The Money Supply Process: How Much Progress Since C. A. Phillips' Bank Credit?

By Jacob Cohen, Pittsburgh

I. Phillips' Bank Credit

Sixty years later, it seems appropriate to survey what has happened to *Phillips'* pioneering discussion of the money supply process (*Phillips*, 1924).[1] Phillips posed the micro-macro paradox of the individual bank and the banking system and the vast literature that has followed can be interpreted as dealing in one way or another with this paradox.

Phillips did not see his contribution as formulating the "textbook multiplier" with which he is now identified, but rather as distinguishing credit extension by the banking system from credit extension by the individual bank. The distinction is based on the paradox of loan-deposit expansion. "... for the banking system deposits are chiefly the off-spring of loans. For an individual bank loans are the off-spring of deposits" (p. 64). It is a paradox because the banking system may be viewed as an aggregation of individual banks. What is true of the individual banks is also true of banks taken collectively. From this view, bank loans are the off-spring of deposits.

II. Sophisticated Multipliers

For more than forty years the paradox was ignored in the literature. In that time the focus was on the banking system and the elaboration of the multiplier, although some attention was also given to multipliers for the individual bank.

---

[1] The book was originally published in 1920 but our references are to the 1924 edition. "Money stock process" might be a more accurate title for this paper since the process encompasses more than the supply side of the money market but this is not prevailing usage.

While our discussion is in the context of the U.S. monetary system, the theory transcends institutional detail.

The system multipliers became more complex by introducing additional leakages into time deposits, currency, free reserves (excess reserves minus borrowings from the Fed) and Treasury deposits. The modern money multiplier (checking accounts and currency in hands of the public) can be written as:

$$m = \frac{1 + k}{(q + f)(1 + t + g) + k} \tag{1}$$

where k = currency/demand (checkable) deposit ratio

q = average reserve ratio

f = ratio of free reserves to demand deposits; free reserves equal excess reserves minus borrowing from the Federal Reserve

t = ratio of time deposits to demand deposits

g = ratio of Treasury deposits to demand deposits.

The traditional money multiplier (m) has reserves as the multiplicand:

$$M = mR \tag{2}$$

During the expansion process, legal reserves are absorbed into currency holdings along with absorption into required and desired reserves. Reserves are no longer an accurate index of the original disturbance. Currency outstanding has to be added to reserves in order to measure the multiplicand. This sum equals the monetary base.[2] Thus

$$M = mB \tag{3}$$

where $B = R + C$

The assumed exogeneity of the monetary base is the chief reason why multiplier theory treats the money stock as supply-determined.[3]

The money equation (3) should be regarded as an equilibrium relationship rather than a true supply function (*Carlson*, 1981; *Kareken*, 1967; *Saving*, 1977). The camel of "demand for money" sticks its nose under the tent of "money supply" via the influence of the demand for checkable deposits on

---

[2] The monetary base comes in many different shapes and sizes. For a recent discussion see *John B. Carlson* (1981).

[3] When the monetary authority targets the interest rate and adjusts reserves accordingly, the assumption of exogeneity becomes clouded. Nevertheless, the money equation still holds in reverse. Given "m", M determines B.

the values of "t" and "k". Nonetheless, assuming the predictability of the multiplier, control of the monetary base implies control of the money stock.

III. The Demand for Money

Beyond insinuating its way into the supply function, the demand for money has been treated as a full and equal partner in the determination of the money stock. The reasoning is that the rate of interest and the stock of money are determined jointly by the demand and supply of money. In a complete model (to be discussed below), the demand for money is inevitably involved in interest-rate determination but the interest rate directly affected by the demand for money is the "own rate of interest" rather than some market interest rate such as the Treasury bill rate.

As perceived by quantity theorists (monetarists) the money stock is determined by the money supply function. The monetary base, given the value of the multiplier, determines the money stock. It is true that the interest rate is a relevant variable in influencing the multiplier but the interest rate can be given. In graphic terms, one can think of a supply curve of money drawn with respect to the interest rate. The slope of the curve will depend on the respective elasticities of the multiplier parameters (free reserves, time deposits, etc.) with respect to the interest rate. Given the slope and given the interest rate (say the Treasury bill rate) the money stock will be determined. The monetary base will be a "shift" variable: responsible for moving the curve "to the right or left."

Consistent with the quantity theory, the demand for money is a theory of velocity rather than of money determination (*M. Friedman*, 1956; *Harris*, Chap. 7). The demand for money is a function of prices, relative rates of return on alternative assets, income and wealth constraints and tastes. Given the stock of money (determined independently) this equation solves for the velocity of money.

IV. The New View: Money Demand Determines Money Stock

It is useful to conceive of the monetarist view in this way – as defined by the supply curve of money because the New View of the money supply process can be defined by the demand curve of money. Perhaps the clearest statement is found in *Gramley* and *Chase* (1965). The New View stresses the price-theoretical behavior of the public. The key idea is portfolio balance – a substitutionary relationship between money, securities, time deposits,

existing physical assets.[4] When the interest rate falls on securities or time deposits due to a central bank open market purchase, the amounts demanded of currency and demand deposits will increase. The growth in both demand and time deposits is not the result of an increase in the quantity of deposits that banks are willing to supply but of an enlarged public demand to hold them due to falling security rates (*Gramley-Chase*, pp. 1987 - 8).

