UNIVERSITY OF BIRMINGHAM

Faculty of Commerce and
Social Science

FINANCIAL CREDIT MULTIPLIERS AND THE AVAILABILITY OF FUNDS

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Series A Number 47

DISCUSSION PAPERS

Series A

Economic Theory and Econometrics

May, 1964

FINANCIAL CREDIT MULTIPLIERS AND THE AVAILABILITY OF FUNDS

In an almost dialectical fashion monetary economics has been merged with its antithesis - the Keynesian income generating model-to form a new synthesis. A synthesis in which money, the change in the stock of money, or, more adventurously, the stock of credit, or the change in the stock of credit outstanding are regarded as important variables on which consumer's and investor's ex-ante demands for goods and services depend.[1] Certainly the new synthesis has not been widely accepted, but more modest variants of its general approach are certainly well represented in the litetature. Warburton and Friedman, for instance, have produced evidence that shows that the change in money stock acts as a leading indicator as to future changes in money income; while Duesenberry, as a member of the availability school, states that there are grounds to suppose that it is the availability of finance rather than the explicit costs of funds which determines the volume of business investment.[2] Outside of the academic realm, governments too have shown a revived interest in the operation of their countries' financial systems. In 1958 and 1960, the U.K. Radcliffe Committee and then the U.S. Commission for Money and Credit published their reports which, when considered along with the subsequent printing of the evidence on which they were based, indicate an official interest in the financial mechanism which has certainly not been exceeded since the early 1930's. The introduction of the flow of funds schedule in the Federal Reserve Bulletin and the U.K.'s C.S.O. publication of the new periodical

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1. D.C.Rowan, "Techniques of Monetary Control: A Review Article", Banca Nazionale del Lavero Quarterly Review, no.65, June 1963,pp.192-216; J.Cohen, "Circular Flow Models in the Flow of Funds", International Economic Review, May 1963, pp.153-170.

2. C. Warburton, "Monetary Velocity and Monetary Policy", Review of Economics and Statistics, Nov. 1948, pp.304-313.
M. Friedman, "Demand for Money: Some Theoretical and Empirical Results", Journal of Political Economy, August 1959;
J. Duesenberry, Business Cycles and Economic Growth. N.Y.Economics Handbook Series, 1958.

Financial Statistics show that these governments' revealed interest has by no means abated.

Quite naturally, as the variants of the above hypothesis have been developed, fresh attention has been paid to the process by which money and credit are created. Initially, the relatively simple bank deposit multiplier of Phillips and Keynes was re-examined.[3] A. Gambino, for instance, following on from Meade and Goodwin's work in the thirties, held that the empirical evidence suggested that the public desired a certain bank deposit/currency ratio which varied over time. He suggested that English economists would do well to modify the traditional multiplier representation by treating the variations in the public's cash holdings as an endogenous variable rather than dismissing it as an exogenous factor as Keynes had done.[4] The challenge was taken up by R. Sayers who neatly dismissed Gambino's objections by stating that, in English conditions, the variations in the public's cash holdings could be ignored as the Bank of England would always make sure that the banks had the necessary currency to maintain their required or desired cash ratios. While meeting Gambino's objection, however, Sayers introduced the liquid asset multiplier as the representative model of the bank deposit creation process. As Sayers saw it, treasury bills, money at call, commercial bills and currency represented the banks' store of reserves; for, in the given institutional conditions, anyone of the first three items was practically a perfect substitute for currency. Holding, correctly, that the Bank of England in conjunction with the Treasury could influence the market's holding of liquid assets to a large degree and observing that the banks held 30% of their assets

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3. C.A.Phillips, Bank Credit, New York: Macmillan, 1916.
J.M.Keynes, A Treatise on Money, II, London: Macmillan, 1930.

4. A. Gambino, "Money Supply and Interest Rate in Recent Macro-Economic Conception", Banca Nazionale del Lavero Quarterly Review, No.30, (1954), pp.111-127.

in such instruments, Sayers held that the value of the multiplier was approximately 10/3.[5]

Sayers' own presentation has not gone unchallenged; though it is supported by such specialists as Manning Dacey and H.Johnston among others. Crouch, Coppack and Gibson have questioned his formulation. Basically, they argue that it is perhaps inexpedient to dismiss the cash ratio bank deposit multiplier on two counts. First they argue that the Bank of England may make the non-cash liquid assets imperfect substitutes for cash by only rediscounting at a penal rate. Next they point to the fact that the non-bank holdings of non-cash liquid assets are fairly large; therefore, the banks may vary their holdings of the same at their own discretion.[6] If the bank rate is and remains above the market rate and the discount houses are forced to rediscount with the central bank, or if the public is indifferent to the level of their non-cash holdings of liquid assets - e.g., the supply of non-cash liquid assets is completely elastic as far as the banks are concerned over the relevant marginal range then there certainly is substance to the points they make, as Sayers would be the first to admit.

