1$, while depreciation equals $k_3 - k_2$. The value of net investment ($p_k I_n$) is equal to the difference between the flow-supply quantity and the flow-demand quantity multiplied by the market price, *i.e.*,

$$p_k I_n = p_k(s_k - d_k) \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (8)$$

In Fig. 3, while net investment output equals $k_2 - k_1$, capital growth during the period will be $(k_2 - k_1)/k_1$.

Any increase in the stock-demand for capital goods will, *ceteris paribus*, raise the market price and consequently lead to an increased flow of output of capital goods, as the producers of investment goods attempt to maximise profits by producing where marginal costs equal market price. Investors determine the stock quantity of capital goods they desire by computing the present value (or demand price) of the expected future earnings of the future flow of productive services of the stock of capital. It is the expectations of investors about future profits relative to the current rate of discount *and* their ability to obtain finance—in order to execute this demand—which determines the position of the stock-demand curve and, given the rate of depreciation, the market-demand curve in Fig. 1 (*a*).

A higher rate of interest, with any given set of expectations about the prospective money yield of capital, will entail a leftward shift in the stock demand for capital schedule in Fig. 1 (*a*). Thus, given entrepreneurial expectations and the rate of depreciation, *there is a different demand for capital schedule for every possible rate of interest* (Fig. 1 (*b*)) [cf. 8, pp. 202–3]. Given expectations of entrepreneurial investors, the existing stock of capital and its rate of depreciation, the market price for capital goods depends peculiarly on the current rate of interest.[1] If this price exceeds the minimum flow-supply price of capital goods, p_m, new gross investment will be undertaken. *The rate of capital accumulation will thereby depend on the rate of capital depreciation and the elasticity of supply in the capital-goods industries* [cf. 3]. As Keynes observed: " A fall in the rate of interest stimulates the production of capital goods not because it decreases their costs of production but because it increases their demand price" [2] [8, p. 211].

It is the effect of a change in the rate of interest on the discounting process, and hence on the demand for capital schedule, which links the money rate of interest to the level of investment output. Hence the money rate of interest rules the roost—the activity in the capital-goods sector—in the short run by limiting the demand for capital.[3]

[1] This approach highlights Keynes' insistence that knowledge of the prospective yield of capital is *not sufficient* to determine the rate of interest; rather, the rate of interest is an exogenous variable in determining the demand for capital [11, p. 137].

[2] Despite this ancient Keynesian admonition, economic text-books abound with statements that a reduction in the rate of interest reduces the *costs* of capital goods.

[3] With imperfections in loan markets, the lack of finance may also be an important element affecting activity, *i.e.*, " availability " may become as important as interest charges. (See Section VII below.)

III. The Stationary State—Where the Money Rate of Interest Rules the Roost in the Long Run

As long as net investment is positive, the stock of capital will increase each period. If either: (1) there is no change in the stock-demand schedule for capital over time—that is if there is no change in profit expectations (ϕ), —the rate of interest (i), or the number of entrepreneurial investors (E); or (2) the stock supply schedule shifts out more rapidly over time than the demand schedule, then ultimately a stationary state will be reached where the gross output of the capital-goods industry will equal the rate of depreciation of the capital stock. This situation is represented in Fig. 4. This

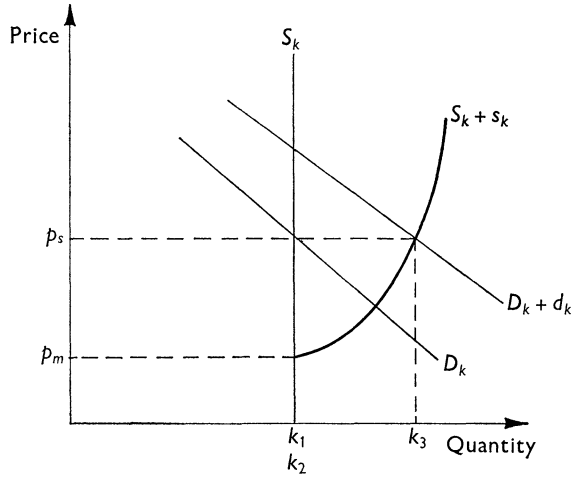

Fig. 4

stationary state is, of course, completely compatible with a less than full employment level of effective demand.

