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A Process Approach to Flow-of-Funds Analysis

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THE presentation of the first set of quarterly flow-of-funds tables marks the end of another phase in the development of money-flow accounting. No one familiar with the accounts can fail to be impressed by the magnitude of the effort required to produce them. I am confident that the effort will prove to have been worthwhile. There is a certain obvious analogy between the flow-of-funds accounts and the national income accounts. There is also, I think, an analogy between the reaction of economists to the existence of FOF data and their reaction to the existence of national income data. National income data had existed for many years before the appearance of Professor Kuznets' monumental works in 1937 and 1938. But interest in the national income accounts had to wait until the depression posed the problems of national income analysis in such a way that they could no longer be neglected. In the same way, the flow-of-funds data, which have been available for many years, have not been used very much. Interest in their application has become much greater since the revival of interest in monetary problems. Of course, national income analysis had Keynes, and the Keynes of flow-of-funds analysis has not yet revealed himself. In his absence, we shall have to do our collective best to get full value out of the great effort which has gone into the construction of the accounts.

I. Objectives of Flow-of-Funds Analysis

Broadly speaking, the object of flow-of-funds analysis is to trace in a systematic way the connections between production, prices, expenditures, and other variables in the so-called real system and the terms and conditions on which funds can be raised in the financial markets. The connection is, of course, a two-way one, since events in the real sector affect the situation in the financial markets and events in the financial markets affect the real sector. Indeed, the distinction between the real system and the financial system is an artificial one, since financial decisions are, in many cases, part of decisions relating to expenditures, production, and prices.

The ultimate payoff of all financial and monetary analysis is

mainly in its contribution to our knowledge of the interaction process mentioned above (though some of us are, of course, interested in financial conditions for their own sake). But the flow-of-funds accounts promise to be particularly useful in the study of those interactions because they give us data on changes in assets and liabilities for the different sectors which are integrated and consistent with the income-flow data for the same sectors.

The flow-of-funds accounts do not in themselves reveal anything about the interactions we wish to study. Veblen used to tell his fellow students that he had mastered German by staring at words until their meaning came to him. But we are not likely to unravel the mysteries of finance by staring at the flow-of-funds accounts until their meaning comes to us. To gain any real knowledge of financial processes, we require a set of behavior equations, which account for the expenditure, production, and portfolio choices of the various actors in the system, to supplement the identities implicit in the flow-of-funds accounts. But the existence of the accounts should make it possible to implement a detailed and realistic market of financial processes, which will give us a bigger payoff from a given set of substantive theories about economic behavior. To put it another way, the flow-of-funds accounts pose the problem of explaining why the flows were what they were.

In this paper I shall try to sketch out in very broad outline the nature of the processes by which supply and demand are brought into balance in the money and capital markets. I have listed very briefly some of the adjustment processes which can operate. But I have put the major emphasis on the problem of arranging a model which does justice to the complicated lag structure in a market where some of the variables move very rapidly while others respond slowly.

II. Flow-of-Funds Analysis or Analysis of Process of Balancing Supply and Demand

The problem of flow-of-funds analysis may be conceived of as an explanation of the process by which the accounting identities implicit in the accounts are satisfied, just as national income analysis might be thought of as an explanation of the process by which the national income identities are satisfied. Alternatively, we may think of the problem as one of showing how supplies and demands are brought into balance in financial markets. We do not, of course, observe the supply and demand functions in these markets—we only observe the outcome of the balancing process.

We may either consider the supply and demand in the market for each type of security or, by netting out, consider the supply and demand for currency and demand deposits. Suppose that we consider the amounts supplied and demanded (of either money or securities), on the assumption that interest rates remain fixed throughout some short period and that there is no change in the amount of demand deposits and currency. Then, we could, given the necessary data on the current-account operations and portfolio choices of each sector, compute the amounts demanded and supplied for each type of security. If we take the algebraic sum of the differences between amounts supplied and amounts demanded, we will obtain the difference between the amount of currency and demand deposits supplied and the amount demanded (with opposite sign).