The demand for demand deposits can also be drawn as a positively sloping curve with respect to the (implicit) yield on demand deposits. The supply of demand deposits in *Gramley-Chase* is assumed to be perfectly elastic at some implicit rate of interest. (The implicit interest takes the form of free service charges for check handling.) The quantity of deposits supplied thus depends on the willingness of the public to hold deposits. Since this is true for each and every bank in the system, the constraint on bank deposits and thus on bank asset holdings is based on the public's desire to hold bank deposits. *Gramley-Chase* provide a demand-pull interpretation of demand deposits (p. 1385). The New View insists that banks have to be passive in the "acceptance" of demand deposits because by custom or legislation they cannot vary the price at which offer demand deposits. If not constrained by regulations and if intermediation was proving profitable, banks would raise deposit rates to attract more funds and lower lending rates to attract more lending business until an equilibrium was reached. Artificial constraints prevent adjustments by means of relative prices (*Tobin,* 1963; *Tobin* and *William C. Brainard*, 1963).

Money multiplier analysis comes under specific attack. The construct is an equilibrium condition for currency and bank reserves which ignores the underlying behavioral functions (*Gramley-Chase,* p. 1390).[5]

Money Demand as Money Advanced

The public's demand for money defines the total quantity of funds available for bank investment in cash reserves and earning assets (*Gramley-*

[4] The portfolio balance approach is shared both by nonmonetarists such as *Gramley-Chase* and *Tobin* and monetarists such as *Brunner-Meltzer*. The distinction would seem to be that for monetarists, the chain reaction of substitutions is initiated by an increase in the quantity of money determined by an exogeneous increase in the monetary base (*Brunner*, 1980; *Brunner-Meltzer*, 1976). For nonmonetarists, the money stock is an endogenous variable in the substitution process determined by such variables as interest rates and income (*James Tobin*, 1969).

[5] In rebuttal it has been argued that the multipliers define equilibrium conditions because they summarize the behavior of the public, the banks, and the Fed.

Chase, p. 1385). Holders of money advance funds to the banking system. This theme is stated earlier in the pioneering study of *Copeland* (1952, esp. Chaps. 13, 14) and in later studies by supporters of the New View. In these studies the banking system is portrayed as a financial intermediary acting in similar fashion to other financial institutions.

Copeland, in his pioneering moneyflows study, interpreted the banking sector accounts as "cash-or-equivalent funds" accounts (*Cohen*, 1957). The bank and non-bank sectors simultaneously advance funds to each other; the acquisition of money by non-bank sectors advances funds ("resources") to the bank sector at the same time that the bank sector advances resources to non-bank sectors by the acquisition of earning assets. The anomaly of non-bank sectors increasing their holdings of the means of payment at the same time that they advance these "funds" to the banks is self-evident.

V. Money as Product

A cash-funds form of account emancipates us from what can be called the social accounting point of view. "Funds" are now restricted in meaning to the means of payment. Sources of funds are those transactions occasioning an increase in a transactor's money holdings (for non-bank sectors) and decreases in the total means of payment (for the bank sector). Uses of funds would refer to transactions that cause a sector's holdings of the means of payment to decrease (non-bank sector) or cause total means of payment to increase (for the bank sector). The "funds" items is not itself a source or use transaction. In cash-funds accounting "sources" and "uses" and the means of payment entry are all subsumed under the more generic headings of "credits" and "debits." For example, increases in the means of payment are a credit item for the bank sector, a debit for the nonbank holder. An increase in bank reserves is a debit for the bank gaining reserves, a credit for the bank losing reserves.

If demand deposits are not advanced, then they are not debt. This leaves only the alternative of treating them as a product, albeit a special kind of product (*Cohen*, 1957, pp. 428 - 29). The idea of treating money as a product (commodity) has become well-known through the work of *Pesek* and *Saving* (1967, 1968) and *Pesek* (1970, 1976, 1977a, 1977b). Demand deposits are "sold" or "rented" with an "instant repurchase [of currency] clause." Primary deposits are sales for cash (reserves). Derivative deposits are sales on credit – the customer rents the money. Such sales are to be contrasted with the idea of "moneys advanced" in the New View. Pesek derides the picture of the humble borrower being converted into a proud lender indistinguish-

able from the time depositor (*Pesek*, 1976, p. 878). Pesek also makes a positive argument for treating money as a commodity: demand deposits yield a return for their services as a medium of exchange. Their dollar amount is the capitalized value of these services (*Harris*, pp. 37 - 38; *Pesek*, 1976, p. 866).

Increments in the means of payment now appear on the product side of the bank product account. On the expense or allocations side there will be a corresponding charge to some liability reserve account such as "instant repurchase of currency reserve" or "liability for servicing checkable deposits." Assuming that the value of the medium of exchange function is measured by servicing costs, this liability item will correspond to the dollar value of demand deposits.

