**THE MONETARY AND THE REAL:
SECTORAL INTERDEPENDENCE AND MARKET OUTCOMES**

by

Douglas Vickers

Professor of Economics
University of Massachusetts, Amhurst
and
Visiting Professor/Bateman Lecturer (1991)
Department of Economics
University of Western Australia

DISCUSSION PAPER 91.20
NOVEMBER 1991

ISSN 0811-6067
ISBN 0-86422-156-8

THE MONETARY AND THE REAL:
Sectoral interdependence
and market outcomes

Douglas Vickers

"There are good reasons to
think that the nature of
money is not yet rightly
understood."

John Law, 1720

I

Among the "unsettled questions of political economy", to adapt the title of John Stuart Mill's important but neglected Essays,¹ none is more pressing at the present time, or more important for aggregate analysis and policy, than that of the relation between the monetary and the real. The "veil of money", the notion that money was "neutral", and the "axiom of reals" or the preoccupation with real activity that took place behind the monetary veil, have heavily influenced the development of economic analysis. Not only is that true in a historic sense; it continues to haunt modern constructions.² The observation of John Law that heads this paper had immediate reference, of course, to the progress in the theory of money that occurred in the eighteenth century.³ But the questions implicit in the statement have continuing relevance for contemporary opinion and the functioning of the monetary economy.

Our objective in this paper is to consider the relation between the availability of money, the circulation of it, and the determination of real values and rates of progress in real incomes in the economy. Following the inspiration of Keynes, recent literature has examined the relation between finance, investment,

and saving, and has considered the extent to which connections exist between the "real" expansion implicit in potential "multiplier" effects on the one hand and the familiar notion of the velocity of circulation of money on the other.⁴ Tsiang, in an early paper, concluded that "in considering the effects of inflationary financing of development investment, the multiplier principle, which neglects the supply of money and the money-market mechanism, can be dangerously misleading".⁵ More recently Snippe, basing his argument on the increase in the demand for money and finance that results from "the multiplier process", has observed that it "does not alleviate the finance problem, but, rather makes it worse".⁶

Our immediate perspective is influenced by Keynes' post-General Theory argument that "if [following an increase in investment expenditure] there is no change in the liquidity position, the public can save ex-ante and ex-post and ex-anything else until they are blue in the face, without alleviating the problem in the least - unless, indeed, the result of their efforts is to lower the scale of activity to what it was before ... the banks hold the key position in the transition from a lower to a higher scale of activity. If they refuse to relax, the growing congestion of the short-term loan market or the new issue market, as the case may be, will inhibit the improvement, no matter how thrifty the public purpose to be out of their future income ... The investment market can become congested through shortage of cash. It can never become congested through shortage of savings. This is the most fundamental of my conclusions within this

field".⁷

In the General Theory (though we are not setting out to present an exegesis of that work) Keynes had argued similarly that "if the grant of a bank credit to an entrepreneur additional to the credits already existing allows him to make an addition to current investment which would not have otherwise occurred, incomes will necessarily be increased and at a rate which will normally exceed the rate of increased investment. Moreover, except in conditions of full employment, there will be an increase of real income as well as of money-income". This is, of course, the familiar real multiplier process. But Keynes has here supposed that its instigation depends on an initial "grant of bank credit" or the creation of new money. It follows, in ways we shall examine more fully, that saving in a unique monetary sense will increase as a result of the new money creation. "The savings which result", Keynes continues, "are just as genuine as any other savings. No one can be compelled to own the additional money corresponding to the new bank credit, unless he deliberately prefers to hold more money rather than some other form of wealth. Yet employment, incomes and prices cannot help moving in such a way that in the new situation someone does choose to hold the additional money".⁸ The creation of new money by the banks in order to finance investment expenditure will generate, in the hands of the ultimate holders of it as it is circulated through the real markets of the economy, what Basil Moore in an insightful analysis has referred to as "convenience lending" and what we shall refer to in a related context below, following the termin-

ology that Keynes has just adopted, as convenience saving.⁹

That the earlier literature in our subject had understood money as substantially a "veil" does not need any extensive explanation. Schumpeter has addressed the point eloquently. Drawing a distinction between "Real analysis" and "Monetary analysis", he observed that the period that followed the developments in the theory of money in the eighteenth century witnessed "a victory of Real Analysis that was so complete as to put Monetary Analysis practically out of court for well over a century".¹⁰ It is not true, of course, that there had been no work, or no important work, in monetary analysis during the classical period. Jacob Hollander, Richard Sayers, Jacob Viner, and John Hicks, among others, have thrown important light on the topic.¹¹ Viner's classic examination of the bullionist controversies of the early nineteenth century continues to warrant careful attention, and his discussion of the currency school and the banking school positions are relevant to the question of the exogeneity or the endogeneity of the money supply that will engage us again below. Hicks' discussion of Henry Thornton's well known Paper Credit has emphasized the extent to which that early work addressed many "Keynesian" questions and other more modern issues.¹²

But the good deal of work on monetary affairs, including the large amount of what Keynes, following his Treatise, allowed to "fall into the background" as "technical monetary detail",¹³ does not obscure the fact that the nineteenth century economists did, by and large, hold to the view that the analysis of the economic system could be dichotomized into that of a real and a monetary

sector. The distinction between what Schumpeter characterized as Real and Monetary Analysis was taken up by Patinkin who examined the "invalid dichotomy" issue in neoclassical theory. His argument has been further evaluated by Rogers, in his important Money, Interest and Capital, in a manner that is relevant to our present investigation.¹⁴ John Stuart Mill, notwithstanding some highly suggestive arguments to the contrary in his Essays on Some Unsettled Questions, concluded that "there cannot, in short, be intrinsically a more insignificant thing, in the economy of society, than money; ... It is a machine for doing quickly and commodiously, what would be done, though less quickly and commodiously, without it ... it only exerts a distinct and independent influence of its own when it gets out of order".¹⁵ The brilliance of Mill's conclusion, however, is not in his view of money as a "veil", or, as Pigou early in the twentieth century called it, a "garment or a wrapper" over economic affairs.¹⁶ It is in his recognition that money does "get out of order", and that it is then that many aspects of its true significance emerge in full light. One senses an anticipation of Hyman Minsky's perception of the endogenously generated cyclical instability that is characteristic of a monetary market economy.¹⁷