In simple markets in which only one kind of security is considered, it is obvious that any reaction which increases the amount of demand for securities decreases the demand for money, and conversely. In a world with many different types of securities, however, changes in interest rates may increase the demand for one type of security and decrease the demand for another. This type of reaction may only push a supply and demand imbalance from one submarket into another without directly affecting any net imbalance in the supply and demand for money. Of course, those processes may indirectly result in an adjustment in the supply and demand for money. If initially there should be balance in the market for short-term securities and an excess supply of long-term securities, the market might be brought into balance by a two-stage adjustment in which (1) a rise in long rates induces some asset holders to try to sell short and buy long, thereby raising short rates and (2) inducing cash holders to buy shorts.

Conceptually at least, we may think of situations in which there is no net excess demand or supply for money but in which there are imbalances in the net markets. Relative rate changes which induce asset holders to move from one type of security to another will remove these imbalances.

On the other hand, we may think of situations in which there is a net excess demand for money. In that case the market can only be brought into balance by market adjustments or sequences of adjustments which have the effect of reducing the net demand for cash balances.

A wide variety of market adjustments are available to eliminate excess demands and supplies in submarkets when there is no net excess demand for currency and demand deposits. But there is only a limited set of adjustment processes which have a net effect on the demand for or supply of cash. Each member of the set of adjustments

may be brought into play by various other adjustments in the market so that the adjustment processes which influence demand for or supply of cash may be regarded as the end product of the market adjustment processes. (The case in which there are imbalances in the submarkets with no net excess demand for cash is then a special one in which the adjustments originating in the submarkets just cancel out.) Because of the special importance of the market adjustments directly affecting the demand for cash, it may be useful to list the most important ones with some comment on the other market processes which bring them into play.

FACTORS INFLUENCING DEMAND FOR AND SUPPLY OF CURRENCY AND BANK DEPOSITS

An analysis of factors influencing supply and demand for currency and demand deposits falls naturally under five headings: (1) flexibility of the supply of demand deposits, (2) household substitution of time deposits or securities for currency and demand deposits, (3) corporate and state government liquid-asset management, (4) cash holdings of financial intermediaries, (5) expenditure effects.

A. Supply of Bank Deposits

Even in the face of a fixed supply of owned bank reserves, the volume of demand deposits shows very substantial flexibility. The swing in net free reserves over the cycle is about $1 billion. From the trough of a cyclical slump to the peak of the boom, then, commercial banks increase the supply of demand deposits by about $5 billion from a given owned reserve base (i.e. given total reserves less those absorbed by time deposits). This process is somewhat obscured by the fact that increases in bank reserves (or reductions in reserve requirements) occur during slumps, generating not only a decline in borrowing from the Federal Reserve and an expansion of excess reserves, but also an expansion in deposits. During the boom, demand deposits continue to expand in spite of the fact that reserves are increasing very slowly or (allowing for absorption by time deposits) even contracting slightly.

A part of this adjustment results from a more or less passive response of banks, which do not keep their reserve position closely linked to increases in demand for loans. (Since this does not involve a movement of interest rates, a purist may say that the passive response of banks to increased loan demand should be considered part of the available supply of funds at initial interest rates rather than a response to excess demand for funds. It does not, of course, make any

difference which way we look at it so long as we recognize the existence of this element of flexibility in the system.)

In addition, however, some part of the induced expansion may be connected with adjustment pressures in the money market.

The absorption of excess reserves may reduce the supply of federal funds, so that the federal-funds rates rise to the discount rate, inducing some banks to borrow from the Federal Reserve instead of in the federal-funds market even though they have not expanded loans.

When interest rates are rising, some banks may borrow so as to carry securities to maturity rather than take capital losses.

When money is tight, New York banks raise their rates to dealers, who then try to mobilize funds from other banks with excess reserves.

Rising interest rates may force bank dealers in municipal securities to carry them longer than planned, or other underwriters may borrow to carry an increased inventory. The resulting strain on reserves may be absorbed by the use of excess reserves or by borrowing.