At the stationary state of p_s in Fig. 4, accumulation is absent. The price p_s must, of course, be equal to the long-run flow-supply price in the capital-goods industry, for otherwise the short-run flow-supply curve would shift as firms entered or left the industry.[1] For all reproducible capital goods then, as long as the short-run market price exceeds p_s (*i.e.*, the spot price exceeds the expected long-run supply price), net investment is undertaken. If the market price is less than p_s but greater than p_m gross investment is positive while net investment is negative. At a market price below p_m gross investment falls to zero and the rate of decline in the capital stock corresponds to the rate of depreciation. Whenever the market price stands below the long-run supply price, p_s, there is a redundant stock of capital, and, in the language of the market, a " contango " in the capital-goods market is

[1] The long-run supply price is related to Lerner's marginal productivity of capital [14, p. 180, also see 12, p. 350].

established, and a running down of present stocks must ensue [9, pp. 143–4].

If profit expectations (*i.e.*, $q - c$) are taken as expected to diminish with any increase in capital stock (as Keynes implicitly assumed in Chapter 17), while q, c and a for money are zero, then it is the liquidity premium of money which " rules the roost " in the long run, in the sense that it ultimately checks the output of capital by checking demand for capital goods. The logic of the stationary state unfolds, if the long-run supply price of capital goods is given and the positive constraint on the yield on money (since $l > c$) limits the demand curve for capital, no matter how much the supply of money increases. The consequent fall in the market price of capital relative to the long-run supply price as accumulation occurs tends ultimately to reduce the flow of new capital goods produced, until only replacement demand remains.

Since the interest rate is confined to the range of positive values, if the economy is to avoid the stationary state, then the ultimate source of continual capital accumulation for a profit-maximising, market-oriented, monetary economy lies in investors believing in the continuous growth of profit opportunities over time ($\Delta\phi > 0$). Profit expectations depend primarily on the expected *value* productivity of capital services over time. There is no natural law of diminishing *value* productivity *over time* as long as either new consumer goods (or fashions) can be continually introduced, and/or the income elasticity of demand for all existing goods equals unity, and/or the population of buyers (including governments, foreigners, etc.) and their total purchasing power grows at least as rapidly as output, or some combination of these factors. Consequently, there is no *a priori* reason to believe in the inevitability of the stationary state as long as profit expectations are enlarged over time.

Keynes, on the other hand, following the logic of his assumptions, noted that as the stock of physical assets grew, the market price of capital would ultimately equal p_s where " it no longer pays to produce them [additional capital goods] *unless the rate of interest falls* pari passu " [11, p. 228]. At this point, with the rate of interest at its practical minimum, we have reached the true stationary state.

The imminency and inevitability of the stationary state in *The General Theory* derives from the static framework on which it is based. Keynes clearly recognised that changes in technique, tastes, population and institutions can still lead to progress [11, pp. 220–1]. Yet from the orthodoxy of the time he reflected the fear of a fundamental tendency for a decline in the rate of profit with accumulation [17, p. 595].

IV. The Peculiarity of Money

By utilising an approach similar to the stock-flow analysis developed above, Keynes could have eliminated much of the terminological confusion about " own-rates " of interest and the sterility of the discussion of why the

monetary rate " ruled the roost." Moreover, the same general approach for the asset, money, would have cut the fog and controversy over the notion of the " liquidity trap."

Fig. 5 contains the demand and supply schedules for money. Money demand includes the familiar *flow* demand for active balances plus the *stock* demand for idle balances. The supply curve is entirely a stock schedule—a datum created from the past and, in economies utilising bank money, primarily the result of past actions of the monetary authorities. Essentially, we are devoid of a " flow-supply " schedule for money because (as we will develop in Section V below) *an essential property of money is that it should have a zero* (or negligible) *elasticity of productivity*. This rules out a supply flow.[1]