Wicksell discussed at length the cyclical instabilities induced by the divergence of money market or nominal rates of interest from what he saw as natural rates. That discussion might appear to place him in the camp of monetary rather than real analysts. But he must nevertheless be understood as falling under the latter heading. This follows from his insistence that the

natural rate of interest, which functioned in many respects as what the present day neo-Ricardians see as a "centre of gravitation" of the system, is explicable by reference to "real" causes, namely the real marginal productivity of the economy's capital stock.¹⁸ The other main component of neoclassical and contemporary analysis, the neo-Walrasian scheme, essentially sees no need for money at all. The point has been discussed expansively by Davidson and numerous authors whose analysis adopts a "Post Keynesian" perspective.¹⁹ Frank Hahn also has concluded that "the Walrasian economy ... is essentially one of barter".²⁰ From this perspective Hahn has spoken further of the "inessential" nature of money and has explained that "The main content of the monetary theory of an inessential economy is implicit in its construction: there is nothing we can say about the equilibrium of an economy with 'money' that one cannot say about the equilibrium of a non-monetary economy".²¹

What the classical and the neoclassical theory point to, and what characterizes much of contemporary analysis such as the "new classical economics" with its reliance on rational expectations and infinite market clearing velocities, is the neutrality of money. Money is "neutral", we can say, if changes in the quantity of money in circulation do not cause any change in the equilibrium solution values of such real variables as the level of output, employment, relative commodity prices, and the real rate of interest. In that case its only effect is to cause a proportional change in the absolute money price level. The analytical system is thereby completely dichotomized. In many expressions of

the neoclassical analysis it is acknowledged that though money might well be non-neutral in the short run, neutrality obtains in the long run (though the rational expectations "policy irrelevance theorem" concludes that money is neutral in both the short and the long run).

Our immediate concern, to the contrary, is with the manner in which the existence and circulation of money affects the operation of the aggregate system in an essential way, in both the short run and the longer run. On the level of the individual firm, for example, in relation to optimal operating levels, factor combinations, investment expenditures, and capital expansion, the monetary and financial aspects of relevant decisions need to be taken clearly into account. On the aggregate level, such decision problems and outcomes find an analogue in the provision of finance that is necessary to facilitate an expansion of investment. That, as can be seen from the quotations above, is the precise point that Keynes addressed.

Most pointedly, the question arises, in the context of expanded investment and capital formation, "Where does the money come from?" Can or does saving finance investment? If the classical conception of Say's Law could be shown to have validity, then saving flows into and finances investment. This is no doubt the notion behind the Turgot-Smith savings-investment doctrine²² that sees an automatic mechanism that transforms saving into investment. It also lies behind the Ricardian notion of the progress of the economy toward the stationary state as the investment of the savings out of the capitalists' profits propels the system for-

ward. At the same time, a declining rate of profit on capital investment is induced by the pressure of diminishing marginal productivity in the wage good industries, notably agriculture. That puts an upward pressure on the money wage rate and causes a decline in the profit rate. But clearly, more is involved than the notion, as the classical analysis saw it, of such an automaticity in the savings and investment flows. For if it is true, as the Keynesian multiplier analysis has led us to believe, that the causal relation needs to be reversed and that it is investment that generates saving, the question arises as to how the saving, which comes later in real time than the investment, can provide the finance, or the expendable funds, to make that investment possible. What, in short, are the savings that investment expenditures generate, what processes of financial flows operate to bring investment and saving into equality with one another, and what relations exist between the flows of values in the financial sector and the generation of values, and thereby the motivation for economic activity, in the real sector? What interdependence exists, in other words, between market outcomes in the respective spheres of circulation?

II

Consider, first, the firm's demand for money capital. A number of considerations on this level provide a background to the macroeconomics of money capital investment. An adequate foundation for our subsequent discussion can be provided by the following minimal observations. They address the fact that inade-

quacies of analysis at this point have caused a serious hiatus in the neoclassical theory of the firm and its optimizing behavior. Two important distinctions need to be borne in mind. First, analysis must focus on the distinction between the real capital and the money capital employed by the firm. The former, along with cooperating monetary and working capital assets such as inventories and accounts receivable, is described on the assets side of the firm's balance sheet. The latter is described on the liabilities side of the balance sheet which depicts in summary form the financing sources, or the sources of money capital, employed in the firm. Money capital is not to be understood as a factor of production. It describes, rather, the source and magnitude of the funds available to the firm to be used to finance the investment in real capital and other assets. Real capital, properly interpreted, is a factor of production. But in the context of a flow-flow production and factor use analysis, in which a flow of factor services is understood to provide a flow of product output, it is not the real capital asset, the machine tool for example, that is to be understood as the factor of production. That productive factor is to be interpreted as the flow of services provided by the real capital asset.

Second, we are here speaking of the firm's demand for money capital. We are not yet speaking of its demand for money. The firm's demand for and use of money capital is depicted, as has been said, on the liabilities side of its balance sheet. That money capital, which will be obtained in general in the form of short term loans, longer term debt, and equity capital (including

retained earnings), is invested by the firm in numerous possible ways, depending on decision preferences, optimization criteria, and expected future value realizations. One of the assets in which the money capital may be invested is money. To the extent that the firm allocates its available money capital to investment in money balances, it is to that extent satisfying its liquidity requirement, but it is thereby reducing the extent to which that money capital would otherwise be available for the financing of real capital assets and an expanded production process.²³

The neoclassical theory of the firm has expanded, of course, beyond the immediate or short run analysis in which day-to-day production and variable factor use decisions are made. But the attempts to accommodate analytically the use of fixed or real capital assets have not in general achieved a satisfying integration of the real and the financial theories and decision problems of the firm. The real and the financial theories of the firm have followed separate and unsymbiotic developments. No satisfactory recognition has been given, moreover, to the problems that arise when account is taken of the uncertainties and the essential ignorance of the future, in the context of which decisions in the firm are necessarily made.²⁴

Earlier analysis of the manner in which the conventional theory of the firm is in need of amendment to take account of its money capital financing problem makes extended discussion at this point unnecessary.²⁵ It has been shown that the traditional conceptions of marginal optimization and the relevant factor use decisions do not get at the heart of the relations that exist

between the firm's real and financial decisions and their bearing on its optimum structure and operations. For implicit in the conventional neoclassical procedure is the assumption that the firm exists and operates in what we may refer to as a condition of money capital saturation. By this term we refer to the fact, or the supposition, that the firm has ready access at all times to as much money capital as it needs in order to enable it to operate at any desired level of output, with any desired quantity or combination of factor inputs. In fact, however, account needs to be taken of the manner in which the firm's structural and operating decisions are subject to what we have referred to previously as a "money capital availability constraint".²⁶

When account is taken of the pressure and the significance of that constraint it becomes clear that money capital financing costs must be imputed to factors of production. It follows that decisions as to the firm's optimum or desirable operating structure will be influenced by what we have termed the money capital intensity of the factors. This refers to the amount of money capital that must be introduced to the firm in order to provide for the presence of each unit of factor services.