1. *A Value Theoretical Approach*

Pesek brands multiple expansion of bank credit as a "myth, not supported by a shred of empirical evidence, superfluous for the analysis of the stock of money, and a waste of the student's time" (1977, p. 915). He attacks the multiplier because it is not value-theoretical.[6] Here in a strange alliance, Pesek and *Saving* join forces with the New View but from a different perspective. Applying the theory of the imperfectly competitive firm to banks, they are seen as producing that quantity of demand deposits that brings their marginal costs into equality with their marginal revenue (1968, Chap. 12).

It is possible to reconcile such a marginal approach with multiplier theory (*Towey,* 1974). The marginal cost of producing deposits shifts downward and to the right with an expansion of reserves via the central bank. A stepwise assimilation of reserves by the banking system results in the conventional multiplier.

2. *Money and Real Balance Effect*

Pesek and *Saving* argued that "inside money" was indistinguishable from "outside money" (concepts associated with *Gurley-Shaw*, 1960) and should be included in the wealth effect (1967). *Don Patinkin* (1969) took exception to this position. Pesek brings on Patinkin's attack by mistakenly allocating demand deposits to a bank's net worth. Inside and outside money are part of real balances without necessarily contributing to the net worth (wealth) of

---

[6] Inconsistently, *Pesek* and *Saving* in their money and banking text follow the traditional approach and define the supply of money in terms of the multiplier formula (1968, pp. 215 - 16, 323).

the private sector. The key issue instead is whether holdings of money balances should be offset by bank loans. Bank loans outstanding may be one of the many variables influencing monetary dissaving (the operational real balance effect) but there is no more reason to offset them against money balances than any other influence.[7]

3. *Defining Money*

In the discussion of money as bank product I have assumed that money is exclusively used for transactions purposes. The identification of such balances becomes a problem when interest is earned on checkable deposits. Now the likelihood of measured transactions balances having a saving component (funds are being "advanced" to depository institutions) is increased. For *Pesek* and *Saving* as soon as an asset pays an explicit rate of interest it ceases being money and becomes bank debt. This would seem to be an arbitrary approach – one that assumes that the implicit rate of interest on bona fide transactions balances matches the market rate of interest (P-S, 1967, chap. 5). An alternative basis for defining money would be to identify and exclude the savings component in checkable deposits. For a time the Federal Reserve calculated an "adjusted M-1B" which substracted estimated transfers from savings accounts from M-1B (now M1) (see *Simpson* et al., 1981). This could be the basis for defining money.[8] Now the yield on money becomes not only the cost of the services provided by banks but also an explicit yield. Banks and other financial institutions in order to attract reserves or interest-earning I.O.U.'s offer an explicit yield (equivalent to a negative service charge). In today's financial world shift-adjusted checkable deposits are the money commodity.

VI. The Equivalence of Models

The commodity view of the means of payment takes a giant step towards resolving the paradoxical micro and macro views of the banking system with which we started. Each bank in the banking system produces money. The bank "buying reserves" pays for them by selling primary demand

[7] Why this offsetting – essential to the inside money concept – should have gone so long unchallenged is a puzzle. On the distinction between the real balance variable and the real balance effect, see *Cohen*, 1982a.

[8] Shift-adjusted M-1B failed to capture current saving flows into NOW and similar accounts whose sources were M-1A demand deposits. These too have to be removed from estimates of money as the means of payment (*Cohen*, 1982c).

deposits. The bank acquiring earning assets pays for them by selling derivative demand deposits. The so-called depositor is either selling reserves or supplying assets for which he receives payment in demand deposits. The motive is to acquire transactions balances.

The resolution of the micro-macro paradox still leaves unanswered the respective influence of demand and supply on money stock determination. Substitution possibilities on the demand side cannot be denied. The difficulties in theorizing are highlighted by a simple model of the reserve and money market. Demand-side and supply-side theories are equally consistent with this model.

The three elemental equations are (*Hendershott*, 1977, Chap. 2):

$$D = D(\overset{+}{Y}, \overset{-}{r}) \tag{4}$$

$$Rf = Rf(\overset{-}{r}, \overset{+}{r_d}) \tag{5}$$

$$Ru = qD + Rf \tag{6}$$

where D = demand deposits
Y = nominal income
r = interest rate on securities
r_d = discount rate
q = reserve requirement against demand deposits only
Ru = unborrowed reserves
Rf = free reserves

Substituting (4) and (5) into (6) produces the condition for equilibrium in the bank reserve market.

$$Ru = q(D[Y, r]) + Rf(r, r_d) \tag{7}$$

This equation simultaneously solves for the interest rate, demand deposits, and free reserves given income, the discount rate, unborrowed reserves and the reserve requirement. In other words, the interest rate following an increase in unborrowed reserves by the central bank has to fall to whatever level is necessary to equate the supply of unborrowed reserves with the demand for unborrowed reserves. Equation (7) represents the demand side approach: the demand for demand deposits at the equilibrium interest rate determines the stock of money.