Meanwhile, that is while the controversy over the cash and liquid asset ratio bank deposit multipliers has been going on, several economists have developed a series of credit generating models to show how both banks and non-bank financial institutions may extend the stock of purchasing power available under certain conditions. Yohe, for instance, amplifies Gambino's concept of cash variations due to oscillations in the public's desired deposit/cash ratio by considering the impact the cash/deposit ratios of the savings banks, non-bank financial

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5. R. Sayers, "The Determination of the Volume of Bank Deposits", Banca Nazionale del Lavoro Quarterly Review, December 1955.

6. R.L.Crouch, "A Re-examination of Open Market Operations", Oxford Economic Papers, July 1963, pp.81-94. D.J.Coppac and H.J.Gibson, "The Volume of Deposits and the Cash and Liquid Asset Ratios", The Manchester School, no.3 (Sept. 1963), pp.203-222.

institutions and the public will have on the bank's ability to generate deposits. He, in the Hicksian and Radcliffe fashion, also treats the financial institutions as a second set of banking institutions, and shows how within a particular set of conditions they may generate credit and the degree of interdependence there is between them and the commercial banks.[7]

More adventurously, McLeod, who may be characterized as a leading proselyte of the new synthesis - the debt-expenditure school, integrates the bank and financial intermediary credit multipliers into the income generating mechanism. "It is really true of both types of institutions that 'they can only re-lend what is deposited with them', as used to be claimed by the banks in denying that they could 'create' credit, and is now claimed by other financial intermediaries in denying they can 'create' credit, but it becomes clear that both do in fact participate in the multiple expansion of income, savings and credit."[8] While truth is literally relative to the institutional and social conditions in economics, and it is by no means clear that even within the set of conditions McLeod assumes that one may treat a change in the stock of credit outstanding as being equivalent to a permanent change in the flow of expenditure to which the income multiplier may then be applied, there is little doubt that facets of Yohe's and McLeod's findings are certainly topical at this time.

Patinkin represents a major policy concern found in them, for instance, when he writes that the only difference between the banks and other financial institutions is that each "... creates its own unique form of debt...."[9] He notes that frequently the banks, as opposed

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7. W.P.Yohe, "The Derivation of Certain Financial Multipliers", Southern Economic Journal, July 1962.

8. A.N.McLeod, "Credit Expansion in an Open Economy", Economic Journal, LXXII (September 1962), pp.618.

9. D. Patinkin, "Financial Intermediaries and the Logical Structure of Monetary Theory", American Economic Review, March 1961, p.99.

to the financial intermediaries (non-bank financial institutions), be the heaviest burden of monetary regulation, and he concludes that if "... welfare is not properly considered (they) may wither up and die. It requires little imagination to see that as they wither up and die, the traditional form of monetary policy will become less effective. Such reasoning as this undoubtedly underlies the recent changes in th U.S. tax and interest rate regulations which have removed some of the competitive advantages enjoyed by the Saving and Loan Associations. the national debt management and the availability of funds level much has been made of the war induced excess liquidity as insulating the financial structure from the effects of traditional monetary measures for a number of years; while Brechling and more recently Duesenberry have shown that even without an overall surfeit of national debt, variations in bank and non-bank asset holdings over the business cycle mak monetary management more difficult.[11] Somewhat elaborating on the ab approach, Shearer has developed an interesting variation of the bank deposit multiplier approach to delineate the amount of private credit as opposed to total credit the banks may create given a net injection of cash. In short, he proposes a restrictive form of the availabilit doctrine in which he holds it is either the amount or the change in t amount of bank loans to the public as opposed to their loans to the government which have the most effect on business.[12]

In all, it seems the structure and the change in the stru ture of the asset portfolios of the banks, the intermediaries and the public are now taken as variables upon which in part the degree and

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10. D. Patinkin, Ibid., p.99.

11. J. Duesenberry, "The Portfolio Approach to the Demand for Money and Other Assets", The Review of Economics and Statistics, XLV, Feb. 1963, p.9-24.
F. Brechling and G. Clayton, "Commercial Banks' Portfolio Behaviour Unpublished paper, London, ISE., 1962.

12. R. Shearer, "The Expansion of Bank Credit: an Alternative Approach Quarterly Journal of Economics. August 1963.

perhaps composition of income generating activity depend. Warren L. Smith and Shearer are inclined to de-emphasize the importance of the intermediaries' asset holdings; McLeod and Cohen hold that they must be considered; while others such as Duesenberry place considerable emphasis on the changes in portfolio structures of the household and non-financial institution corporate sector as being matters of concern. As a result, it seems worthwhile to develop a series of interacting bank and financial institution credit multipliers which result from certain assumptions of the desired or prescribed asset holdings of the banks, of the financial intermediaries and of the public. It seems, as suggested above, that there is much to be gained from an understanding of the credit generating mechanism of the whole of the financial system rather than just part of it. This is done below. Admittedly, each of the following eight models is only strictly relevant to a particular type of financial structure, as portrayed by each set of assumptions, and for predictive purposes these must mirror the institutional and behavioural practices of the financial market as closely as possible.

Models of Credit Expansion

Notation: G = Government

B = Commercial Banks

I = Financial Intermediaries

P = Public

The above terms are used as suffixes to denote asset ownership.

X = Change in Cash = Change in notes and coin outside the Central Bank plus bankers' deposits at the Central Bank.

D = Change in Clearing Bank-Commercial Bank deposits.