Leaving aside for the present the fuller analysis of the interconnections between the firm's financing and factor use decisions, it follows that what must come to prominence for our present purposes is the effective cost to the firm of introducing additional money capital, or, as has been said, of relaxing the money capital availability constraint. For that effective cost provides the benchmark for incremental capital investment decis-

ions. If, as we shall observe in what follows may be the case, the firm obtains new money capital by selling a new issue of debt securities, it becomes necessary to specify appropriately the full marginal cost of debt capital. It is similarly necessary, under relevant conditions, to specify the full marginal cost of equity capital. In any event, the cost of money capital that is relevant to investment and financing decisions at the level of the firm, and which lies behind the following analysis, is to be understood as the appropriately specified full marginal cost of relaxing the money capital availability constraint.²⁷

III

A valid insight implicit in the foregoing analysis provides a point of entry to the Post Keynesian theory of the firm and its financial market dependence. This does not depend on what would be the untenable assumption that it is possible to conceive, in the uncertainties that abound in the real world, of stable and well-defined behavior functions and relations such as conventional analysis may suggest. The parametric forms of behavior functions cannot be specified independently of the passing and the pressures of real time and history. Rather, the usefulness of a reconstructed analysis rests in its ability to alert us to the nature of the causation and the directions of relationships that subsist and that demand recognition for decision purposes. Though stable functions and curves do not exist over real time in real world economies, it is a valid insight that in the decision as to the worthwhileness of expanded capital investment, for example,

attention must be paid to the possible increase in the value of the firm that may result from it, and to the effective cost, at the margin of decision, of the money capital that is necessary to finance the investment.

Thus there enters the analysis, as a basic building block of the Post Keynesian theory, the Keynesian concept of the marginal efficiency of investment. This points to a decision criterion that conceives of the economic value of capital expenditure as the increment to the value of the firm that results from discounting the incremental income stream that can be expected to result from the investment at a discount factor, or capitalization rate, specified by the best estimate of the firm's full marginal cost of relaxing the money capital availability constraint. That incremental economic value can then be compared with the supply price of the capital goods that must be acquired, plus the incremental investment in working capital assets associated with the new capital project.

It has been forcibly argued, by Pierangelo Garegnani for example, that the notion of the marginal efficiency of capital is "the Achilles' heel" of Keynes's critique of the neoclassical theory.²⁸ John Eatwell also joins in the critique of the concept, arguing that it "was itself derived from the neoclassical schedule".²⁹ But such claims are not to the point. The concept does not require any surrender to the neoclassical notions of capital that were rebutted in the famous Cambridge critique of neoclassical capital theory.³⁰ That this is so has been clarified by Luigi Pasinetti and convincingly argued by Colin Rogers.³¹

Consider, then, that based on its estimate of the marginal efficiency of investment, and incorporating in its decision process an estimate of the relevant marginal cost of money capital, the firm decides to undertake investment expenditure. The question arises as to how that investment expenditure is to be financed. It has frequently been observed that a large part of such industrial expenditures are made out of firms' accumulated retained earnings. The fact is well substantiated. But it is an analytical superficiality to leave the matter at that point. To the extent that the net earnings of previous periods have been retained in the firm rather than distributed to the owners in the form of dividends, the relevant amounts will have been reflected on the liabilities side of the firm's balance sheet as additions to the equity capital employed in the firm. But what must be considered is the precise use to which the cash flow counterpart of the retained earnings has been put. To the extent that earnings have been retained, to that extent a part of the net periodic cash flow generated by the firm's production activities and sales will have been retained. That cash may have been put to various uses. It may have been used to repay short term loans or retire long term debt. In that case the firm's debt-to-equity financing ratio would have been changed. The cash may have been held in bank balances or invested in marketable securities as part of the management of the firm's liquid asset position. Or it may already have been invested in fixed capital assets of one kind or another.

For investment to proceed it is necessary to consider not

simply the extent to which retained earnings may have increased the firm's equity position in the past, but whether there is immediately available in the firm an amount of cash sufficient to finance the investment expenditure. In short, the immediate source of finance will be either immediately available cash, the proceeds of the sale of marketable securities, both of which will have been recorded on the assets side of the balance sheet, or new borrowings from one or more of several financial intermediaries. To the extent that previously held cash is used, there will, of course, be no increase in the money supply as a result of the investment expenditure, but the transformation of previously idle into active balances might be interpreted as an increase in the velocity of circulation of money. We shall return to the point. To the extent that industrial firms sell part of their holdings of marketable securities to non-bank investors or speculators in order to provide finance for the investment expenditure, such sales, depending on the extent to which in the aggregate economy they occur, will put pressure on security prices and imply a tendency for security yields and market rates of interest to increase. That, in turn, will imply an upward pressure on what we have already inspected as the cost of money capital and may thereby moderate the aggregate level of investment that would otherwise occur. In that case again, money is being enticed out of idle or speculative balances into active circulation and no increase in the money supply occurs.

What is at issue here is the relation between the "real" multiplier effects of investment expenditures and the associated

impacts and disturbances in the financial sector. Dennis Robertson, at whose time period analysis we shall look again in the following section, has referred to Kahn's observation, in his initial introduction of the multiplier concept, that "I am here considering the position in the final position of equilibrium when everything has settled down ... I do not enter into the question of [the] time lag". Robertson observes that "if, with Mr. Kahn, we are prepared to forget about the period of transition, we can declare the problem of the finance of the process of investment to be self-solving".³² But such an analytical luxury is not, in fact, available to us.