B. Household and Business Demand for Cash

The household demand for currency and demand deposits may be expected to respond to changes in interest rates in two ways. On the one hand, increases in rates paid by savings institutions may induce households to shift liquid assets from demand deposit form to time deposit form. On the other hand, increases in interest rates or in stock yields (adjusted for expectations) may induce households to buy marketable securities and draw down demand deposits (as well as time deposits). In much recent discussion, the first possibility has been considered almost to the exclusion of the second. Without entirely deprecating the importance of the first, I have some reasons for thinking that the second type of substitution may also be important. For the moment, it is sufficient that changes in long-term interest rates induce some substitution between demand deposits and other financial assets. I have discussed the nature of the substitution between household demand deposit holdings and other financial assets in Note A, below.

A similar situation applies to corporate holdings of demand deposits. We may suppose that corporations hold certain amounts of liquid assets to cover themselves against the possibility of temporary excesses of cash outflows over cash inflows from current operations, to meet accrued tax liabilities, or because of advance financing of plant and equipment expenditures. We may suppose that the amounts held are invariant with respect to the interest rate but that the proportion held in demand deposit form varies inversely with the

yields obtainable from holding Treasury bills, time deposits, or commercial paper. We might also suppose, however, that the total amount held varies (*ceteris paribus*) inversely with the long-term bond rate as treasurers try to postpone borrowing for more favorable conditions (of course, they might think that rates will continue to rise and, therefore, act in the opposite way).

A good deal has been said about corporate reactions to the bill rate but I am not sure that corporate sensitivity to bill rates is really very great. There is, however, some evidence that high bond yields have an adverse effect on their liquidity position.

C. Expenditure Effects

A money market can be balanced if the demand for money (at given income levels) has some interest elasticity to the interest rate or if expenditures have some interest elasticity. In classical theory, the demand for money was supposed to be inelastic to the interest rate, and investment demand was supposed to be highly elastic. Things have been turned around in recent years; and, as we have already seen, there is almost certainly some interest elasticity of demand for money. It has often been said that investment and consumer expenditure are not interest elastic or, at least not much so.

High or rising interest rates may, however, have an adverse effect on expenditures in several ways. First, high interest rates per se may cause some marginal projects to be abandoned or postponed in the orthodox way. This may not be very probable in the manufacturing or the utilities field, but may be of more significance in commercial construction, where margins are thinner and leverage very high. Unfortunately, there is little evidence one way or another on this point.

There is fairly strong evidence that high interest rates can choke off residential building through their effect on the supply of funds for insured and guaranteed mortgages.

It is also frequently suggested that expenditures are held down by bank rationing of credit to marginal borrowers. Once again, the evidence is unsatisfactory. In spite of the unsatisfactory state of the evidence, we are safe in concluding that interest rate movements have a fairly substantial effect on expenditures through their effect on residential building and that they have at least marginal effects on some other types of investment expenditures.

III. Multistage Processes

When we deal with the problems of equilibrium analysis, we do not have to worry much about the timing of action and reaction in the

markets with which we deal. But when we turn to analysis of the processes by which equilibrium is (or might be) established, we are beset with timing problems. One man cannot react to another man's action until after it has taken place, and in process analysis we must always be explicit about the lapse of time before the reaction. That means that a theory which explains the dynamic processes in the market must contain considerably more information than the corresponding equilibrium theory. In addition, there are always some difficulties in setting up a dynamic analysis involving complex lags in a way which makes the results comprehensible. There is considerable danger that simplifications of the lag structure designed to make analysis manageable will distort the substance of the analysis. This has been true to some extent in the rather simplified models purporting to explain the "loanable-funds" theory of interest. In those models, it is usual to assume that financial markets are brought into equilibrium (for given values of expenditure flows) instantly or in the shortest time interval recognized on the model. The interest rate thus established is then taken to influence the expenditure flows in the next period.

Now supply and demand are in some sense balanced in the financial markets in very short periods. But it is certainly not true, as these models imply, that money and capital markets are continuously in equilibrium (even for given values of income flows). The models alluded to use only one or two open-market interest rates, and take no account of reaction lags by lenders or borrowers. In fact, of course, there are many types of interest rates, and while some of them respond very quickly to market conditions, others respond very slowly.