T = Change in Treasury Bills outstanding - outside the hands of the Central Bank.

S = Change in Government Securities outstanding excluding the Government obligations contained in T.

L = Change in Loans made by financial institutions - banks and financial intermediaries.

Y = Change in Financial Intermediary Deposits and other Liabilities.

A = The initial autonomous transfer of privately owned bank deposits to financial intermediary ownership.

Without a suffix, these symbols indicate the aggregate change in the amount of the particular asset-liability outstanding.

General Assumptions:

(i) All financial institutions are fully loaned up at the beginning of the expansion period, and, given for instance a cash injection, the time period and conditions are such that they are fully loaned up at the end of this period.

(ii) All the following marginal ratios are non-negative and d,f, k,j,p,q,r,s and w are $\leq$ 1. In addition, where there is a difference between a particular desired and required ratio, the largest is the binding one.

Ratios:

h = The marginal intermediary Y/own commercial bank deposit ratio the public desire to hold.

d = The marginal cash/deposits. (D) ratio the banks are required or desire to hold.

e = The marginal cash/total own commercial bank deposits ratio the non-financial institution public desire to hold.

f = The marginal reserves (currency and clearing bank deposits)/own liabilities (Y) ratio the financial intermediaries are required or desire to hold.

g = The marginal cash/own commercial bank deposits ratio the financial intermediaries are required or desire to hold.

k = The marginal government security/D ratio the commercial banks are required or desire to hold.

j = The marginal government security/Y ratio the intermediaries are required or desire to hold.

p = The marginal treasury bills/D ratio the clearing banks are required or desire to hold.

q = The marginal treasury bills/Y ratio the intermediaries are required or desire to hold.

r = The marginal redeposit ratio on financial intermediary loans.

s = The marginal liquid assets $(T_B+X_B)/D$ ratio the banks are required or desire to hold.

t = the marginal treasury bills/(D_p+Y_p) ratio the public desire to hold.

u = The marginal treasury bills/intermediary owned D (D_I) ratio the intermediaries are required or desire to hold.

v = The marginal cash/own bank deposits plus intermediary liabilities (D_p+Y_p) the public desires to hold.

w = The marginal reserves/liabilities (Y) ratio the financial intermediaries are required or desire to hold where reserves include cash, clearing bank deposits and treasury bills.

Note: (1) The use of marginal as opposed to average ratios makes the analysis more realistic as it permits the introduction of constants into the corresponding relationships. Average ratios need not then be constant. If changes in cash, etc., are small, we may drop the assumption of linear relationships and interpret marginal ratios as first derivatives. For example, letting Y and D_p represent absolute quantities rather than increments,

$$Y = \phi\ (D_p)$$

$$\frac{dY}{d(D_p)} = h.$$

For large changes in cash, etc., in the non-linear case, the marginal ratios must be interpreted as averages of the first derivatives over the relevant ranges - i.e. as average marginal ratios.

(2) "Treasury bills" throughout may be taken to include money at call and commercial bills held by the banks, provided it is assumed that changes in the quantity of these are compensated by equal changes in the discount houses holdings of treasury bills.

(3) In the later models, change in cash (X) is a gross change which is not net of cash flows in exchange for other claims against the Government or Central Bank. Consequently, it might usefully be interpreted as the Government deficit on combined current and capital account.

Model I

Asset holders: G, B, P.
Assets = Liabilities: X, D, L.
Ratios : d, e
In equilibrium, change in cash in circulation with the public = X - dD

$$= eD$$

$$\text{Therefore } D = \frac{X}{d + e}$$

Change in Deposits at Bank

$$\text{Change in loans} = (1 - d)D = \frac{(1 - d)X}{d + e}$$

Mechanism The public acquires X in cash. It deposits $\frac{X}{1 + e}$ with the clearing banks and retains $\frac{e}{1+e}$ X.

The clearing banks lend out $\frac{X}{1 + e}$ (1 - d);

the public redeposits $\frac{X}{1 + e} \cdot \frac{1 - d}{1 + e}$;

the banks lend out $\frac{X}{1 + e} \cdot \frac{(1 - d)^2}{1 + e}$.

The process continues until the final change in deposits D equals:

$$\frac{X}{1 + e} + \frac{X}{1+e}\left(\frac{1-d}{1+e}\right) + \ldots + \frac{X}{1 +e} \cdot \left(\frac{1-d}{1+e}\right)^{n-1} = \frac{X}{1+e} \cdot \frac{1}{1-\frac{1-d}{1+e}} = \frac{X}{d+e} = D$$

providing that n is sufficiently large, since $0 < \frac{1-d}{1+e} < 1$ as $1 > d > 0$ and $e > 0$.

It should be immediately noticed that if e = o the multiplier $\frac{1}{d+e}$ is transformed into the traditional textbook form - e.g. $\frac{1}{d}$. ; exogenous cash leakages should be deducted from X before the multiplier is applied. This model is identical to the one Gambino presented in 1954; except that he used average rather than marginal ratios.[13]

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13. A. Gambino, Op. Cit., p.119.

Model 2

Asset Holders: G, B, I, P.
Assets or Liabilities: X, D, Y, L, A.
Ratios: r, f, g, d, e.