In the general case, industrial firms will finance investment expenditures by taking, in the short term, increased bank loans. This is possible by virtue of the fact that industrial corporations frequently, if not generally, maintain arrangements with banks that permit them to draw as required against established lines of credit. They form part of what Hicks has referred to as the "overdraft sector".³³ This increased demand for money, or what Keynes came to see as the coping stone of his liquidity preference theory, has been referred to as the "finance demand".³⁴ Keynes saw, as instanced in the references to his post-General Theory writing that we noted at the beginning, that it was this demand for short term cash accommodation that made the expansion possible. "Credit expansion", he argued, "provides not an alternative to increased saving, but a necessary preparation for it. It is the parent, not the twin, of increased saving".³⁵

The fact that the banks in this way increase their loan

advances against industrial lines of credit means that the money supply increases in response to the demand for it. The money supply is thereby endogenous. The expenditure of the newly created money means that it passes into the hands of the suppliers of the factors of production that are activated by the increased investment expenditure. It passes through the hands of the capital goods producing firms, into the hands of materials suppliers, to workers' bank balances, and thereby to either consumption expenditures or liquid asset holdings. The money begins a journey of active circulation. Thence, as Robertson observed, "All the money that is anywhere must be somewhere".³⁶ The important question at issue, however, is that of the use that is made of the increased money supply by its successive recipients.

When a firm makes an investment expenditure commitment and concludes the necessary short term financing arrangements, it will at the same time anticipate that in due course it will sell long term securities in the money capital market and that with the proceeds of such a sale it will retire its short term bank loans. That long term capital may be obtained, as we have seen, in the form of debt capital or equity capital. In either case, the services of an investment banker will be retained to market the long term securities. The investment banker is said to "underwrite" the new capital issue, meaning that he agrees to purchase the new issue from the firm and, hopefully, resell it to investors or speculators in the capital market. The investment banker will frequently hedge his position by subcontracting part

of the new issue to subunderwriters, such as other financial intermediary institutions and pension funds. But the issuing firm will have made its investment expenditure decision on the basis of its estimate of its cost of capital, implying that it plans or hopes to sell its new long term security at a price implicit in its cost of capital estimate. Whether that will in due course be able to be done depends on the investment banking commitments it is able to secure and possibly on money capital market conditions at the time the new issue comes to market. The timing, estimates, and anticipation of financial market conditions are therefore acutely relevant and important.

It is to be noted that all of these arrangements and procedures occur without any person's prior commitment of savings, and before the savings that will result from the income expansion induced by the investment expenditure will have occurred. Investment precedes saving in causation and in time. Whether, in due course, the long term capital security issue will be able to be floated in the capital market at the hoped for price, or at the initially projected yield or effective interest rate, will depend on the savings funds that are made available by the recipients of the higher induced incomes. Davidson has analysed the relevant financial flows in some detail, and has observed that the likelihood of floating the new capital issue at previously anticipated prices and yields depends on what he calls the marginal propensity of income earners to purchase securities out of saving.³⁷ If security market conditions make it necessary to discount the new issue price further than had been anticipated, that

will imply an increase in the effective yield or interest rate, with possibly negative effects on further investment expenditures.

From this analysis of the financing of investment expenditure and its induced and lagged effects it is possible to draw a number of summary conclusions. First, much depends, for the outcome and effects in the financial as distinct from the real markets, on the precise structure of the channels of financial flows and the institutional framework within which the system functions. Operatively relevant is what has been termed the degree and structure of financial intermediation that exists. Kaldor made much of the point in his stimulating discussion of "Speculation and economic stability",³⁸ and Minsky, in numerous extended works, has expanded the analysis of the topic.³⁹

Second, the financial flows and their market impact are dependent in an acute sense on the decision of successive income recipients on two levels. The outcomes depend, on the one hand, on the marginal consumption propensities that are operative and, on the other hand, on the public's decision as to the forms in which savings are to be held. The implied forces on both of these levels will determine the strength of the demands for capital securities of different kinds and different maturities, with the implied effects we have already noted for security prices and yields. The theory and analysis of individual and institutional asset portfolio structures thus gain significant relevance at this point.

Third, as we shall examine more fully in the next section,

the demand for money can be expected in the general case to increase, not only for the purpose of the immediate financing of investment expenditures such as we have already examined, but also for normal transactions purposes. This will follow from the higher levels of economic activity and income generation that are induced. At that point the trading and payments habits of the public become relevant for their impact on the efficiency of money use or, in familiar terms, the velocity of circulation of money. That velocity may well increase if, in the industrial sector, business firms react to any increase in interest rates by managing their operating cash balances more efficiently. Or it may be conceived to increase as idle balances are transformed into active balances, as the edging upward of interest rates and yields pry speculative cash balances loose.

Fourth, the rate of realization of the "real" multiplier effects that follow from investment expansion will depend on the extent to which expansion in the consumption goods trades is anticipated or foreseen. If that foresight were perfect and complete, the multiplier effects would be realized more rapidly, or may hold more nearly instantaneously at all points in time. But the time lapse and the imperfection of expectations are again highly relevant. What occurs, therefore, as the interactions are in process between developments in the financial and the real sectors of the economy, is a changing structure of market prices and traded quantities. Inherent in the foregoing analysis is the recognition of prices, and the interrelations between prices, on a number of levels: first, consumption goods prices that are

relevant to the consumption-saving decision; second, the supply prices of new capital goods that influence the worthwhileness at the margin of new capital investment expenditures; third, the prices of existing capital asset securities, implying market yields on existing industrial securities and thereby the estimates of the firm's cost of money capital; and fourth, the variable factor costs, notably the cost of labor expressed in the going money wage rate. It might be added that the conjunction between these prices, and the activity levels they collectively vindicate, determine the on-going valuation of the firm, or the value of the capital goods currently in place and engaged in production. This implied market value of the firm's existing assets, reflected in the financial market's valuation of the firm's capital securities, may be used as an investment decision criterion, as in Tobin's famous "q theory" of investment.⁴⁰