The rates paid by savings institutions, for example, change very slowly, and the average of these rates must be regarded as responding to a moving average of the bond and mortgage yields in which the institutions invest (though it must be noted that some of these rates remain constant, and then jump suddenly when administrative rulings of regulatory authorities change). The movements of these rates may be very important in mobilizing and channeling funds through the securities markets over a long period, but they play a relatively small role in the short-run adjustment of supply and demand for money and securities.

The rates charged for conventional mortgage loans move much more quickly than the rates paid by savings institutions; but they lag behind the open-market rates, and move with a somewhat smaller amplitude. Moreover, their role in the short-period adjustment of supply and demand is greatly reduced by the advance commitment of

funds. Even in the case of a direct negotiation between an individual household and a savings and loan association or mutual savings bank, a couple of months will usually elapse between the making of the commitment and the actual payment by the lender. Events in the securities markets in the meantime may direct the lender to change his policy with regard to new commitments, but that will only influence his need for funds to meet mortgage commitments a couple of months later.

In addition, the hard-up marginal buyer faced with an unexpected change in rates will shop around until he finds a lender whose rates are below average. This will help to equalize rates, but the possibility reduces the effectiveness of changes in mortgage rates in bringing supply and demand into balance in short periods.

Finally, we must recall that houses are built on credit. Even if mortgage rates rise and prevent some people from buying houses, the first effect is to lock the builder into his construction loan and prevent him from starting another house. This will reduce the demand for funds at a later date but not immediately.

The open-market rates for corporate and municipal bonds may have an effect on the balance between supply of and demand for funds in two ways. On the one hand, rate increases may discourage borrowers; and, on the other hand, they may encourage individuals or institutions who are not fully invested to buy. Ordinarily, plans to issue bonds are made a fairly long time in advance of the actual date of sale, and small changes in rates will not cause their cancellation or postponement. Large changes in rates do, of course, lead to a certain number of postponements of issues already arranged for and for a possibly larger (though quite unknown) number of issues planned but never formally scheduled for issue. To the extent that such postponements occur in response to short-period changes in yields, the yield changes do contribute to the short-period adjustment of supply and demand. However, it is probable that such postponements fill only a small part of the gap.

These are only examples, but their force should be sufficient to make it clear that many of the adjustments which are most important in offsetting a systematic tendency toward excess demand for money over long periods are relatively ineffective in the short run. Some others, which are not so important in the long run, have much greater relative importance in the short period. This suggests that any realistic analysis of adjustment processes in the financial markets must be a multistage one. In a period as short as a month or even a quarter of a year, most of the variables which account for the variation in amounts of funds supplied and demanded must be taken

as predetermined by flow variables in previous periods or by prices and initial stocks of assets and liabilities at the start of the period. The events of the period will produce changes in the values of the flow variables, in asset stocks and liabilities, and in prices; and these changes will have (1) a direct effect on amounts of funds supplied and demanded in the next period and (2) an indirect effect through some of the more slowly moving variables mentioned above.

To put it more concretely, we can start the analysis of short-period supply and demand adjustments by assuming that virtually all final-product expenditures and production schedules are predetermined in the sense that they depend on lagged flow variables or beginning-of-the-period stocks, with reaction to changes in stock or flow variables within the period being negligible. Second, we can assume that most of the borrowing plans for the period are determined by prior events —initial asset and liability positions, expected cash flows estimated from previous flows, expected interest rates based on initial interest rates. We can suppose, I think, that the amounts that people wish to borrow during the period are not much changed by the deviation of actual from expected cash flows during the period. We must, however, allow for the possibility that some borrowing will be postponed if interest rates rise sharply during the period. (The postponement function must be taken to be a one-sided one, i.e. borrowing will be postponed by a fall in interest rates but not brought forward by a fall, and its elasticity should be lower than the elasticity of planned borrowing to expected interest rates. We should also allow for the possibility that borrowing plans postponed by rising rates will be reactivated by a fall in rates.)