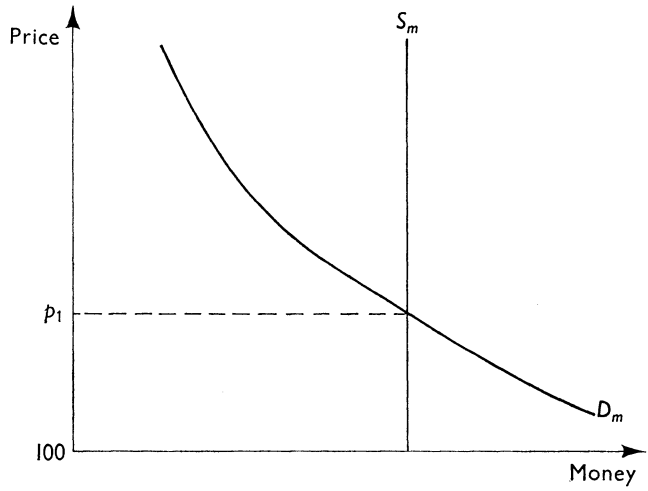

FIG. 5

Fig. 5 can be identified with the familiar liquidity preference diagram, where we have explicitly assumed that : (*a*) the money asset cannot have a flow supply schedule; (*b*) the ordinate axis represents the rate of interest on money which is " nothing more than the percentage excess of a sum of money contracted for forward delivery, *e.g.*, a year hence, over what we may call the ' spot ' or cash price of the sum thus contracted for forward delivery " [11, p. 222]. Thus, in Fig. 5, at the origin we have the price of money in terms of money (*i.e.*, 100), which is, of course, *the long-run supply price of money*; the value of money can never change in terms of itself. The intersection of demand and supply yields, therefore, the market price for borrowing a unit of money which will prevail in a perfect market. This interpretation of the price ordinate highlights the fact that the spot price for borrowing money can never be less than the expected long-run supply price of money

[1] If there was no commodity which had a zero elasticity of productivity, then Fig. 5 would be modified to introduce a highly inelastic flow supply schedule for that commodity which had the lowest elasticity of productivity.

in terms of money, and hence there can never be a contango in the money market as long as $l > c$. If there were a contango in the money market, then the spot price would be lower than the long-run supply price (the intersection would occur in the fourth quadrant), and it would be profitable to buy money (borrow) spot and sell it (repay loan) in the future. In the absence of stamped money or some other scheme for making the carrying cost of money exceed its liquidity premium, such a contango cannot occur, and therefore *there can never be a surplus stock of money*. This, of course, is the logical basis of Keynes' argument that the " pure " rate of interest can never be negative [11, 238]. Imperfections in the market place prevent the effective rate of interest on borrowing money from declining below some positive rate (*i.e.*, there is the usual liquidity trap) [11, pp. 208, 141].

The total demand for money curve can be specified as

$$D_m = f_9(T, i_c, i_e, W) \quad . \quad . \quad . \quad . \quad . \quad (9)$$

where T is planned transactions and represents the demand for active balances, while i_c is the current rate of interest on money (which is related to the current price of placements), i_e represents the expected rate of change in the rate of interest (or the expected rate of change in the price of placements) and W is the stock of wealth owned by the public. The latter three variables relate the public's demand for money as a store of value. The variables i_c and i_e are important in comparing the relative attractiveness of placements *vis-à-vis* money as a store of value. Given i_c and i_e, the demand for speculative balances can be written as $D^s_m = \gamma W$, where $\gamma \geq 0$. In the usual Keynesian liquidity preference analysis it is often implicitly assumed that $\gamma = 0$, however, there is no reason to believe this is necessarily so [1, p. 193]. In fact, Keynes argued that $0 < \gamma < 1$ [10, p. 668].

With $\gamma > 0$, as wealth accumulates and income grows the D_m curve will shift outwards: (1) with a rise in planned transactions the demand for active balances will rise; and (2) the demand for money as a store of value will rise [cf. 19, p. 166]. Accordingly, the D_m curve shifts from $D^1{}_m$ to $D^2{}_m$ in Fig. 6. Thus the price of borrowing rises from p_1 to p_2, while the purchasing power of money is not changed.

From equations (1)–(8) it follows that as the stock of capital goods increases (S_k shifts rightward over time), if the demand curve for capital goods remains rigid, then the stationary state will be approached as the market price for capital goods declines in order to reflect the expected lower yield associated with the increase in the stock of capital. Given the long-run supply price of p_s in Fig. 4, the market price will decline until it equals p_s. At that stage any further increase in the capital stock will place the market price below the long-run supply price and tend to dry up activity in the capital-goods industry.

Moreover, if the money stock did not expand as the capital stock increased, then the money rate of interest would rise (as in Fig. 6), and the

demand curve for capital would shift inwards as the capital-stock supply curve shifted outwards over time. This would accentuate the decline in the spot price of capital goods. Alternatively, if the supply of money increased rapidly enough, the rate of interest could be pushed towards zero, even with capital accumulation. Nevertheless, as long as $l > c$ for money, the price for borrowing money must exceed the value of money in terms of itself, *i.e.*, there cannot be a contango, and the demand for capital schedule is constrained by the rate of interest.

Inevitably, under these assumptions there is a stage at which it no longer pays to increase the stock of capital goods, since the market price of capital will ultimately equal the stationary state (long-run) supply price (p_s in Fig. 4). At that point " the further production of new capital assets will come to a standstill " [1] [11, p. 228].