Fifth, it follows that the effective constraint on increased investment expenditure is a financial constraint. It is not true to say that savings constrains investment. The extent to which investment can proceed and can act to generate increased incomes and saving depends on the ability and the willingness of the banks to increase the money supply in response to the demand for it. It is necessary, of course, for the banks (and the other depository or money-creating institutions as defined in the Depository Institutions Deregulation and Monetary Control Act of 1980) to hold reserves, principally in the form of deposits at the Federal Reserve Bank, equal to no less than a stipulated percentage of their deposit liabilities. As the banks expand

their loans and deposits and thereby the money supply, they must have reason to believe that the central bank will in fact take whatever action is necessary to supply reserves as they become necessary to support the deposits outstanding. That, however, is precisely the manner in which, in the contemporary monetary and market system, the banking relations operate. The principal function of the central bank is to act as the lender of last resort and thereby to guarantee the liquidity of the system. It is a mistaken vision of bank operations to imagine that the banks' deposit creation is ultimately constrained by their possession of reserves. Rather, the creation of bank reserves as that is rendered necessary by real activity developments in the economy follows the emergence of the banking system's need for reserves. That necessary creation of reserves is effected by the central bank's open market purchases of securities.

Sixth, this recognition that the money supply is therefore endogenous means that its supply is in general highly elastic. But it is elastic at a loan interest rate that is set by the banks at a mark-up above the exogenous rate at which the central bank is prepared to make reserves available. That rate recognizes in general the existing structure of open market rates, as well as international interest rates and the likelihood that either desired or unwanted money capital flows may result from international interest rate differentials. The central bank will and does, therefore, set its own lending rate at different policy determined levels, influencing thereby the readiness with which liquidity is available or can be created within the financial

sector.⁴¹

Seventh, a clear relation has emerged between the rates of return that, it is anticipated, can be generated on capital investment in real sector activities and the rate of interest or the cost of money capital. But as a matter of doctrine, the relation between the one and the other, the marginal efficiency of capital and the rate of interest, is to be seen somewhat differently from the manner in which it was frequently perceived in the neoclassical scheme. For Wicksell, for example, the natural rate (the rate of interest that would equate saving and investment at full employment) was the center of gravitation of the system. The induced cyclical fluctuations in activity and prices (and the implied pressure on bank reserves) that resulted from a divergence of the market from the natural rate was conceived to bring the market rate of interest into line with the real or natural rate. For Keynes, on the other hand, and for the line of analysis we have adopted, it is the exogenously determined nominal or market rate that is the center of gravitation. The level of that rate determines, or anchors, the rate at which money capital is available to investing firms, and it therefore determines the level of the marginal efficiency of capital at which investment becomes, or ceases to be, economically worthwhile. Keynes, in other words, has reversed the relation between the marginal efficiency of capital and the rate of interest as the neoclassical scheme had perceived it.

Finally, it can be noted that the new money supply that is created at the beginning of the investment process circulates and

may find its way back to the banks. We have noted that in the process, some of that incremental money supply may be absorbed as transactions balances that are necessary to support the new higher level of economic and real market activity. Such increased demands will themselves put upward pressure on the rate of interest. But to the extent that the money supply returns to the banks, to the extent, for example, that it is regathered by the banks as the short term borrowers repay bank loans, to that extent there is a temporary reduction of the money supply. Loans create deposits, and the repayment of loans destroys deposits. When that occurs the banks are again in a position to extend loans to new borrowers, and there is active in the financial system what might be termed a revolving fund of finance. In short, the ability and readiness of the banks to continue to accommodate the economy's demand for money will depend on the banks' own liquidity preferences and their expectations of borrowers' profitability and income generating prospects. It was for that reason that Keynes highlighted, as we saw at the beginning, the fact that "the banks hold the key position in the transition from a lower to a higher scale of activity".

IV

The foregoing analysis of mutually dependent real and financial sector developments makes it necessary to inspect more closely the generation of saving and its relation to the creation of money and the multiplier effects. In view of the time lags we have already taken somewhat into account, notably in the tempo-

rary financing of expenditures, it will be useful to explore the saving and money-creation effects with the aid of a simple time period model, similar to that made famous at an earlier stage by Robertson in his discussions with Keynes.⁴² The upshot of the argument will be to the effect that the new money supplies that find their way into the hands of income earners after being spent by borrowers for investment purposes will represent immediate, though possibly temporary, "convenience saving". To construct a simple model of income generation adequate to illustrate the points at issue, consider the following relations:

$$C_t = a + bY_{t-1} \quad (1)$$

$$I_t = \bar{I} \quad (2)$$

$$Y_t = C_t + I_t \quad (3)$$

Voluntary savings, referred to as S_{vol} appear as

$$S_{vol} = Y_{t-1} - C_t = -a + (1-b)Y_{t-1} \quad (4)$$

Investment expenditure is for the moment taken to be autonomous, and consumption expenditure in any time period is dependent on income earned in the preceding period, with a marginal consumption propensity of b . Taking the sum of autonomous expenditure components as defined by $a + I = A$, the path of the periodic income realizations is described by the first order difference equation

$$Y_t - bY_{t-1} = A \quad (5)$$

By usual solution methods the periodic income path is describable as

$$Y_t = \frac{A}{1-b} + (Y_0 - \frac{A}{1-b})b^t \quad (6)$$

The data shown in Table 1 are based on the assumption that $C_t = .9Y_{t-1}$, and periodic series for investment, consumption, income, and voluntary savings are recorded. The second last column of the Table records the periodic change in voluntary saving, which will be subject to further comment below. The final column records the actual saving, $S_t = Y_t - C_t$. The specimen data can be shown to be consistent with Equation (6) by substitution, for any selected period, of the base period's values and the marginal consumption parameter. The Table introduces the assumption, which will be commented on again below, that the level of investment expenditure increases permanently by 50 in the first period following the base period.

Table 1

t	I	C	Y	S_{vol}	Increase in S_{vol}	S_t
0	100	900	1,000	100	-	100
1	150	900	1,050	100	-	150
2	150	945	1,095	105	5	150
3	150	985.5	1,135.5	109.5	4.5	150
4	150	1,021.95	1,171.95	113.55	4.05	150
Limit values	150	1,350	1,500	150	-	150

Consistent with the traditional multiplier concepts, the ultimate increment in voluntary saving is the sum of a geometric series commencing at the magnitude 5 and increasing by a factor of .9,

which is equal to the marginal consumption propensity assumed in the Table. This follows from the fact that the increase each period in voluntary saving can be shown to be defined as $(1 - b)$, or one minus the consumption propensity, times the increase in income that occurred in the preceding period. That in turn is equal to the consumption propensity times the increase in income in the period before that. The voluntary saving is thus raised in the limit by 50, or by the same amount as the investment expenditure that instigated the multiplier process.