This model shows what effect an autonomous transfer of privately owned bank deposits into the financial intermediaries' hands (A) will have on the equilibrium conditions portrayed in Model I. Note, initially, the financial intermediaries will add A to their holdings of bank deposits and to their liabilities to the general public.

In equilibrium:

(i) The change in Intermediary deposits and liabilities $= Y = A + r(1-f)Y$

$$\text{Therefore} \quad Y = \frac{A}{1-r(1-f)}$$

$$= \frac{A}{1-r+rf}$$

(ii) The change in Intermediary loans $= L_I = (1-f)Y$

$$= \frac{(1-f)\,A}{1-r+rf} \,.$$

(iii) The change in cash in circulation with the public $= X_P = X - dD$

$$- \frac{g}{1+g} \; fY = eD_P$$

$$\text{Now,} \quad X - dD - \frac{g}{1+g} \; fY = X - dD_P - \frac{d}{1+g} \; fY - \frac{g}{1+g} \; fY$$

$$= X - dD_P - \frac{d+g}{1+g} \; fY = eD_P;$$

$$\text{Therefore,} \quad D_P = \frac{X - \frac{d+g}{1+g} \; \frac{fA}{1-r+rf}}{d+e},$$

and the change in bank liabilities

$$D = D_P + D_I = \frac{X - \frac{d+g}{1+g} \; \frac{fA}{1-r+rf}}{d+e} + \frac{f}{1+g} \; \frac{A}{1-r+rf}$$

$$= \frac{X}{d+e} + \left(1 - \frac{d+g}{d+e}\right) \frac{fA}{(1+g)(1-r+rf)} \,.$$

(iv) The change in bank loans to the public $= (1-d)D$.

This model casts some light on two questions posed in the literature; namely, are financial intermediaries able to create claims against themselves, and does their existence affect the level of bank deposits outstanding? Providing r is greater than 0 and f is less than 1 it is obvious that financial intermediaries will be able to generate claims against themselves in much the same fashion as banks do. Next, if g = e, then such institutions will have no affect on the level of bank deposits given that the banks are able to place all their free funds. If g is less than e, then their presence will stimulate the lending capabilities of the banks; conversely, if it is greater, their presence and their expansion will tend to reduce the level of bank deposits outstanding.

In view of the controversy over the former point as represented by the conflicting views of A,B.Cramp and Warren L. Smith for instance, as to whether the financial intermediaries actually generate credit or just distribute savings, it is perhaps useful to portray how the process or mechanism of intermediary expansion works.[14]

Mechanism:

The intermediaries receive	A;	
they lend out	$A(1-f)$;	
the public redeposits	$A(1-f)r$....	inducement interest rates access to intermediary credit at some future date;

and so on, until finally,

$$\text{intermediaries } Y = A + A(1-f)r + A(1-f)^2r^2 + \ldots + A(1-f)^{n-1}\,r^{n-1}$$

$$= \frac{A}{1-(1-f)r} = \frac{A}{1-r+rf}$$ providing $(1-f)r$ is less than one, and n is very large.

In short, expansion is possible if $r > 0$ and $f < 1$.

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14. A.B.Cramp, "Financial Intermediaries and Monetary Policy", Economica XXIX (May 1962), 143-151, and Warren L. Smith, "Financial Intermediaries and Monetary Controls", Quarterly Journal of Economics, LXIII (Nov.1959) 533-553.

Model 3

Asset Holders: G,B,I,P.
Asset or Liabilities: X,D,Y,L.
Ratios: h,f,g,d,v.

Model 3 is simply a variant of Model 2 with this difference: r is dropped and h is substituted in its place. In addition v replaces e.

In equilibrium, change in cash in circulation with the public

$$X_P = X - dD - \frac{g}{1+g} \quad fY = v(D_P + Y)$$

$$\text{Now } X - dD - \frac{g}{1+g} \quad fY = X - dD_P - \frac{dfY}{1+g} \quad - \frac{gfY}{1+g}$$

$$= \quad X - dD_P - \frac{d+g}{1+g} \quad fhD_P \quad = v(D_P + Y)$$

$$= v(D_P + hD_P)$$

$$= v(1+h)D_P.$$

$$\text{Therefore } D_P = \frac{X}{d + v\,(1+h) + \frac{d+g}{1+g}\ fh} \quad ,$$

$$\text{and } D = D_P + D_I = \text{Change in Bank Deposits} = D_P\ (1 + \frac{fh}{1+g}) \quad .$$

$$= \frac{\left(1 + \frac{fh}{1+g}\right) X}{d + v\,(1+h) + \frac{d+g}{1+g}\ fh}$$

In equilibrium, the change in liabilities of the financial intermediaries will be equal to $Y = hD_P$

$$= \frac{hX}{d+v(1+h) + \frac{d+g}{1+g}\ fh} \quad .$$

It is interesting to note again that if we let the public's equilibrium cash holding = eD_P instead of $v(D_P + Y)$ and set $e = g$ the banking system remains unaffected deposit-wise by the intermediary induced expansion of credit; though the volume of intermediary owned bank deposits will have grown, and perhaps, being larger and generally

more volatile balances, will make the banks' portfolios more conservative. In short, the changes in deposits and intermediary liabilities will be as follows:

$$D = \frac{X}{d+e} \quad \text{and} \quad Y = \frac{hX}{(d+e)\left(1+\frac{fh}{1+e}\right)} .$$

However, if the change in the public's cash holding is as noted $[X_p = v(D_p+Y)]$, then the expansion of the financial intermediaries' deposits will reduce the change in bank deposits for a given X as h takes on values greater than 0.