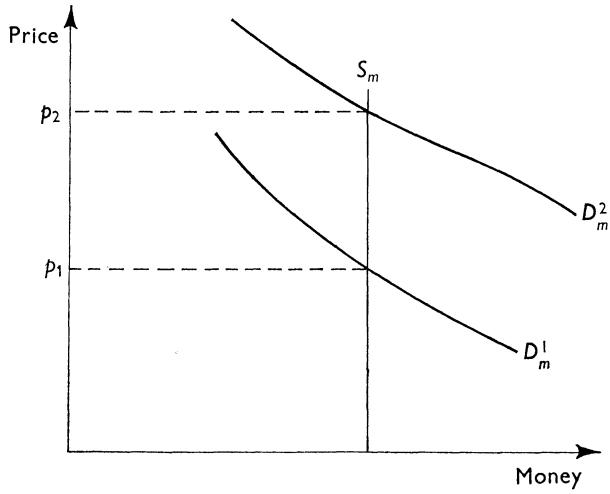

FIG. 6

Thus, given expectations about $q - c + l$ for all assets, as the stock of assets in general increases, that asset whose short-run market price declines most slowly relative to its long-run supply price "will eventually knock out the profitable production of each of the others " [11, p. 229]. As the market price of each capital good approaches its long-run supply price it is no longer profitable to enlarge the stock of it. Finally, there is only one asset alone which if its stock was to be increased would not be redundant. The yield on this asset thus rules the roost. Acknowledging the impossibility of a contango in the money market, this asset must be money.

[1] The exception to this case involves user costs. In the stationary state it will never pay to produce more than the required replacement capital goods in any period " unless the cost of production at some future date is expected to rise above the present cost of carrying a stock produced now to the date of the prospective higher price " [11, p. 228]. See Section VI below for a further discussion of this point.

To summarise, then, what matters in determining the level of production of capital goods at any point of time is the relationship between the demand-price curve for these goods, the minimum flow supply price and the short-run elasticity of supply of capital goods. The relationship between the market price of capital (as determined by the intersection of the market demand and short-run supply curve) and the long-run supply price (p_s) determines whether the stock of capital is increasing or not. Since capital goods have carrying costs which exceed their liquidity premium, it is possible for the spot price to be more than, equal to or less than the long-run supply price. While all other durable assets can become redundant, as long as there can never be a contango in the money market, money can never be in surplus supply; and hence the return on money rules the roost. (In a non-monetary economy, *i.e.*, " an economy where there is no asset for which the liquidity-premium is always in excess of carrying costs " [1] [11, p. 239], that asset whose market price declined least relative to its long-run supply price would be " the " rooster!)

V. The Essential Properties of Money

What, then, is so peculiar about money which enables it to occupy this strategic position in the roost? Secondly, is there something that rules the rooster? These vital questions deserve to be explored.

Keynes noted that the two essential properties of money must be that it has " zero (or negligible) elasticities both of production and substitution " [11, p. 234]. Thus Fig. 5 was drawn devoid of a flow-supply schedule of money. As Keynes noted, unlike the case of commodities in general, " labour cannot be turned on at will by entrepreneurs to produce money in increasing quantities as its price rises " [11, p. 230]. Accordingly, if the demand for money rises from $D_m{}^1$ to $D_m{}^2$ in Fig. 6 there will be no increase in supply, so that the price of money for " forward delivery " will rise from p_1 to p_2.

With a rise in the price of money there will be a tendency to substitute placements for money as a store of value. This process of substitution, however, was *not* what Keynes had in mind in calling attention to the low elasticity of substitution for money. He was discussing the substitutability of other commodities for the particular money asset. If there was a high elasticity of substitution between money and other reproducible goods *as a store of value*, then an increase in the price of money would induce an increase in the demand for other commodities and result in increased employment in the goods-producing industries. Obviously, if money had a high elasticity of substitution, involuntary unemployment would not be a major

[1] In such a " barter " economy there is no liquidity trap; Say's Law prevails and there is no barrier to full employment.

problem for market-oriented, monetary economies, as an increase in the demand for money as a store of value would spill-over into an increase in the demand for reproducible goods. We have, however, already noted that it will not normally pay to demand physical capital as a store of value as long as there is an organised market for titles to the capital goods.[1] Consequently, a very high elasticity of substitution of placements for money as a store of value will not have any direct employment-creating impact, while it will assure that the elasticity of substitution between money and commodities as a store of value is negligible.