Of immediate interest, however, consistent with the analysis of the financing of incremental expenditures in the preceding section, is the question as to how the expenditure streams in this case are actually financed. Where, again, does the money come from?

Clearly, the increase in investment expenditure that instigates the multiplier process occurs before the voluntary savings that will ultimately be generated by it can be realized. Again we conclude that the investment is not, and cannot be, financed initially by saving. Again, therefore, an increase in the money supply is required to finance the process. With this in view, Table 2 recognizes that in the case being considered the increased money expenditure will accrue as income in the hands of income-earners, but as their consumption expenditures are not influenced by it, those consumption expenditures being assumedly dependent on the preceding period's income, the increments of income will be recorded as what we now refer to as "convenience saving", using the symbol S_{con} to describe the corresponding

amount.

Table 2 indicates the periodic increases in the money supply that will be necessary to fill the gap between the projected levels of investment expenditure and the voluntary saving that will be forthcoming under the assumed conditions. It will be noted that because the investment expenditure is assumed to be maintained at the new higher level to which it was raised in the first period, there will be a need for new money creation in each of the succeeding periods. This assumes, of course, that, in line with the fuller discussion in the preceding section, no money is attracted to the transactions sphere from idle balances, and that no change occurs in the rate of interest to make that desirable, and that, in other words, no change occurs in the velocity of circulation of money. The possible impact on the velocity of circulation will be considered below.

To provide a linkage with earlier literature it is assumed in the argument as summarized in Table 2 that the structure of payments habits in the system is such that the money supply turns over twice during each time period, and that incremental investment expenditures are implemented at a corresponding rate. The velocity of circulation of money is therefore 2. In that case it is understood that the increase in the money supply necessary to finance the periodic increase in expenditure will be one-half of that latter amount.⁴³

Table 2

t	S_{vol}	Increase in M^S	S_{con}	S_t
0	100	-	-	100
1	100	25	50	150
2	105	22.5	45	150
3	109.5	20.25	40.5	150
4	113.5	18.225	36.5	150

It is noted that the "convenience saving" each period is twice the amount of the increase in the money supply, consistent with the assumption that the rate of turnover of the money supply remains constant at 2. Noticeably, the money supply will need to increase at a decreasing rate as the expansion proceeds. Summing the relevant geometric series, it can be shown that, in the limit, the money supply will increase in this case by 250, or by one-half of the increase in income. It will be seen also that the convenience saving tapers off at the same rate as the voluntary saving is increasing.

The data as constructed in the Tables are consistent with and explain Robertson's observation in reference to this kind of situation, in which the multiplier-money supply interaction is brought into view, that "in each period the Authority is conceived of as acting only partly (and decreasingly) by increasing the supply of money, partly (and increasingly) by maintaining the

income velocity of the previously issued supply".⁴⁴ The dynamics of the situation we have envisaged permit us to make a number of relevant analytical conclusions.

V

The Tables and the illustrative data in the preceding section, together with the difference equation model into which Robertson's earlier suggestions have been cast, are, of course, highly schematic. They do, however, emphasize a number of relevant issues. First, it should be understood that the velocity of circulation of money does not have, in the Post Keynesian theory, the causative significance attributed to it in the earlier neo-classical analysis. It serves legitimately only as an ex post datum descriptive of realized outcomes. Its explanatory, or predictive, significance has been seriously misconceived by virtue of its appearance in the traditional quantity equation of exchange. Our analysis has emphasized consistently the activity-forming and the price-forming significance of expenditure decisions. The endogeneity of money as we have exhibited it implies forcibly that, as to the price level relation that is generally embedded in the quantity theory, the causal relation in fact is not from the money supply to the price level, but from the price level to the money supply. The money supply, we have seen, is created endogenously by the banks in response to the demand for it, as that demand is dependent, in turn, on the price level at which production and activity is conducted. That price level will depend on the cost pressures inherent in factor use decisions and

the mark-up that firms, depending on their perception of their market power, choose, or attempt, to adopt. The ability and willingness of the banks to expand the money supply, and the price or interest rate at which they do so, has been seen to depend on the decisions of the central bank to make reserves available to vindicate the increased money supply.

Second, it is to be expected that, in the kind of expansion process envisaged, the velocity of circulation may in fact be highly variable. This may be expected to follow for a number of reasons. Any possible change in the banks' desired liquidity position may cause their lending rate to edge upward as the borrowing to finance investment expenditure increases, particularly if increases in risk exposure are associated with the increased borrowing. This may in turn lift the general level of interest rates in the money market, inducing a change in individuals' liquidity preference and changes in their desired portfolios. As a result, the extent to which money might be shaken loose from previously held speculative balances will impact on the effective velocity of circulation. At the same time, the monetary authorities may alter the interest rate at which they are willing to supply reserves to the banks to permit them to finance the expansion, and such policy induced pressure on the market interest rate structure can be expected to spill over to variations in the public's liquidity preference and the effective velocity of circulation of money.

Third, there is no reason to believe that as the expansion proceeds the consumption and savings propensities will remain

constant at the assumed levels. Relevant, therefore, is the manner in which a change in the economy's saving rate will affect the flow of funds into the long term capital market. In particular, changes may occur in the savers' propensity to allocate saving to the purchase of the long term capital securities which, we saw in the preceding section, would in due course be issued by the firms to retire, or "fund", their temporary short term borrowing that had facilitated the expansion. At the same time, there is no reason to believe that the time lags in expenditure and financing decisions would in fact be precisely those we have assumed for illustrative purposes.