We can also assume that the lending policies of intermediaries during the period are predetermined. That does not mean that they are unchanged from the previous period or constant throughout the period. It only means that the changes are reactions to events which have already happened at the start of the period, not to changes in interest rates or asset positions during the period. Some borrowers who have made their plans on the basis of earlier lending policies may, therefore, be disappointed. They may have to pay a higher rate than expected, or voluntarily borrow less than the planned amount, or be refused their loan wholly or partially. However, their disappointment depends on what has already happened to interest rates in open markets or to portfolio positions of lenders before the start of the period in question. These are, of course, only simplifying assumptions which cannot be literally true. But because of the lag between commitments and take-downs and the time lag in policy formulation, the feed-back from changes in open-market interest

rates and within-the-period portfolio changes to the plans and policies of lenders and borrowers (except through postponement of open-market issues) must be quite weak even for a period as long as three months and certainly for a period as short as one month.

Finally, we can safely assume that the rates offered by savings institutions, though they may change in response to prior events, will not respond to changes in market yields during the period. The flow of funds to savings institutions will, therefore, depend on income (itself determined by lagged variables) and interest rates paid, which are determined by past events. However, the flow may be reduced or increased to the extent that variations in the rate of sale of marketable securities to households are reflected in time deposits. We may also take the flow of funds through life insurance companies and self-administered pension funds as given.

It may be taken for granted that nonbank financial institutions will make it their business to remain fully invested and that short-run variations in their cash positions will not be very important. They will invest all the funds they receive during the period and no more. Differences between cash inflow and cash outflow implied by their commitments and policies with respect to direct lending will have to be rectified either by purchase or sale of government securities or by variation in the amount of other open-market securities (primarily new issues, except for equity purchases).

Suppose for the moment that open-market interest rates were unchanged for the period. Then there would presumably be no voluntary postponements of open-market issues. If we added up all the increases and decreases in cash balances implied by the assumptions made above, we would certainly find that the sum was different from zero. If the net demand for cash on a constant interest rate assumption is positive, and bank reserves expand just enough to balance off the absorption of reserves required for increased time deposits, how is the gap to be filled?

IV. Short-Run Adjustments

Our assumptions have ruled out many of the responses to excess demand which are important over longer periods. In the short run, the market must rely on a number of marginal adjustments. The gap between supply and demand for money at fixed interest rates might, to judge from quarterly changes in cash balances, be as large as $2 billion.

Because excess demand for money is only likely to occur at a time when commercial and consumer loan demands are expanding, a part

of the gap will be filled by expansion of bank assets, unless banks are already operating at full stretch. Part of this expansion will be balanced by sales of federal securities, but part of it will be met and made possible by a reduction in net free reserves. A second closely related process is connected with the inventory problems of underwriters and dealers handling new issues of corporate and municipal securities. If there is a net shortage in the flow of funds into the market, it may first be felt by dealers and underwriters, who find that securities do not move as quickly as expected. Once the situation is recognized, dealers and underwriters will arrange for better yields in the deals they undertake. Meanwhile, however, they will have accumulated inventory, which they may wish to hold until the market improves. Some of this inventory will be financed by bank loans, and this will have the same tendency to cause a fuller use of bank reserves and bank borrowing as the rise in business loans discussed above.

The tightening of bank reserve positions, particularly in New York, may cause New York banks to raise rates to government bond dealers and cause them to seek funds elsewhere—either from other banks or by borrowing directly on repurchase agreements from the larger corporations. (This may seem to be in conflict with what was said above about corporate sensitivity to short rates. However, the statement just given applies only to large corporations, and the volume of funds is small relative to the total holdings of corporations.)

In addition, underwriters who are pinched by the situation may redouble their selling efforts, and mobilize funds which would otherwise be idle without much of an interest rate change.

No doubt there are other adjustment processes of this gleaning type which help to clear the market in the very short run, and these are meant to serve merely as examples.