Furthermore, even an increase in the purchasing power of money will not encourage the substitution of any other good for money in its role *as a*

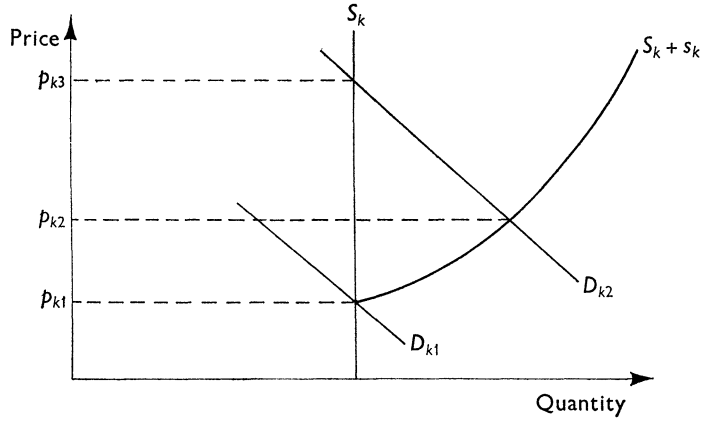

FIG. 7

medium of exchange. Unlike other durable goods, when the exchange value for money alters this does not affect its utility as a medium of exchange which is derived solely from its purchasing power [11, p. 231]. For capital goods, on the other hand, a change in their market price alters their value as an input in the production processes, *i.e.*, it changes the price of the service of capital. Thus, an increase in the market price of capital will encourage entrepreneurs to substitute labour for capital in the production process, thereby generating an employment effect. Money, on the other hand, by its very definition has a negligible elasticity of substitution as a *medium* of exchange. In sum, commodities are not normally good substitutes for money either as a store of value or a medium of exchange.

Since capital goods also possess a higher elasticity of productivity than money, then if the demand for capital increases from D_{k_1} to D_{k_2} (in Fig. 7)

[1] The only exception to this will be the case of wage–price inflation, where if the short-run supply price of durables is expected to increase more rapidly than their carrying costs individuals may substitute durables for money as a *store of value* destroying the monetary aspects of the economy. This will be developed in detail in Section VI.

the market price would rise moderately from p_{k_1} to p_{k_2} (instead of p_{k_3} if this good had a zero elasticity of productivity), and the accumulation of capital would increase as the numbers of workers in the capital-good industry rises [cf. 11, 235]. Moreover, with an increase in the price of capital, entrepreneurial substitution of labour for capital would mean that some of the increase in demand would spill over into increasing the demand for labour directly.

If the demand for money rises, since the elasticity of productivity is zero, no additional men can be employed to produce " the object of desire," while the increase in the rate of interest will cause, *ceteris paribus*, a leftward shift in the demand schedule for capital goods, which will lead to a decline in the market price, output and employment of the capital-goods industries. This decline in the market price will, for a given set of expectations about $(q - c)$, imply an increase in the expected return on the *existing* stock of capital, in order to bring it up to the rate of return on money. To make it worthwhile to purchase any new capital goods, therefore, each firm must now earn a return equal to the higher opportunity cost of the alternative investment opportunity [cf. 16, p. 8]. Thus in a perfect market where firms are able to borrow any sums they want at the going rate of interest the marginal rate of return on new investment (adjusted for risk) will just be equal to the higher rate of interest on borrowing money. The resulting unemployment effect is obvious.

Alternatively, if the demand for money declines, if there is a zero productivity elasticity, there would be no release of resources from the production of the money commodity, while the fall in the rate of interest will increase the demand for capital. The rise in the market price of existing capital is indicative of the lower expected return on the existing capital stock, and therefore the reduced opportunity cost of undertaking a new investment project. Hence firms are encouraged to borrow to finance additional investment until, in a perfect market, the expected rate of return on the marginal investment equals the lower rate of interest on borrowing money.

VI. The Money Rate of Interest and the Money Wage-rate

For Keynes not only does the money rate of interest " rule the roost " but money is also the standard in which contracts, debts and wages are normally expressed. The combination of properties of a low elasticity of productivity and of substitutability renders money uniquely desirable for measuring deferred payment *and* for pricing labour services. Money possesses a large liquidity premium once contracts are fixed in terms of money and wages are sticky in terms of money, for, as Keynes noted, " the convenience of holding assets in the same standard as that in which future liabilities may

fall due and in a standard in terms of which the future cost of living is expected to be relatively stable is obvious " [1] [11, pp. 236–7].

If the standard of deferred payment had a high elasticity of productivity, then every increase in the demand for the commodity which served as this standard (including any increase in demand for a store of value) would induce entrepreneurs to increase the demand for labour to be used in its production. This increase in labour demand would, in a period of full (or near full) employment, result in the bidding up of money-wages, which would, in turn, result in an increase in the (money) supply price of output as a whole. Thus, a low elasticity of productivity of money is essential if an increase in the demand for money as a store of value is not to destroy the purchasing power or exchange value of that store of value through increases in the money rate of remuneration of labour.