The essence of this model is this: Even if as Hicks and later Gurley and Shaw suggest the financial intermediaries' g is smaller than the public's e, there is a possibility that the very expansion of intermediary liabilities will cause the banks to lose deposits - the losses induced by v will be greater than the cash savings brought on by g.[15]

Model 4

Asset Holders: G,B,I,P.
Assets or Liabilities: X,D,Y,S,L,A.
Ratios: r,f,d,k,j,e. Note: To simplify the algebra we assume g = e and therefore substitute e for g throughout in the appropriate equations.

In this model, it is assumed that both the banks and the financial intermediaries are required or desire to hold a certain proportion of the change in their assets, k and j respectively, in government issued interest bearing obligations. Moreover, while we take it that the Government will meet the institutional and the public's demand for such by issuing the same in exchange for cash, we assume that the Government banks all such remittances received on these sales and does not re-introduce the proceeds into circulation. We further take it that the

15. J.R.Hicks, "A Suggestion for Simplifying the Theory of Money", Economica, Feb. 1935, pp.1-19, and J.G.Gurley and Edward S. Shaw, Money in a Theory of Finance , Washington D.C., BrookingsInstitution 1960.

non-financial institution private sector will not sell any of their bond holdings to the financial institutions and will always maintain their current holdings by subscribing to new issues. Alternatively, if they do sell some of their holdings to the financial institutions, they immediately buy new Government securities from the Central Bank and so still maintain the aggregate level of their holdings throughout the period considered.

Financial Intermediaries

In equilibrium:

Change in Intermediary deposits = $A + r(1-f-j)Y = Y$

Therefore $Y = \frac{A}{1 - r(1-f-j)} = \frac{A}{1 - r + rf + rj}$

Change in Intermediary loans (to private sector) = $L_I = \frac{(1 - f - j)A}{1-r+rf+rj}$

Mechanism: The intermediary receives an autonomous transfer A of bank deposits. It acquires jA of government securities. It lends out (1-f-j)A to the public. The public redeposits r(1-f-j)A etc; therefore, the final change in intermediary deposits = $\frac{A}{1-r(1-f-j)}$

The Banks

In equilibrium, change in cash in circulation with the public = $X - dD - y\frac{e}{1+e}fY - S = e D_p$

Now L H S = $X - dD - \frac{e}{1+e} fY - kD - jY$ R.H.S. = $e(D-D_I)$

Therefore

LHS = $X - (d+k)D - \frac{efY}{1+e} - jY$ $= eD - \frac{efY}{1+e}$

Therefore $D = \frac{X - jY}{d+k+e} = \frac{X - \frac{jA}{1 - r - rf + rj}}{d + k + e}$

L_B = Change in bank loans to private sector $= \frac{(1-d-k)\frac{X-jA}{1-r+rf+rj}}{d + k + e}$

In addition, even if we release the assumptions we made on the behaviour of the non-financial institution private sector and of the government, and replace them by assuming that the expansion in the institutions' holdings of government debts induces no cash leakage, it is apparent that the changes in the amounts of private credit advanced by the banks and the intermediaries will be reduced by kD. and jY respectively. To this extent, the above model is an elaboration of Shearer's model mentioned above.[16]

Model 5

Asset Holders: C,B,I,P.

Assets or Liabilities: X,D,Y,S,L.

Ratios: h,f,d,v,g,k,j. Here we have re-introduced h to establish a linkage between the growth of bank deposits and the growth of the reserve base of the financial intermediaries. In addition, g and v have been re-introduced and e has been dropped.

The assumptions adopted for this model are identical to those used in Model 3, except that the clearing banks and the intermediaries acquire government securities in the proportions noted.

Case A:

Cash paid by the financial institutions for additional government securities stays in circulation. In short, the non-financial private sector is prepared to run down its holdings of government securities to the extent of meeting the institutional demand, or the central authorities immediately transfer the proceeds of their bond sales back to the private sector.

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16. R. Shearer, Op.Cit.

In equilibrium, as in Model 3.

$$D = \frac{\left(1 + \frac{fh}{1+g}\right) X}{d+v(1+h)+ \frac{d+g}{1+g} fh} \quad \text{and } Y = \frac{hX}{d+v(1+h) + \left(\frac{d+g}{1+g}\right) fh}$$

L_B = change in private loans by banks

$$= (1-k-d)D = \frac{(1-k-d)\left(1+ \frac{fh}{1+g}\right)}{d+v(1+h) + \frac{d+g}{1+g} fh}$$

L_I = change in private loans by intermediaries

$$= \frac{(1 - j - f) hX}{d+v(1+h) + \frac{d+g}{1+g} fh} = (1-j-f) Y$$

Case B:

Assume cash paid for government securities by the financial institutions remains in the hands of the Central Bank. In equilibrium, change in cash in circulation with the public:

$$= X - dD - \frac{g}{1+g} fY - S = v(D_p + Y)$$

$$\text{L.H.S.} = X = dD_p - \frac{d+g}{1+g} fh\ D_p - k\ D_p - k \frac{fhD_p}{1+g} - j\ h\ D_p = v(D_p+Y)$$

$$= v(1+h)D_p$$

$$\text{Therefore } D_p = \frac{X}{d + k + v(1+h) + jh + \frac{d+g+k}{1+g} fh}$$

$$\text{So } D = \frac{\left(1 + \frac{fh}{1+g}\right) X}{d+k+v(1+h) + jh + \frac{d+g+k}{1+g} fh}$$

As in case 6A, Y equals hD, viz:

$$Y = \frac{hX}{d + k + v(1+h) + jh + \frac{d+ g + k}{1 + g} fh}$$

Whereas the introduction of government securities in case 5A has no effect on the increments of intermediary and bank liabilities as induced by an autonomous injection of cash X into the private sector, on the assumptions of 5B this is by no means the case. Here both the expansion of Y and of D are affected, and, more interestingly, it may be seen that the presence of k and j have dampening effects on the growth of the liabilities, not only of the sponsoring institutions but of the other block as well. More concretely, under the assumptions of 5B, if the banks increase their k they will not only inhibit the growth of their own deposits but also the growth of the liabilities of the intermediaries as well; likewise, a rise in j for the intermediaries will similarly affect the growth of the banks.

Model 6

Asset holders: G, B, I, P.

Assets or Liabilities: X, D, Y, T, S, L.

Ratios: h, f, d, v, g, j, k, p, q.

Assumptions: As in Model 5A, except that both the banks and the intermediaries are required or desire to acquire both treasury bills and government securities in the relevant proportions noted above - e.g., k and j, and p. and q respectively. In addition, while as in 5A it is assumed that the cash paid for government securities stays in circulation, it is taken that the cash paid for treasury bills is absorbed and held by the Central Bank.

In equilibrium:

Change in cash in circulation with the public:

$$= X - dD - \frac{g}{1+g} fY - pD - qY = v(D_p + Y)$$

$$\text{L.H.S.} = X - (d+p) D_p \quad - \quad (d+p) \frac{fY}{1+g} - \frac{g}{1+g} fY - qY$$

$$= X - (d+p) D_p - \frac{d+p+g}{1+g} fhD_p - qhD_p = v (1+h) D_p$$

Therefore, $D_P = \dfrac{X}{d+p+v(1+h)+qh+\frac{d+p+g}{1+g}fh}$

$$D = D_P + D_I = \frac{(1 + \frac{fh}{1+g})\,X}{d+p+v(1+h) + qh + \frac{d+p+g}{1+g}fh}$$

$$L_B = (1 - d - k - p)\,D$$

The change in intermediary liabilities = $Y = hD_P$

and $hD_P = \dfrac{hX}{d+p+v(1+h)+qh+\frac{d+p+g}{1+g}fh}$, and the change in the intermediary loans to the private sector = $L_I = (1-f-j-q)Y$.

At first glance the above model does not appear to differ much from part B of the previous one. Indeed, if k and j are substituted for p and q in this one, D and Y will be identical to the values found in 5B cet. par. On this level, the only change of note is that L_B and L_I have been reduced by pD and qY respectively. Nevertheless, if we let v and h decrease to zero, it should be immediately noticeable that we are left with this bank deposit multiplier: $D = \frac{X}{d+p}$. If d is equal to 8% and p is equal to 22% as they are represented to be in British conditions, the bank deposit multiplier is equal to $\frac{10}{3}$; this is the liquid asset multiplier. Retracing this step, and letting v first take on a positive value, the multiplier becomes $\frac{X}{d+p+v}$ and Gambino's objection to the traditional conception X/d comes into view. Sayer's contention that the v could be excluded from the denominator in English conditions is formally correct if the central authorities offset the leakage of cash induced by v as it accrues; but if v is known, one could equally well get the same result by adjusting the initial X and leaving the denominator in its old form. Second, as h takes on a positive value, the leakages may become far more acute,

and it is perhaps more meaningful to surplant what one might call the compensated multiplier approach with the uncompensated one represented above.

Model 7

Asset Holders: G,B,I,P.

Assets or Liabilities: X,D,Y,T,S,L,A.

Ratios: s(=d+p), f, q, j, r, e. We assume $g = e$ for simplification.

Assumptions: Here it is taken re Sayers that the clearing banks must maintain a fixed liquidity ratio (s) of cash plus treasury bills (see Note 2) to deposits. The central bank is understood to deal freely between treasury bills and cash. The supply of government securities outside of the Central Bank is taken as fixed as is the supply of treasury bills after making allowances for the Central Bank dealing mentioned above. It is understood that the non-financial institution public holds a constant level of treasury bills. Finally, it is assumed that institutional conditions are such that after the public's demands for T and S are satisfied, the intermediaries get what they want, and then the banks are left with the residue whether or not in the case of Government securities this amount is greater or less than kD.