Beyond this, the impact of a shortage of funds must be felt in the market for long-term bonds in terms of rising yields. Rising bond yields may cause some postponements of issues; and this will automatically reduce cash balances, since the issuers are likely to finance planned future expenditures, not current ones (the reduction is not one for one, however, since the issuers might have bought Treasury bills to hold pending expenditure of the proceeds). Alternatively, individual investors may be attracted to the new issues and draw down demand deposits. The connection may be indirect. Pension funds may be induced to buy bonds rather than stocks, while individuals buy new stock issues. Finally, of course, the Treasury may respond to the situation by selling shorts rather than longs, thus taking pressure off the long market and putting it on the

short. The resulting rise in short rates may encourage banks to hold more of their shorts and tighten reserve positions still further.

Again, these are only examples of the many complicated marginal adjustments which may be brought into play to remove short-period imbalance between supply and demand.

V. Longer-Run Adjustments

If we suppose that the tendency for excess demand for funds persists, we must obviously look elsewhere for processes which will bring supply and demand into equilibrium. Some of the processes mentioned in connection with short-run adjustments can be repeated over and over, but only up to a point. Bank reserve positions can be squeezed a little bit each quarter for several quarters, but there is clearly a limit, established by technical limits on the mobilization of excess reserves and by the ban on continuous borrowing from the Federal Reserve. Dealers may become cumulatively more efficient in extracting idle funds from corporate treasurers, but only up to a point. Postponed security issues may accumulate (with new postponements each quarter exceeding previously postponed issues brought to market), but only at the expense of reductions in corporate liquidity, which must ultimately lead to new decisions about investment programs. The market does not use up all its slack in one quarter, but unless the excess demand is very small, it cannot work on, using up slack indefinitely.

A one-time increase in long-term yields will have continuing effects, both directly and indirectly. Aside from the one-shot mobilization of idle demand deposits, a higher level of yields may cause a continued flow out of household demand deposits (or a reduced flow into) for a long time.

In addition, the rise in long rates will tend to pull up rates paid by savings institutions and, therefore, cause a shift of demand deposits toward time deposits as well as a reduction in the proportion of additions to transactions balances going into demand deposits.

Third, the rise in long rates will lead to an increase in conventional mortgage interest rates or a tightening of downpayment and maturity standards. More important, it will reduce the attractiveness of guaranteed and insured mortgages subject to maximum interest rates. The result will be a reduction in the rate of residential construction and, ultimately, a reduction in the rate of growth of income (compared with what it would have been with easier money). The results will not show up, however, for many months because of commitment lags and lags in the reaction of builders to changes in the rate

of sale of houses. A reduction in the rate of growth of income will, of course, reduce the rate of growth of transactions balances, and help to reduce excess demand for money.

Meanwhile, the tightening of bank reserve positions as well as the increase in interest rates may cause banks not only to raise interest rates but to reduce loan maturities or refuse marginal loans. This may, in turn, reduce the expenditure of the would-be borrowers.

The increased cost of funds may cause the postponement or cancellation of some state and local expenditure projects. Similarly, corporations may be induced to put off expenditures until more favorable terms for raising funds can be obtained.

Of course, several turns of the interest rate screw may be required before the excess demand is eliminated; and, in the meantime, all sorts of things may happen in the real-expenditure sector; so the market is always likely to be adjusting to either excess demand or excess supply. This somewhat inadequate account of the time-lag problems in flow-of-funds analysis can serve only to indicate some of the broad outlines of a flow-of-funds model.

Note A. Household Demand for Currency and Demand Deposits

The theory of asset management for households suggests that the division of household assets between demand deposits and time deposits (whether at commercial banks, mutual savings banks, or savings and loan associations) or fixed-value bonds (United States savings bonds) ought to be sensitive to the interest rates paid on time deposits and savings bonds. If we consider households which do not buy marketable securities, the argument is based on the fact that to earn interest on time deposits or savings bonds one must forego the convenience of holding funds in a checking account. As the proportion of financial assets held in time deposit form increases, the number of trips to the bank to make transfers to a demand deposit account so as to write checks will increase. And as the interest rates paid on time deposits increase, the amount of that kind of effort which seems worthwhile will also increase; so the proportion of household assets held in time deposit form should increase with the interest rates.