If money is to be designed as a store of value, then there must be a " normal " expectation that the value of output in general will be more stable in terms of money than in terms of any other commodity. This does not necessarily require that wages be fixed in terms of money; rather what is necessary is that wages be " relatively *sticky* in terms of money " [11, p. 237]. If wages are sticky in terms of money, then the short-run supply price (in money terms) of output as a whole will, in the absence of changes in monopoly elements (*i.e.*, mark-ups over prime costs), vary only with the law of diminishing returns in the short run, and changes in productivity in the long run [11, p. 268]. Consequently, the stability of the exchange value of money is closely related with the stability of the money wage-rate.

Fiat money will thus be the money *par excellence* on the proviso that the money wage-rate is sticky, *and* in particular that the money wage-rate does not exhibit autonomous movements,[2] for any increase in the demand for fiat money cannot induce an increase in the demand for labour (and hence raise the money wage) to produce money, since the elasticity of productivity of fiat money must be zero. Since fiat money also does not normally involve any carrying costs, there cannot be a contango in the market for fiat money. As Keynes summarised the situation:

> " Thus we see that the various characteristics, which combine to make the money-rate of interest significant, interact with one another in a cumulative fashion. The fact that money has low elasticities of production and substitution and low carrying-costs tends to raise the expectation that money-wages will be relatively stable; and this expectation enhances money's liquidity-premium and prevents the exceptional correlation between the money-rate of interest and the

[1] Thus those who advocate freely flexible money wages and prices forget the impact that such a policy would have on liquidity premiums and therefore on interest-rate phenomena. This contradiction is implicit in much of the current analysis which stresses Phillips' curves and (partially) flexible money wages, with the plasticity of wages increasing in the near-full-employment economy.

[2] Certainly the money wage should not increase before full employment.

marginal efficiencies of other assets [1] which might, if it could exist, rob the money-rate of interest of its sting " [11, p. 238].

Thus if the money wage is stable the money rate of interest will rule the roost, simply because a zero elasticity of productivity means that any change in the demand for money *will not alter the supply of money* or its purchasing power in terms of flow supply prices. Instead, it simply raises the rate of interest. Changes in the money wage-rate, however, by altering the money wage (prime-cost) component of the supply price of output as a whole, will alter the exchange value between money (per unit) and goods, and hence alter money's desirability as a store of value.

If the money wage-rate was to increase, then although the exchange value of money for labour had decreased proportionately, the exchange value of those assets with higher elasticity of productivity for labour would decrease by less. Substantially, with higher money wages, and therefore higher money flow supply prices of commodities, the purchasing power of money would decrease by more than the exchange value of other durable assets. Thus if a wage–price inflation is expected, the expected appreciation in money terms of all durable assets except money (whose $a = 0$ by definition) will be greater than zero. This " is tantamount to an increase in the commodity-rates of money-interest and is, therefore, stimulating to the output of other assets " [11, p. 231]. This inflationary expectation will, however, impede the money commodity from fulfilling its function as a store of value.

Thus as Keynes noted:

> " The stimulating effect of the expectation of higher prices is due, not to its raising the rate of interest (that would be a paradoxical way of stimulating output—in so far as the rate of interest rises, the stimulaing effect is to that extent offset) but to its raising the marginal efficiency of a given stock of capital. . . . For the stimulus to output depends on the marginal efficiency of a given stock of capital rising relative to the rate of interest " [11, p. 142–3].

In terms of our previous notation this means that ΣQ_r will increase by a greater proportion than the current rate of interest will rise as a result of the decrease in the supply of real cash balances as wage–price inflation occurs. Thus, wage–price inflationary expectations can increase the demand for capital (durable) goods if they raise the future prospective money yield of capital goods relative to any increase in the current rate of discount.

If, however, money wages and prices are expected to rise rapidly enough so that the market price of durables at some future date is expected to be greater than the present market price by an amount which will more than cover the cost of carrying goods produced now to the date of the prospective

[1] This exceptional correlation depends on the fact that without the high liquidity premium for money the market price might fall below the long-run supply price as the stock of money increased —as happens with all other durable goods.

higher spot price, then there will be an acceleration of demand for capital goods—including replacement goods [cf. 11, p. 228]. If such expectations are rife, individuals will abandon the use of money as a store of value as the economy undergoes a flight from currency so great that durable goods become the primary store of value, as rising interest rates are " unable to keep pace with the marginal efficiency of capital (especially of stocks of liquid goods) under the influence of the expectation of an even greater fall in the value of money " [11, p. 207]. When a flight of this magnitude occurs, durable goods are held as a store of value (inventory speculation), and ultimately exchanges involving durable goods (except due to differences in speculative expectations) can grind to a halt in the economy; only non-durables and services will be traded. This must mean, in modern production–specialisation–exchange economies, the breakdown of the monetary system and a reversion to barter practices. As Lerner so cogently observed:

> " The essential superiority of a monetary economy over a barter economy is the saving of mental effort made possible by money. In a monetary economy it is not necessary to think of all the rates of exchange of every commodity for every other commodity in which one might be interested. It is sufficient to know the money price of a commodity and to use this price as a representative of all the other things one might have instead. *But this service can be rendered by money only if there is a sufficient stability in its purchasing power.* In hyperinflation money ceases to be able to perform this service, and the economy reverts to barter until some other monetary unit is established " [1] [14, p. 191, italics mine].