The supply-side approach to money determination can be expressed in two versions – one that considers both sides of the money market and the second, a "pure" supply-side approach, ignoring the demand for money.

The first version converts the bank reserve equation (7) into a money market equation. Thus:

$$D(Y, r) = \frac{Ru}{q} - \frac{Rf(r, r_d)}{q} \tag{8}$$

where the demand and supply of money solve simultaneously for the money stock and the interest rate.

The second version substitutes equation (5) only into equation (6). Thus:

$$D = \frac{Ru}{q} - \frac{Rf(r, r_d)}{q} \tag{9}$$

Given the interest rate, the money stock is determined by the sum of unborrowed and free reserves. In this version, the demand for money equation (4) solves for Y, given r.

The choice among theories seems to depend on which market we wish to emphasize – the reserve or money market. But more markets may be involved and their introduction should give a less ambiguous view of the money supply process. What is called for is a generalized framework with the spotlight on the bank credit and product markets and which is constructed in such a way that it captures the two-endedness of market transactions. While "general," the analysis is not necessarily an "equilibrium" one. An important feature of the succeeding discussion will be disequilibrium in the money market when the interest rate is the "own interest rate" on checkable deposits.

VII. A Generalized Framework

Table 1 presents a transactions matrix based on the two-endedness of market transactions (see *Cohen*, 1974, 1982a). The symbols stand for flows in the following markets:

P = product market (value of output, gross business income)

E = equity market

L = labor (input) market

B = bond market

T = time deposits

F = financial intermediary (nonbank) claims

M = transactions deposits

C = currency in hands of public

R = bank reserves

The "own price variables" indicated in the table headings are the product price level *(p)*, equity yields *(r_e)*, wage rate *(W)*, the bond yield ($1/r_b$), return on time deposits (r_i), on intermediary chaims (r_s), on transactions deposits (r_m), on currency (r_c) and on reserves (r_f).

The first symbol in each cell of the matrix indicates the market generating the supply of funds, the second, where the funds are allocated. Thus BP, for example, in the fourth row and first column stands for the selling of bonds to finance purchases in the product market. The bond market is a highly aggregative category including transactions in bank loans. The columns of the matrix denote the demand side of a given market, the rows the supply side. Intra-market transactions are shown along the diagonal. Within each market, transactions are carried on by the various transactor-sectors. Transactors are constrained by their accounting frameworks in the same way as the markets in which they participate. The significance of the various cells on the demand side for banks is that they can finance loans in various ways. For the commercial bank sector the relevant terms on the demand side of the "bond" market are EB (financing loans by equity capital), BB (shifting the composition of the portfolio), TB (borrowing via time deposits and nondeposit sources of funds), MB (selling transactions deposits), CB (paying out currency) and RB (losing reserves to another bank). These apply to an individual bank or a banking system. The RB term for banks will be significant for an individual bank losing reserves to a second bank but will cancel out for the banking system.

Each term in the matrix will have its own set of explanatory variables. Since a dual decision is being explained, the arguments will refer to both decisions. These arguments will consist of own and cross-interest-rates, prices, flow, stock and expectational variables.

The key equations for the bank loan and money markets are

$$MB = MB(\overset{+}{r_i}, \overset{-}{r_m}, \overset{+}{1/r_b}, \overset{-}{q}, \overset{+}{R}) \tag{10}$$

$$BP + BL = BPBL(\overset{+}{r_e}, \overset{-}{1/r_b}, \overset{+}{r_n}, \overset{+}{p}, \overset{+}{Y}, \overset{+-}{EX}) \tag{11}$$

$$MB = BP + BL \tag{12}$$

Table 1: **The Dual-Decision Matrix**

Supply \ Demand	$P\,(p)$	$E\,(r_e)$	$L\,(W)$	$B\left(\frac{1}{r_b}\right)$	$T\,(r_i)$	$F\,(r_s)$	$M\,(r_m)$	$C\,(r_c)$	$R\,(r_f)$
$P\,(p)$	PP	PE	PL	PB	PT	PF	PM	PC	PR
$E\,(r_e)$	EP	EE	EL	EB	ET	EF	EM	EC	ER
$L\,(W)$	LP	LE	LL	LB	LT	LF	LM	LC	LR
$B\left(\frac{1}{r_b}\right)$	BP	BE	BL	BB	BT	BF	BM	BC	BR
$T\,(r_i)$	TP	TE	TL	TB	TT	TF	TM	TC	TR
$F\,(r_s)$	FP	FE	FL	FB	FT	FF	FM	FC	FR
$M\,(r_m)$	MP	ME	ML	MB	MT	MF	MM	MC	MR
$C\,(r_c)$	CP	CE	CL	CB	CT	CF	CM	CC	CR
$R\,(r_f)$	RP	RE	RL	RB	RT	RF	RM	RC	RR

$$LM + PM = LMPM(\overset{-}{r_i}, \overset{+}{r_m}, \overset{-}{r_s}, \overset{-}{r_e}, \overset{+}{Y}) \tag{13}$$

$$MB - (LM + PM) = \lambda MB \tag{14}$$

where the additional symbols are:

EX = expectational variables

r_n = expected rate of return on investment

λ = speed of adjustment coefficient

The disturbances that we emphasize originate on the borrowing side of the bank loan market.[9] The BP and BL functions in response to changes in Y or EX variables shift to the right or the left. Business and households borrow to buy output or to hire inputs. This shift in the demand for funds shows up in the MB equation as a change in the yield on loans (r_b) leading to a change in the flow of bank credit financed by money creation. Equation 12 states the equilibrium condition in the bank loan market (selected elements in the bond row and column).