In equilibrium,

Change in intermediary deposits $= A + r(1-f-q-j)Y = Y$

$$\text{Therefore} \quad Y = \frac{A}{1-r(1-f-q-j)} = \frac{A}{1 - r + rf + rq + rj}$$

Change in intermediary loans $= L_I = (1 - f - q - j)Y$

The public's holding of cash and treasury bills equals

$$(T + X) - sD - \frac{e}{1 + e} fY - qY = (T_p) + e(D-D_I) = (T_p) + eD - \frac{e}{1+e} fY$$

$$\text{Therefore} \quad D = \frac{(T + X) - qY - (T_p)}{s + e}$$

Note: (T+X) is controlled by the Government

$$L_B = (1 - s) \frac{(T+X) - qY - (T_p)}{s + e} - (S - jY - S_p)$$

Here the liquid asset multiplier approach takes on a more representative and determinable form than in the above model in which the banks could set their own p ratio. As we are dealing in changes in deposits, loans and the like, T_p, the change in the public's holding of treasury bills, should be equal to zero by the assumptions mentioned above. It is introduced though in parentheses to illustrate Crouch's objection to Sayer's formulation. In brief he holds that the non-banking sector's holdings of treasury bills besides being large are quite variable. As a consequence, should the banks find that their liquid asset ratio is relatively low they may always bolster it by purchasing the necessary treasury bills from the non-banking public with cheques drawn against themselves. He concludes then that only the cash ratio becomes relevant in determining the bank deposit multiplier given the case in which (T + X) is negative; e.g. when the government by taxes or the central bank by open market sales of government securities draws cash out of the system. As he points out though, this conclusion only really holds when the central bank rediscounts at a penal rate of sufficient size for the banks and/or the discount houses to stop treating cash and treasury bills more or less as perfect substitutes, and when the banks and/or the discount houses are compelled to rediscount with the bank.

Some objections might be raised to the assumption that the financial intermediaries as opposed to the banks may acquire such treasury bills and government securities as they desire. To some extent such an objection certainly has merit, but it may be countered as follows: (i) Some financial intermediaries such as the Post Office Savings Bank are required by law to hold all or a major proportion of

their assets in government obligations whatever the price of the same may be. (ii) As for the rest, they undoubtedly adjust their j's and q's according to the market conditions, so there are some grounds for assuming that these institutions may be able to satisfy their demands fairly readily.

Considering the model again, one additional point of interest arises as we look at the determinates of L_B, the banking system's loans to the private sector. If the non-financial institution public run down their holdings of government securities, S_p becomes negative, and bank loans are reduced by an equivalent amount. In effect the banks fund their advances and substitute the released government securities in their place; unless of course they have excess reserves to generate the means of purchase-deposits. In short, except in the latter circumstances, the non-institutional public may not increase the purchasing power it has at its disposal by selling its semi-liquid assets to the banks or for that matter to the financial intermediaries. The Central Bank must lend a hand by introducing cash or treasury bills or both in exchange for the released securities.

Model 8

Asset holders: G,B,I,P.

Assets or Liabilities: X,D,Y,T,S,L.

Ratios: s(=d+p), w,h,v,g,j,k,t,u. Here it should be noted that t is equal to the marginal ratio of the public's holding of treasury bills to both its clearing bank and intermediary deposits, u is the marginal ratio of the intermediaries' treasury bills to their clearing bank deposits, and in addition w replaces f, i.e. intermediary reserves now include treasury bills, and v replaces e.

Assumptions: As for Model 7.

In equilibrium:

Change in the public's holdings of cash and treasury bills

$$= (T+X) - sD - \frac{g+u}{1+g+u}\, wY = v(D_p+Y) + t(D_p + Y)$$

$$\text{L.H.S.} = (T+X) - sD_p - \frac{swY}{1+g+u} - \frac{(g+u)wY}{1+g+u}$$

$$= (T+X) - sD_p - \frac{s+g+u}{1+g+u}\, whD_p \qquad \text{R.H.S.} = (v+t)(1+h)D_p$$

$$\text{Therefore } D_p = \frac{T + X}{s+(v+t)(1+h) + \frac{s+g+u}{1+g+u}\, wh}$$

$$D = \frac{\left(1 + \frac{wh}{1+g+u}\right)(T+X)}{(s+v+t)(1+h) + \frac{s+g+u}{1+g+u}\, wh}$$

$$\text{In equilibrium, } Y = hD_p = \frac{h\,(X+T)}{s+(v+t)(1+h) + \frac{s+g+u}{1+g+u}\, wh}$$