Consequently, Keynes' emphasis on a zero (or negligible) elasticity of productivity of the money asset,[2] if money is to be a store of value, is based on his belief that the money wage-rate would change primarily in *response* to changes in tightness in the labour market. With a zero elasticity of productivity, increases in the demand for money would not induce an increase in the demand for labour, and consequently would not affect the money wage and therefore the money supply price of output as a whole. Thus, a zero elasticity would tend to encourage wealth holders to believe that money was a safe store of value, and hence contribute to the high liquidity premium on money.

If, on the other hand, money was never utilised as a store of value and only employed as a medium of exchange (or a unit of account) for current transactions, then, as most general equilibrium analysts correctly point out,

[1] Lerner noted that the much rarer hyper-deflation phenomena could also destroy the monetary system [14, p. 191].

[2] If bank money is the primary form of money, then the supply, in the short-run, must be determined by the monetary authorities with reference to the level of employment in the system and not with reference to the profit-making opportunities of commerical banks. In the long run this may require expansion of supply of money as the economy grows [see 4, 5].

it would make no difference what commodity was used as the numeraire. It is only when money can be utilised as a store of purchasing power that a low elasticity of productivity and substitutability are required for the money commodity. *The low elasticities will enhance the stickiness of wages in terms of money—a necessary condition for people to have confidence in using the money commodity as a store of value over time.* Thus in a monetary economy, while the money rate of interest may be the rooster ruling the demand for all capital goods, nevertheless *it is the money wage-rate which rules the rooster.*

The perfunctory treatment of the problem of durability and the high carrying costs of most durables in the usual general equilibrium analysis has not only hindered the use of such an approach in solving real world macroeconomic problems but it has also misled many into ignoring the peculiarities required for a viable monetary system. Peanuts may serve as the numeraire in the usual general equilibrium analysis; it would never be the money commodity in the real world! A general equilibrium approach may be useful in considering the allocation of resources under normal economic motives in a world where all production and consumption occurs in the present, and the future is fixed and reliable in all respects. Nevertheless, in the real world,

> " expectations concerning the future affect what we do to-day. It is when we have made this transition that the peculiar properties of money as a link between the present and the future must enter into our calculations. . . . Money in its significant attributes is, above all, a subtle device for linking the present to the future; and we cannot even begin to discuss the effects of changing expectations on current activities except in monetary terms " [11, p. 294].

Once economists recognise that rapid movements in money wage-rates can, in a modern monetary economy, destroy the usefulness of money as a store of value and consequently induce a reversion to barter, the general equilibrium delusion of the unmitigated desirability of freely flexible wages and prices will be apparent.

In contrast to this Keynesian position of the propriety of sticky money wages, some economists continue to argue that changes in demand and not cost (and particularly money wage-rates) are the primary exogenous cause of price fluctuations. They tend to ignore the fact that the money wage-rate is a ubiquitous component of the flow-supply prices of commodities and that labour costs are uniquely related to short-run market prices. It should be obvious, however, that in a profit-maximising system any exogenous change in the demand (price) for goods will induce changes in short-run market prices, *if there is no change in the money wage-rate or degree of monopoly* (*i.e.*, mark-up), only to the extent that diminishing returns is present. If, on the other hand, there is an exogenous increase in the money wage, then, even in the absence of any change in demand, the resulting short-run market price will be higher than before *except*: (1) if the degree of monopoly

decreased proportionately more than the increase in wages; or (2) if the reduction in diminishing returns as the quantity demanded declined more than offset the increase in money wages, or some combination of (1) and (2). In the real world of changing effective demand levels at less than full employment an *incomes policy* which controls both the money wage and the profit margin (mark-up) will provide more stability in the purchasing power of money than will a policy which permits freely flexible wages and profit margins. Hence such an incomes policy will enhance the usefulness of money as a store of value and prevent " flights from money," as the price level changes only to reflect the changing *real* costs of producing commodities as aggregate demand changes. Fortunately, real-world institutions and imperfections have, until recently, limited wage flexibility and have therefore prevented the establishment of flexible wages and prices of " perfect " markets, which some economists advocate as a panacea for all our modern macroeconomic ills.