If we picture the checkable deposit market in $r_m - M$ space, with the supply of deposits downward sloping and the demand for deposits upward sloping with respect to the own (implicit-explicit) interest rate, r_m, the counterpart to an increase in bank loans in the bank loan market is an increase in the supply of derivative deposits in the deposit market.

A fundamental misunderstanding is that the seller of bonds is demanding additional money balances. This is the *Gramley-Chase* identity – the demand for money is the other side of the sale of securities to the bank. The credit market transaction, however, has to be distinguished from the deposit market transaction. The borrower borrows to spend in the product market – the relevant term on the supply side of the bond market is the BP term of the matrix.[10]

Disequilibrium Money

I assume that the implicit and/or explicit yield on deposit balances is set by the banks and is not affected by an increase in the supply of demand deposits. As shown in equation 14, the result is an excess supply of money

---

[9] This emphasis on the bank loan market is a striking feature of recent model building (*Modigliani / Papdemos*, 1980; *Judd* and *Scadding*, 1981, 1982; *Goodfriend*, 1982).

[10] This is also the basis for criticizing *Keynes'* so-called "finance motive" which has the borrower adding to his money balances (*Cohen*, 1982 a).

balances at the prevailing own rate of interest. The increase in actual balances exceeds the desired increase (described in equation 13) by some fraction of the initial change in deposits. An expansionary disturbance can be represented by the following sequence, $MB \rightarrow BP + BL \rightarrow LM + PM$. The monetary disturbance is shown by the first term – money creation to finance the purchase of bonds. Bond sales finance output directly or indirectly via the hiring of inputs. The money leakage is represented by the final terms – the allocation of income from inputs or product sales into money balances. In this framework, expansion takes place until desired money holdings (in response to increased transactions or changes in relative yields) match the initial disturbance. That is, "leakages" into money balances along the way set a limit to the ultimate expansion and define the value of the income multiplier (*Cohen*, 1982a, p. 16, n. 41). Desired money balances will decline with movements into depository liabilities such as time deposits.[11]

Disequilibrium money may also originate on the demand side of the money market. Corporations faced with a "cash flow" problem – finding their cash receipts to be less then anticipated – will use income to build up cash balances (*Sinai*, 1975). In terms of the transactions matrix, PM and BM replace PP and PL flows. Liquidity crises are dramatic cases of disequilibrium money.

Deposit supply as a shock precipitating disequilibrium money has been elaborated in a recent money market model (*Judd* and *Scadding*, 1981).[12] Bank loans have deposits as a byproduct. But changes in credit demand are not necessarily equal to changes in deposit demand (p. 28). The public ends up holding deposits only because this is a necessary part of accepting the credit it wants.

The notion of disequilibrium money has been contested by *William H. White* (1981). "Buffer-stocks" of money are not likely with prevailing cash balance management techniques, ability to repay bank debts, the use of overdraft accounts, and the depressing effect of excess cash holdings on market interest rates.[13] The response might be that households and small

---

[11] Depending on the relative cost of supplying primary deposits versus supplying other claims, banks may initiate the shift from checkable deposits to liabilities by increasing the supply of liabilities. This is what is meant by "liability management."

[12] Instead of simply "T" – changes in time deposits in our matrix, this model deals with more substitute sources of funds for banks – small time and savings deposits, managed liabilities such as large-denomination CDs, and net Federal funds purchased and repurchase agreements. The analysis is unaffected, however, by this additional detail.

[13] In *White*'s survey of the disequilibrium literature, money demand stock adjustment models are classified as equilibrium models. Presumably this is justified because

corporations face relatively large transactions costs relative to the benefits of holding exactly the desired amount of money. The result is "loosely managed" portfolios (*Judd-Scadding*, 1981,p. 28; *Judd,* 1982, n. 15, pp. 17 - 18). The empirical results of the *J-S* model support the hypothesis that deposit supply shocks associated with changes in bank credit force the public off their (equilibrium) demand curve for transaction deposits (*Judd* and *Scadding*, 1981; 1982).[14]

VIII. Policy Implications

The focus of policy-making at the Fed since the coming of the New View in the 1960s has been the reserve and money markets with the key relation being the demand for money. As a result, before and after the formal adoption of monetary targets in 1975 and despite the change in operating procedures in 1979, monetary control has been through the rate of interest. The unwitting result is that monetary control works through the bank loan market.