Fourth, it should be borne in mind that not only will the possible variations we have just referred to affect the structure of prices and yields, or the effective interest rates, in the money and capital markets, but they will impact also on price levels in the real markets. We noted previously that such impacts were to be expected in the consumption goods, the capital goods, and the labor markets. The impacts of the expansion on the price dimension and the output dimension of national income respectively are not illustrated in the analysis we have constructed. The elaboration of such differential effects, the lack of which remains one of the more serious defects of the neoclassical scheme of things, has only lately benefited from the Post Keynesian developments.⁴⁵

Fifth, it can be seen that high degrees of interaction and criss-crossing of effects occur between the public's asset portfolio preferences and decisions, the similar preferences and

decisions of the banks and the non-bank financial intermediaries that participate in the process, and the policy determined actions of the central bank functioning in its capacity as the lender of last resort.

Finally, we have not addressed directly in the foregoing the manner in which all of the decisions and impacts we have brought into view are influenced by the realities of uncertainty, ignorance, and the pressures on decisions and outcomes of the passing of real historical time. Progress has lately been made in analyses addressed to these questions, and significant work emanating from the perspectives that Shackle, for example, has proposed, has appeared.⁴⁶ But in the flux and the flow of real world economic affairs, it is possible to see the general nature of what Keynes referred to as the "dynamic development ... the forces which determine changes in the scale of output and employment as a whole; and ... [the fact that] ... money enters into the economic scheme in an essential and peculiar manner."⁴⁷ In the world as it exists, and in the analysis directed to the explanation of it, the monetary and the real are intricately interintrusive. Money matters. The supposition of its neutrality, in either the short run or the long run, is not analytically sustainable.

REFERENCES

- Archibald, G.C. "Multiplier and Velocity Analysis: An Annulment." Economica, August 1956, 265-69.
- Asimakopulos, A. "Kalecki and Keynes on finance, investment and saving." Cambridge Journal of Economics, 1983, 7, 221-33.
- _____. "Finance, liquidity, saving and investment." Journal of Post Keynesian Economics, Fall 1986, 9, 79-90.

Chick, V. "Financial Counterparts of Saving and Investment and Inconsistency in Some Simple Macro Models." Weltwirtschaftliches Archiv, 1973, 109, 621-43.

_____. Macroeconomics After Keynes: A Reconsideration of the General Theory. Cambridge, MA: MIT Press, 1983.

Clower, R.W. ed. Monetary Theory. London: Penguin, 1970.

Crotty, J.R. "Owner-manager conflict and financial theories of investment instability: a critical assessment of Keynes, Tobin, and Minsky." Journal of Post Keynesian Economics. Summer 1990, 12, 519-42.

Davidson, P. Money and the Real World. New York: Wiley, 2nd ed., 1978.

_____. "Finance, funding, saving, and investment." Journal of Post Keynesian Economics, Fall 1986, 9, 101-10.

Eatwell, J. and M. Milgate, eds. Keynes's Economics and the Theory of Value and Distribution. New York: Oxford University Press, 1983.

Garegnani, P. "Notes on consumption, investment and effective demand" in J. Eatwell and M. Milgate, eds., 1983.

Hahn, F.H. "Some Adjustment Problems." Econometrica. 1970.

_____. "On the Foundations of Monetary Theory" in M. Parker, ed. Essays on Modern Economics. London: Longmans, 1973.

Harcourt, G.C. Some Cambridge Controversies in the Theory of Capital. Cambridge: Cambridge University Press, 1972.

Hicks, J. Critical Essays in Monetary Theory. Oxford: Clarendon Press, 1967.

_____. The Crisis in Keynesian Economics. Oxford: Blackwell, 1974.

Hollander, J.H. "The Development of the Theory of Money from Adam Smith to David Ricardo." Quarterly Journal of Economics, 1911,

Hutchison, T.W. Before Adam Smith: The Emergence of Political Economy, 1662-1776. Oxford: Blackwell, 1988.

Kaldor, N. "Speculation and Economic Stability." Review of Economic Studies, October 1939, reprinted in Essays on Economic Stability and Growth. Glencoe, IL: The Free Press of Glencoe, 1960.

Katzner, D.W. "Potential surprise, potential confirmation and probability." Journal of Post Keynesian Economics, Fall 1986, 9, 58-78.

_____. "The Shackle-Vickers approach to decision-making in ignorance." Journal of Post Keynesian Economics, Winter 1989-90, 12, 237-59.

_____. "The firm under conditions of ignorance and historical time." Journal of Post Keynesian Economics, Fall 1990, 13, 125-45.

Keynes, J.M. The General Theory of Employment, Interest, and Money. London: Macmillan, 1936.

_____. "The Ex-Ante Theory of the Rate of Interest." Economic Journal, 1937a, 47, 663-69.

_____. "Alternative Theories of the Rate of Interest." Economic Journal, 1937b, 47, 241-52.

_____. "The Process of Capital Formation", Economic Journal, 1939, 49, 569-74.

Kregel, J.A. "Constraints on the expansion of output and employment: real or monetary." Journal of Post Keynesian Economics, Winter 1984-85, 7, 139-52.

_____. "A note on finance, liquidity, saving and investment." Journal of Post Keynesian Economics, Fall 1986, 9, 91-100.

Lutz, V. "Multiplier and Velocity Analysis: A Marriage." Economica, February 1955, 29-44.

Milgate, M. Capital and Employment, A Study of Keynes's Economics. London: Academic Press, 1982.

Mill, J.S. Principles of Political Economy. ed. Sir W.J. Ashley, London: Longmans, Green, 1909 [1st ed. 1848].

_____. Essays on Some Unsettled Questions of Political Economy. 1844. London School of Economics Reprint, 1948.

Minsky, H.P. Can "It" Happen Again? Essays on Instability and Finance. Armonk, N.Y.: Sharpe, 1982.

Modigliani, F. and M.H. Miller. "The Cost of Capital, Corporation Finance, and the Theory of Investment." American Economic Review, 48, 261-97.

Moore, B.J. Horizontalists and Verticalists, The macroeconomics of credit money. Cambridge: Cambridge University Press, 1988.

Pasinetti, L.L. Growth and Income Distribution: Essays in Economic Theory. Cambridge: Cambridge University Press, 1974.

Patinkin, D. Money, Interest, and Prices. New York: Harper & Row, 2nd ed, 1965.

Pigou, A.C. The Veil of Money. London: Macmillan, 1941.

Robertson, D.H. "Effective Demand and the Multiplier," in Essays in Monetary Theory. London: P.S. King, 1940.