For households which do buy marketable securities there is a three-way choice between demand deposits, time deposits, and securities. For simplicity, we may consider their portfolios divided into two parts. One part is held against short-term income and expenditure variations and for precautionary reasons, is always in

deposits of some kind or in savings bonds, and is divided among these forms on the same basis as the assets of nonsecurity buyers. The remainder is available for risk investment. Most of this remainder will be invested in securities or other variable-price assets, but at any one moment there will be a number of people who are wholly or partially "out of the market."

If these people knew that they would stay out of the market for a long time, they would no doubt leave their funds in time deposits or savings bonds. But many of those who are liquid at a given moment have just sold a security for some reason connected with their judgment about that particular security, and expect to reinvest in a short time. The expected yield on a time deposit may therefore be small even on a large sum and, if the holders are in high tax brackets and oriented toward capital gains, may not be considered. (One might expect such funds to be left with brokers, but customers balances amount to only about $1 billion, which is far too small in relation to the volume of security trading to account for the liquid assets associated with it.)

We might expect that the proportion of these liquid assets held in demand deposits would vary inversely with time deposit interest rates. But we should also expect that if the volume of securities sold to households exceeds the current flow of savings by potential security buyers (a small subclass of households), then there would be a reduction in both time and demand deposits. Thus, a rise in the volume of new stock issues or municipal bond issues may pull funds out of demand as well as time deposits. A rise in the yields of corporate and federal government bonds relative to time deposit rates may have the same result.

There are some reasons for thinking that the pool of uninvested funds held in demand deposits is quite large and that it does respond to the volume of security sales. According to the Federal Reserve Deposit Ownership Survey there were on January 30, 1957 almost $30 billion of individual (personal) demand deposits. Of this amount, 46 per cent was in accounts of over $5,000; 14 per cent in accounts of over $25,000; and 6 per cent in accounts of over $100,000. No doubt some of these accounts were really in the nature of business accounts, but on the other hand the concentration of deposit ownership is greater than the survey indicates because some persons have more than one account. Some of these accounts represent the assets of individuals who do not trade much in marketable securities and who for some reason do not find it worthwhile to take the trouble to obtain time deposit interest. But it seems reasonable to suppose that several of the $13 billion held in accounts of over

$5,000 belong to persons who are looking for suitable investment. If the amount were $10 billion, it would be less than 3 per cent of the bonds and stocks held by households.

If this pool of funds were fixed in amount, its existence would be of little consequence. However, there is also some reason to think that variations in the volume of security sales to household are negatively associated with variations in the rate of increase of demand deposits. These indications are far from conclusive and are reported only for their suggestive value. We fitted regressions of changes in demand deposits of households to variables called "financial saving" (increase in financial assets in flow-of-funds accounts) and "security sales" (net increase in financial assets of households excluding life insurance reserves and net investment in unincorporated business). The demand deposit data were adjusted by subtracting from the original figures a rough estimate of transactions requirements, obtained by using the 1929 ratio of demand deposits to disposable income. The series used covered 1924–29, 1936–40, 1947, 1949, and 1951–57. Goldsmith's data were used for the early years, and the flow-of-funds data for the later ones. The regression obtained was

$$y_1 = \underset{(0.06)}{0.1}X_1 - \underset{(0.11)}{0.5}X_2$$

where y_1 = change in demand deposits adjusted for transactions requirements
X_1 = financial saving, also adjusted for transactions requirements
X_2 = security sales

R was .55. A similar regression for time deposits had, as expected, the complimentary coefficients

$$y_2 = 0.9X_1 - 0.5X_2$$

where y_2 = change in time deposits

R was .68 (22 observations).

In another similar regression, using only the years 1920–29 and 1950–57 (15 observations), the results were similar

$$y_1 = 0.05X_1 - 0.5X_2$$

$R = .68$.

Since the components y_1, y_2, X_2, must add up to X_1, there is some problem in interpreting the results.

If the three categories of saving were independent random variables, and financial saving their sums, we should, of course, find some correlations between any one of them and two others. Since our correlations were not very impressive anyway, we cannot take the fact of correlation very seriously.