Before October, 1979, the federal funds rate was targeted on the basis of the estimated demand for money at the related market rate of interest. When unborrowed reserves became the proximate target in place of the federal funds rate, the intent was to avoid slippage in monetary control due to unpredictable shifts in the demand for money. In practice, with lagged reserve requirements predetermining required reserves, and the discount rate fixed, unborrowed, reserves worked through the federal funds rate. A lower current monetary target was achieved by a smaller supply of nonborrowed reserves forcing a higher federal funds leading to more borrowing at the discount window. The effect on the current value of M1, however, was achieved by a reduction of bank loan demand due to higher interest rates (*Goodfriend*, pp. 7 - 8). Expressed in terms of the money demand function, introducing the change in bank loans, greatly improves the estimation results (*Judd-Scadding*, 1982). The so-called volatility of money is in part the result of volatility in bank lending.

---

the lagged terms reflect the costs of adjustment so in that sense shortrun equilibrium exists. Nonetheless, stock adjustment and distributed lag models have a clear connotation of disequilibrium – that desired holdings of money depart from actual holdings.

[14] Perhaps the simplest approach to disequilibrium money is via the equation of exchange. Assume an initial ratio of M/Y. Now M increases. Given the value of the Cambridge "k", until Y rises to restore the original ratio, money will be in excess supply. In terms of velocity, until the velocity effects of the extra money are reflected in Y, money is in disequilibrium.

While in effect bank lending is the target under current procedures, the Fed has raised many objections to targeting credit. The fungibility of credit, its endogeneity, the need for extensive controls, a reserve requirements structure based on liabilities rather than assets, the absence of requirements for some financial institutions, are some of the reasons given (*Axilrod*, 1982, p. 16; *Higgins* and *Faust*, 1981). There is a strong case for targeting credit, however. Credit flows and nominal income are closely linked (*B. Friedman* 1982). In a stochastic world, in most cases of random shifts in the underlying functions, a bank credit target will lead to a lower variance of income than an M1 or an interest rate target (*Silver*, pp. 11 - 21; *Cohen*, 1982b, pp. 8 - 11). Targeting credit also has the significant advantage of not having to identify the savings component in checkable deposits as is now the case when targeting M1 (*Cohen*, 1982c).

IX. Summary and Conclusions

We started with the paradox of the banking system and the individual bank posed by *C. A. Phillips*. It is resolved by treating the means of payment as a product or a commodity. The paradox of demand deposits being advanced to individual banks and simultaneously being created by the banking system disappears. Whether a bank buys earning assets or reserves, in both instances the bank is selling demand deposits. As a seller of deposits, the individual bank becomes the microcosm of the banking system.

But if not money advanced to the banks, the demand for money still poses a fundamental challenge to *Phillips'* analysis. Beyond the simple textbook multiplier generally attributed to Phillips, the value of the multiplier is influenced by the public's demand for demand deposits relative to its demand for time deposits and nondeposit sources of funds. The sophisticated multiplier formulas that replaced the textbook multiplier are at best reduced form equations summarizing not only bank reaction to exogenous changes in bank reserves but also the public's behavior. A stronger qualification to the supply-side interpretation is the treatment of the money stock as determined by demand and supply interaction, as in any market analysis. The New View took the polar position: the stock of money depends on portfolio allocation.

The last view I reject out of hand. Banks sell deposits mainly for earning assets, although they also sell deposits for reserves. Increases in nonmonetary assets result from portfolio allocations subsequent to bank lending. Although the possibilities of asset substitution are well-nigh limitless,

transactions deposits can only be affected by cash withdrawals, including foreign outflows, or shifts into bank liabilities (time deposits and nondeposit sources of funds).

Phillips' early emphasis on bank credit is a feature of recent modelbuilding. In the short run, transactions deposits are determined in the bank credit market. As a consequence, disequilibrium obtains in the money market. What is a unique feature of disequilibrium is that unlike other nonclearing markets it is not the minimum of amounts demanded or supplied that determines the output. Rather, output will lie on the supply curve, whether excess notional supply or demand prevails. In the long run, substitution into bank liabilities, cash, adjustments in nominal income and interest rates will bring the demand for money into balance with the supply of money.

This equilibrium is reached on the basis of interactions among all markets. The money supply process is best analyzed in the context of a general equilibrium framework based on the two-endedness of market transactions. Bank involvement in these markets is described by asset and liability functions which depend on relative costs and returns. The equilibrium solution is therefore consistent with profit maximization.

The targeting of money since the 1960s has its ideological roots in the demand for money view of money determination. Better control of money could be achieved by focusing on bank credit. But credit should be controlled for its own sake.