_____. Money. Cambridge: Cambridge University Press, 1959.

Rogers, C. Money, Interest and Capital. Cambridge: Cambridge University Press, 1989.

Sayers, R.S. "Ricardo's Views on Monetary Questions." in T.S. Ashton and R.S. Sayers, eds., Papers in English Monetary History, Oxford: Clarendon, 1953.

Schumpeter, J.A. History of Economic Analysis. New York: Oxford University Press, 1954.

Shackle, G.L.S. Decision, Order, and Time in Human Affairs. Cambridge: Cambridge University Press, 1969.

Silk, L. "Getting back to the real world." Journal of Post Keynesian Economics, Spring 1984, 6, 483-85.

Snippe, J. "Finance, saving and investment in Keynes's economics." Cambridge Journal of Economics, 1985, 9, 257-69.

Tobin, J. and W. Brainard. "On Crotty's critique of the q-theory." Journal of Post Keynesian Economics, Summer 1990, 12, 543-49.

Tsiang, S.C. "Liquidity Preference and Loanable Funds Theories, Multiplier and Velocity Analysis: A Synthesis." American Economic Review, September 1956, 46, 539-64.

Vickers, D. Studies in the Theory of Money, 1690-1776. Philadelphia: Chilton, 1959.

_____. The Theory of the Firm: Production, Capital, and Finance. New York: McGraw-Hill, 1968.

_____. "The Cost of Capital and the Structure of the Firm." Journal of Finance. 1970.

_____. "Adam Smith and the Status of the Theory of Money." in A.S. Skinner and T. Wilson, eds., Essays on Adam Smith. Oxford: Clarendon Press, 1975.

_____. "On Relational Structures and Non-Equilibrium in Economic Theory." Eastern Economic Journal, October-December 1985, 11, 384-403.

_____. Money Capital in the Theory of the Firm. Cambridge: Cambridge University Press, 1987a.

_____. "Aggregate supply and the producers' expected demand curve: Performance and change in the macroeconomy." Journal of Post Keynesian Economics, 1987b, 10, 84-104.

_____. "The Money Capital Constraint and Decisions in the Firm" in J.A. Kregel, ed. Inflation and Income Distribution in Capitalist Crisis. London: Macmillan, 1989.

Viner, J. Studies in the Theory of International Trade. New York: Harper, 1937.

Wells, P. "Liquidity Preference and the Flow of Finance." Journal of Money, Credit and Banking, 1971, 3, 123-36.

Wicksell, K. Lectures in Political Economy. Vols. I and II, ed. L. Robbins. London: Routledge and Kegan Paul, 1935.

FOOTNOTES

1. Schumpeter (1954, p.529) refers to Mill's Essays as "containing his freshest and most original contributions to economics".
2. See the comment by Silk (1984).
3. See the expanded discussion in Vickers (1959) and Hutchison (1988).
4. Many of the relevant issues have been raised in a series of articles that stemmed from Asimakopulos (1983). See also Asimakopulos (1986), Kregel (1984-85, 1986), Davidson (1986), and Snippe (1985). The classic discussions of the relation between the Keynesian multiplier and the velocity of circulation of money, to which reference will be made below, are contained in Lutz (1955), Archibald (1956), Tsiang (1956), and Wells (1971).
5. Tsiang (1956, p.563).
6. Snippe (1985, p.267).
7. Keynes (1937a, p.668-69). Italics added.
8. Keynes (1936, p.82-3).
9. Moore (1988, passim.).
10. Schumpeter (1954, p.282). See also Vickers (1975).
11. Hollander (1911), Sayers (1953), Viner (1937), Hicks (1967).
12. Hicks (1967, Ch.10).

13. Keynes (1936, p.vii).
14. Patinkin (1965), Rogers (1989).
15. Mill (1909, p.488).
16. Pigou (1941) excerpted in Clower (1970, p.34).
17. Minsky (1982).
18. See Wicksell (1935, Vol.2, pp.27, 188, 194, 215). See also Rogers (1989) for an expanded evaluation of Wicksell, notably in relation to the results of the Cambridge critique in the theory of capital. The neo-Ricardian "centre of gravitation" notion is advanced in Eatwell and Milgate (1983) and Milgate (1982).
19. See Davidson (1978), Vickers (1985).
20. Hahn (1970), quoted in Davidson (1978, p.xiii).
21. Hahn (1973, p.231). See the relevant discussion in Rogers (1989, p.46f).
22. See Schumpeter (1954, p.324).
23. The following is heavily indebted to earlier and more extended analysis contained in Vickers (1968, 1970, 1987, 1989).
24. An important advance toward the remedy of this analytical deficiency has recently been made by Katzner (1990).
25. See the references in n.23.
26. See Vickers (1968).
27. Vickers (1987a).
28. Garegnani (1983, p.60).
29. Eatwell (1983, p.121).
30. See Harcourt (1972).
31. See also the insightful conclusions of Pasinetti (1974, p.43) quoted in Rogers (1989, p.170). See also Schumpeter (1954, p.1119n).
32. Robertson (1940, p.117-18). Robertson's emphasis on the "transition" recalls Keynes' observation that "it is in the transition [from a lower to a higher scale of economic activity] that we actually have our being" (1936, p.343n).
33. Hicks (1947, p.51).

34. See Davidson (1978, p.159f).
35. Keynes (1939, p.572), quoted in Kregel (1984-85, p.151).
36. Robertson (1959, p.125) quoted in Kregel (1986, p.95).
37. Davidson (1986).
38. Kaldor (1939, 1960).
39. Minsky (1982, p.61f).
40. For a relevant discussion see Crotty (1990) and the rejoinder by Tobin and Brainard (1990).
41. See Moore (1988) for an extended discussion of monetary endogeneity.
42. See Robertson (1940).
43. See the earlier explorations of the multiplier-money supply relation in Lutz (1955), Archibald (1956), Tsiang (1956), Wells (1971), Chick (1973, 1983, Ch.14). See also Moore (1988, p.340).
44. Robertson (1940, p.118) parentheses in original.
45. See Davidson (1978), Vickers (1987b).
46. See Shackle (1969), Vickers (1987a), Katzner (1986, 1989-90).
47. Keynes (1936, p.vii).