It should be noted that if we change our assumptions so that now the non-institutional public doesn't require cash and treasury bill holdings against Y, and if $g = e$, and $u =$ the new t, the relevant multipliers are considerably simplified. Now

$$D = \frac{T + X}{s+ e + u}$$

$$\text{and } Y = \frac{h(T+X)}{(s+e+u)\left(1 + \frac{wh}{1+c+u}\right)}$$

Putting this aside, we find in equilibrium the change in liquid assets in the hands of the public $= X_p + T_p$

$$= vD_p + tD_p + vY + tY,$$

and that the change in bank loans = $L_B = (1-s)D - (S-jhD_p-S_p)$

$$= \left\{(1-s)\left(1 + \frac{wh}{1+g+u}\right) + jh\right\} D_p - (S-S_p)$$

and that the change in the intermediaries' loans

$$= L_I = (1-w-j)hD_p.$$

While this model has some similarities to the previous one, it is perhaps more realistic in as much that now the non-financial public vary both their holdings of treasury bills and of cash as their holdings of bank and financial intermediary deposits expand. The presence of t,v,g,u re-introduces Gambino's objection to Sayer's representation of the multiplier: $\frac{T+X}{s}$. It is certainly true that the Central Bank or the Government may offset these leakages or additions to the liquid asset base in many ways, but as long as these ratios have some value other than zero the multiplier must be adjusted accordingly. Making a Sayer's type response, it is true that conditions could be such in a particular country that the banks could be required to hold a set fraction of their liabilities in these and some other asset which the central bank accepts readily in exchange for X and T and vice-versa - say Government securities. In this case, s may be ignored in the determination of the multiplier as d and f have been in the above. However, if the private sector and the intermediaries wish to hold a certain proportion of this new asset in relation to their deposits at the banks, our variant of the Gambino type of objection must be taken into account.

It is obvious that it is possible to generate a whole series of multipliers as the assumptions on asset holdings are changed so as to approximate the conditions of some particular financial structure. In addition, each model could well be adjusted to take care of exogenous leakages such as those induced by changes in taxes.

Likewise, it should be noted that it is unlikely that the particular ratios, d through v, will remain constant as assumed throughout the expansion period or over long periods of time.[17] Banks have held excess reserves; the public's cash holdings are variable, and h, Y/D_p, has changed over time as Gurley and Shaw and sundry representatives of the commercial banks have observed. Indeed, even if the representative model is properly specified and the functional relationships on which the ratios depend are linear and correctly estimated, there is still some question as to what should be multiplied in order to determine the increments in the liabilities of the respective financial institutions; particularly if the Central Bank in effect monetizes much of the debt outstanding by continually intervening in the market to peg the pattern of interest rates at some prescribed level. As Goodhart points out, in this latter case, there seems to be a case for abandoning the multiplier approach and substituting in its place a flow of funds tableau, a tableau which reflects the changes in bank and non-bank credits for different interest rate structures as the non-governmental sectors adjust their portfolios to each set of the Government pegged rates.[18]

The Goodhart forecasting flow of funds tableau could be incorporated into our type of presentation in this way: Assuming that all the relevant marginal ratios are constant for a particular pattern of interest rates and only vary as the pattern changes, the relevant values of these ratios could be found once the various functional relationships have been correctly set out. For example, letting Y and D_p represent absolute quantities rather than increments, and assuming

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17. C.A.E.Goodhart, "The Determination of the Volume of Bank Deposits, 1891-1914", unpublished dissertation, Cambridge, 1963, p.48.

18. Ibid., p.49.

$Y = \phi (D_p, r_1, r_2, \ldots\ldots r_n)$ where the r's represent the interest rates on n different securities.

$\left(\frac{\partial Y}{\partial D_p}\right)_{r's\ constant} = h.$

Generalizing this equation, $Y = \phi (D_p, x)$, where x represents all factors other than D_p which affect Y and $\left(\frac{\partial Y}{\partial D_p}\right)_{x\ constant} = h.$

From the above it would seem that the forecasting of changes in the banks', the financial intermediaries', and the public's portfolio holdings for various sets of interest rates seems to encounter almost an identical set of problems as an attempt correctly to estimate the change in financial credits via the multiplier approach. In addition, its adoption might shroud the one positive contribution that the straight multiplier approach does make. Namely, that the financial institutions and even the non-financial institution public may and do create credits; the volume of which plays an important part in determining the amount of purchasing power in the economic system - the availability of funds. Moreover, if the availability of funds not only affects the price level, but influences the extent and direction of real income generation as well, then it seems worth holding to the multiplier approach for this reason alone. It is certainly true that the existing multiplier theory provides the authorities with only the roughest framework with which to estimate the credit change for an initial cash or liquid asset inflow, but it does delineate the impact various policy proposals will have on the generation of funds. For instance, on examining the above models it is easy to see that an official regulation requiring the increase of d or f (s or w), will tend to cause a contraction in the amount of credit available. A statute regulating the bank deposit rates while leaving those paid by the financial intermediaries unaffected will

tend to raise h or r and thus favour the growth of the intermediaries at the expense of the banks. Similarly, statutes which affect the banks' or the intermediaries' portfolio holdings of government securities and treasury bills, those which induce changes in k, j, p and q, will certainly affect the flow of funds to the private sector, and they will probably influence the general availability of funds as well.

In summation, there are grounds to suggest that while the actual value of the multiplier may be extremely difficult to pin down, the approach does give the central authorities some useful information on the credit effect of any particular policy change. Indeed, if it is the investment or consumption decisions at the margin that count, and such policy changes have their first impact upon the marginal availability of funds, then by the debt-income hypothesis - the new synthesis - the credit multiplier analysis should be quite a useful tool: a theoretical framework which should be helpful in developing stabilization policies in much the same way as the Keynesian expenditure multiplier models have been in the past.