References

Axilrod, Stephen H.: "Monetary Policy, Money Supply and the Federal Reserve's Operating Procedures," Federal Reserve Bulletin (January 1982), pp. 13 - 24. — *Brunner*, Karl: "The Control of Monetary Aggregates," in Federal Reserve Bank of Boston, Controlling Monetary Aggregates, III, Conference Series No. 23 (Boston, 1980), pp. 1 ff. — *Brunner*, Karl and Allan H. *Meltzer*: "An Aggregate Theory for a Closed Economy," In Jerome L. Stein, ed., Monetarism (Amsterdam, Holland, 1976), Chap. 2. — *Carlson*, John B.: "The Monetary Base, the Economy and Monetary Policy," Federal Reserve Bank of Cleveland, Economic Review (Spring, 1981), pp. 2 ff. — *Cohen*, Jacob: "The Treatment of the Means of Payment in Social Accounting," Journal of Finance XII (December, 1957), pp. 423 - 427. — *Cohen*, Jacob: "Tieing Loose Ends in Monetary Theory in a Moneyflows Framework," Rivista Internazionale di Science Economiche e Commerciali XXI (n. 3, 1974), pp. 246 - 276. — *Cohen*, Jacob: "A Creditist Approach to Monetary Theory," Nebraska Journal of Economics and Business, 21 (Spring 1982a), pp. 2 - 25. — *Cohen*, Jacob: "Beyond IS-LM," Malayan Economic Review, 27 (April 1982b), pp. 1 - 14. — *Cohen*, Jacob: "The Saving-Leakage Effect of Financial Intermediation," Journal of Post Keynesian Economics, (Fall, 1982c), pp. 153 - 156. — *Copeland*, Morris A.: A Study of Moneyflows in the United States, (New York, 1952). — *Friedman*, Benjamin M.: "Using a Credit Aggregate to Implement Monetary

Policy in the Financial Environment of the Future," in Federal Reserve Bank of Kansas City, Monetary Policy Issues in the 1980s (Jackson Hole, Wyoming, August 1982), pp. 223 - 248. — *Friedman,* Milton: "The Quantity Theory of Money – A Restatement" in M. Friedman, ed., Studies in the Quantity Theory of Money (Chicago, Ill., 1956), pp. 3 - 21. — *Goodfriend,* Marvin: "A Model of Money Stock Determination with Loan Demand and a Banking System Balance Sheet Constraint," Federal Reserve Bank of Richmond, Economic Review, 68 (January/February, 1982), pp. 3 - 16. — *Gramley, Lyle* E. and Samuel B. *Chase,* Jr.: "Time Deposits in Monetary Analysis," Federal Reserve Bulletin (October, 1865), reprinted in Karl Brunner, ed., Targets and Indicators of Monetary Policy (San Francisco, Cal., 1969), pp. 219ff. — *Gurley,* J. G. and E. S. *Shaw*: "Financial Aspects of Economic Development," American Economic Review, XLV (September, 1955), pp. 515ff. — *Gurley,* J. G. and E. S. *Shaw*: Money in a Theory of Finance (Washington, D.C., 1960). — *Harris,* Laurence: Monetary Theory (New York, 1981). — *Hendershott,* Patric H.: Understanding Capital Markets, Volume 1: A Flow-of-Funds Financial Model (Lexington, Mass., 1977). — *Higgins,* Bryon and Jon *Faust*: "Velocity Behavior of the New Monetary Aggregates," Federal Reserve Bank of Kansas City, Economic Review (September - October, 1981), pp. 3 - 17. — *Judd,* John P. and John L. *Scadding*: "Liability Management, Bank Loans and Deposit 'Market' Disequilibrium," Federal Reserve Bank of San Francisco, Economic Review (Summer 1981), pp. 21 - 44. — *Judd,* John P. and John L. *Scadding*: "Dynamic Adjustment in the Demand for Money: Tests of Alternative Hypotheses," Federal Reserve Bank of San Francisco, Economic Review (Fall, 1982), pp. 3 - 18. — *Kareken,* John H.: "Commercial Banks and the Supply of Money: A Market-Determined Depand Deposit Rate," Federal Reserve Bulletin (October, 1967), pp. 1699 - 1712. — *Modigliani,* Franco and Lucas D. *Papademos*: "The Structure of Financial Markets and the Monetary Mechanism," Federal Reserve Bank of Boston, Controlling Monetary Aggregates, III, Conference Series No. 23 (Boston, 1980), pp. 111 - 155. — *Patinkin,* Don: "Money and Wealth: A Review Article," Journal of Economic Literature, VII (December, 1969), pp. 1140 - 1160. — *Pesek,* Boris P.: "Bank's Supply Function and the Equilibrium Quantity of Money," Canadian Journal of Economics, III (August 1970), pp. 358ff. — *Pesek,* Boris P.: "Monetary Theory in the Post-Robertson 'Alice in Wonderland' Era," Journal of Economic Literature, XIV (September 1976), pp. 856ff. — *Pesek,* Boris P.: "A Rejoinder," Journal of Economic Literature, XV (September 1977a), pp. 856ff. — *Pesek,* Boris P.: "Reply to Professor Dean," Journal of Economic Literature, XV (September, 1977b), pp. 924ff. — *Pesek,* Boris P. and Thomas R. *Saving*: Money, Wealth and Economic Theory (New York, 1967). — *Pesek,* Boris P. and Thomas R. *Saving*: The Foundations of Money and Banking (New York, 1968). — *Phillips,* C. A.: Bank Credit (New York, 1924). — *Saving,* Thomas R.: "A Theory of the Money Supply with Competitive Banking," Journal of Monetary Economics, 3 (July, 1977), pp. 289 - 303. — *Silver,* Andrew A.: "Choosing Among Narrow and Broad Monetary Aggregates: An Evaluation of 'The Structure of Financial Markets and the Monetary Mechanism' by Modigliani and Papademos," Federal Reserve Bank of New York, Research Paper No. 8110 (June, 1981). — *Simpson,* Thomas D., *et al.*: "Recent Revisions in the Money Stock: Benchmark, Seasonal Adjustment and Calculation of Shift-Adjusted M1-B," Federal Reserve Bulletin (July, 1981), pp. 539 - 42. — *Sinai,* Allen: "The Integration of 'Financial Instability' in Large-Scale Macroeconomic Models; Theory, Practice, Problems," paper presented at Midwest Economic Association meetings (Chicago, Ill., April 1975). — *Tobin,* James: "Commercial Banks as Creators of "Money'," in Deane Carson, ed., Banking and Monetary Studies (Homewood, Ill.,