As Lerner exclaimed after his valiant effort at interpretation, one of the central propositions of *The General Theory* is that " any money which was completely cured of wage and price rigidity would not be able to survive as money " [14, p. 193]. The preceding analysis has attempted to demonstrate the validity of this position, along with insights on the dependence of the process of capital formation on the rate of interest and the money wage. These relationships were central to Keynes' preoccupation with " own-rates " of interest which, for most Keynesians, has generally been the most obscure part of his analysis.

The most obvious consequence of this analysis is that labour unions share responsibility with the monetary authority in controlling the relationship between the demand to accumulate real wealth and the rate of interest. Until such times as labour unions and central bankers recognise that a stable money-wage policy must be an essential consort to a sound monetary policy which encourages economic growth, modern market-oriented *laissez-faire* economies will continue to follow erratic paths of economic growth.[1]

VII. A Complication if the Demand and Supply of Money Are not Equal

Until now, it has been implicitly assumed that in equilibrium the quantity of money demanded would just equal the quantity of money supplied, *i.e.*, borrowing and lending of money conforms to the principles of a perfect market, so that there can never be an excess demand or supply of money at the market price for borrowing money. In such circumstances it does not do much violence to the facts to suggest that the opportunity cost of purchasing a newly produced capital good (*i.e.*, the rate of profit obtainable on existing capital goods) is equal to the rate of interest. If, however, lending

[1] Emphasis on these matters has been considered in the writings of Weintraub [20, 21].

occurs under conditions of an imperfect market, then there is likely to be an " unsatisfied fringe of borrowers " *i.e.*, at the going spot price for borrowing money there is excess demand [8, p. 212]. This phenomenon of credit rationing is likely to be particularly *à propos* when business is active and expanding rapidly. Under these circumstances it is the expected rate of profit on alternative investments which comprises the opportunity cost of any new project; and this opportunity cost (even after adjustment for uncertainty) exceeds the rate of interest [cf. 16, p. 8].

In such buoyant times, therefore, it may be *the supply of finance* which limits the rate of investment which can be undertaken per unit of time by holding down the demand price of capital via restrictions on the number of entrepreneurs (E) who can obtain finance (in equation (1)) to make their demand for capital operational. For as Keynes noted:

> " A member of the public, who, as a result of the credit restriction is unable to borrow from his bank, generally has no facilities . . . for obtaining the funds he requires by bidding up the price of loans in the open market, even though he is willing to pay more than the supply price " [9, p. 255].

Although such a shortage of finance will limit the *rate* at which new investment projects are undertaken, as long as some finance is available it will act as a " revolving-fund " to allow all the projects whose rate of profit exceed the rate of interest to be ultimately undertaken as the fringe of unsatisfied borrowers are gradually eliminated. In the long run, though we may all be dead, we can take comfort in that, *ceteris paribus*, a stationary state will emerge.

The lack of finance can therefore be an important practical obstacle to growth and the actual *rate* at which capital can be accumulated,[1] even though it does not affect the conclusion that the money rate of interest will rule the roost. For the money rate of interest will set up the wall which will limit, *given entrepreneurial expectations*, the ultimate magnitude of the desired stock of productive facilities for the ensuing stationary state.

VIII. Implications of this Keynesian Doctrine for Growth Theory

Not surprisingly, the esoteric qualities of Chapter 17 in Keynes' *General Theory* which rendered the argument rather superfluous for the theory of the employment level, turns out to be vital, perhaps crucial, for the theory of economic growth and price level stability. The latter are the modern problems for Keynesians and all schools of economists.

Our study has shown that, in a Keynesian context, there may be several

[1] For a detailed examination of the importance of " finance " in determining the equilibrium level of investment, [see 4, 5].

reasons why a monetary, market-oriented economy will fail to grow or will advance erratically and unsteadily. The major factors are:

1. If entrepreneurial expectations are sufficiently depressed, then the market price for capital goods can readily fall to equality with (or below) the long-run supply price of capital. In this event, a stationary (or a regressive) state could emerge.

2. If entrepreneurs have " great expectations " but the banking system fails to furnish sufficient finances, then the shortage of finance may impede the accumulation and growth prospects even with idle resources.

3. If money wages are flexible, and if they are expected to alter, then forces may be set in motion which can damage the viability of money as a store of value. Ultimately the " flight from money " can compel the economy to revert to inefficient barter practices. Before this stage is reached the rise in wage-rates, by eroding the " real " supply of money balances can generate a shortage of finance. Unless this is relieved by the actions of the banking system in creating nominal balances, this will, as in 2 above, depress the rate of growth.[1]

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