1963), Chap. 11. — *Tobin*, James: "The Role of Money in National Economic Policy," in Federal Reserve Bank of Boston, Controlling Monetary Aggregates, Conference Series No. 1, (Boston, 1969), pp. 21ff. — *Tobin*, James and William C. *Brainard*: "Financial Intermediaries and the Effectiveness of Monetary Controls," Proceedings, American Economic Review, LIII (May, 1963), pp. 383 - 400. — *Towey*, Richard E.: "Money Creation and the Theory of the Banking Firm," Journal of Finance, XXIX (March 1974), pp. 57 - 72. — *White*, William H.: "The Case For and Against 'Disequilibrium' Money," International Monetary Fund, Staff Papers, 28 (September, 1981), pp. 534 - 572.

Zusammenfassung

Der Geldangebotsprozeß: Welche Fortschritte wurden seit C. A. Phillips' Bankkredit erzielt?

Der Geldangebotsprozeß wird am besten in einem allgemeinen Gleichgewichtsmodell mit in zweifacherweise begrenzten Markttransaktionen analysiert. Historisch gesehen liegt der Schwerpunkt unter Einbeziehung der „Neuen Sicht" bzw. der traditionellen Multiplikatoranalyse auf den Bankreserven und Geldmärkten. Eine verallgemeinernde Analyse würde weitere Märkte umfassen, insbesondere den Bankkredit. Schon vor mehr als 60 Jahren legte *C. A. Phillips* die Bedeutung auf den Bankkredit (Geld- und Kreditschöpfung). Dieser Tatsache wird in der neuerlichen Modellgestaltung Rechnung getragen. In diesen Modellen sind Störungen in dem Einlagenzuwachs in Verbindung mit Veränderungen im Bankkredit für das Ungleichgewicht des Geldes verantwortlich. Das von Phillips dargestellte Paradox des Bankensystems und der einzelnen Bank kann dadurch gelöst werden, daß man die Zahlungsmittel eher als output denn als input der Banken behandelt. Als Verkäufer von Sichteinlagen wird die einzelne Bank zu einem Mikroteilchen des Bankensystems.

Summary

The Money Supply Process: How Much Progress Since C. A. Phillips' Bank Credit?

The money supply process is best analyzed in the context of a general equilibrium framework based on the two-endedness of market transactions. Historically, the focus has been the reserve and money markets with support of the New View and traditional multiplier analysis, respectively. A generalized analysis would feature additional markets – most importantly, the bank credit market. The emphasis placed on bank credit more than sixty years ago by *C. A. Phillips* is reflected in recent model-building. In these models, deposit supply shocks associated with changes in bank credit are responsible for "disequilibrium money." The paradox of the banking system and the individual bank posed by Phillips can be resolved by treating the means of payment as the output of banks rather than as an input. As a seller of demand deposits, the individual bank becomes the microcosm of the banking system.

Résumé

Le processus de l'offre de monnaie: quels sont les progrès depuis le crédit bancaire de C. A. Phillips?

Le processus de l'offre de monnaie s'analyse au mieux dans le contexte d'un équilibre général basé sur les deux points de référence des transactions du marché. Historiquement, on s'est concentré sur les marchés des réserves et de la monnaie en s'appuyant respectivement sur la Nouvelle Vue et sur l'analyse traditionnelle des multiplicateurs. Une analyse généralisée distinguerait des marchés supplémentaires – et le plus important, le marché du crédit bancaire. Des modèles récents prennent en considération le crédit bancaire sur lequel insista *C. A. Phillips* il y a plus de soixante ans. Dans ces modèles, les chocs d'offre de dépôts associés à des changements dans le crédit bancaire sont responsables de la »monnaie de déséquilibre«. Le paradoxe du système bancaire et des banques privées posé par Phillips peut être résolu en traitant les moyens de paiement comme output des banques plutôt que comme input. En tant que vendeur de dépôts à vue, la banque privée devient le microcosme du système bancaire.