The coefficients and some additional information about the time pattern of the data are, however, consistent with a rather simple hypothesis about deposit-holding behavior. Suppose that (1) a large proportion of people put all their funds except for transaction requirements into time deposits, (2) the rest normally invest most of their funds on balance in securities, splitting the remainder about equally between time and demand deposits (doing so by making deposits as new savings accrue and securities are sold, and withdrawals as securities are purchased—the net difference between withdrawals and deposits on account of security sales being equal to net purchase of securities by households). Then if net security sales were fixed, we should expect that variations in financial saving would mostly be reflected in time deposits because a sizable proportion of savers use only time deposits; some of the saving of the other group goes into securities and only half the remainder into demand deposits. The high regression coefficient of time deposits on financial saving and the low one for demand deposits thus conforms to expectations.

Now suppose that there are periods when financial saving is rather low. Interest rates (net of taxes) are low; so those interested in securities pile up a substantial amount of liquid assets, divided about equally between time and demand deposits. If security sales then rise to levels in excess of financial saving for this group, it will draw about equally on both time and demand deposits. If we suppose that liquid assets for this group were built up during the First World War and reduced during the security boom of the twenties, and built up again during the thirties and Second World War, to be reduced again in the fifties, we shall not be surprised at the 0.5 regression coefficients for time and demand deposits against security sales.

As I have already suggested, this hypothesis implies that an increase in stock issues or municipal bond issues or a rise in the yields of government and corporate bonds will draw funds from demand deposits and, therefore, help to eliminate excess demand for funds.

It also has some implications with regard to the sensitivity of transactions holdings to time deposit interest rates. On theoretical grounds we expect the proportion of "transactions" balances held in the form of demand deposits to fall as time deposit interest rates rise. That expectation seems to have been nicely confirmed in the

postwar years. Household holdings of demand deposits and currency has risen relatively slowly since the war while, time deposits plus saving bond holdings have risen much more rapidly. Moreover, savings bond holdings have risen little, and their interest rates have lagged, while savings and loan deposits with the best interest record have risen more than other time deposits. The 1957 changes in rates permitted on commercial bank time deposits met with a good response. Finally, a number of studies of deposit movements for individual institutions suggest that the customers are sensitive to time deposit yields in choosing the form in which they hold funds.

This evidence is very impressive and it would be hard to deny that there is some connection between demand deposit holdings and time deposit yields. But another interpretation is also at least *possible*. Suppose that holders of time deposits are sensitive to relative yields on different types of time deposits but that there is only a mild elasticity of substitution between demand and time deposits. But suppose, also, that at the war's end there was a large pool of demand deposits held by those who are interested in marketable securities and that the pool has not only not grown but has actually declined. In that case, transaction holdings of demand deposits could have risen more or less in proportion to income, while total demand deposits rose much more slowly.

One additional item of evidence in support of this view is worth citing. It is reasonable to suppose that accumulations of time deposits and savings bonds represent, in large measure, the savings of, say, the holders of the lowest 95 per cent of income reserves. Most of their saving is either in this form or in the form of housing equity. Since the war, the sum of increases in time deposits, savings bonds, and increase in housing equity has been a fairly steady proportion of disposable income. It was also a fairly steady proportion of disposable income during the 1920's, but the ratio of this type of saving to disposable income was lower than it has been in the postwar years. The increase in the ratio of this type of saving to disposable income was of about the magnitude one might expect, in view of the change in income distribution.

It seems to me that we are safe in concluding that interest rate movements since the war have reduced the household demand for demand deposits and that this has come about partly through shifts from demand deposits to time deposits, but also through shifts from demand deposits into marketable securities. The relative importance of the two types of shifts is not easily evaluated, but there is some reason to think that the shift into marketable securities has been of substantial, if not dominant, importance.

COMMENT

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I am wholly in accord with Professor Duesenberry's picture of a set of interrelated financial markets, with flow-of-funds accounts as the *ex post* record of the processes by which supplies and demands for various financial assets are balanced. And I find his catalogue of short- and long-run adjusting mechanisms in these markets extremely instructive and suggestive. The structure of interest rates, from the conventional zero on currency to the ratio of expected earnings to common share prices, is the principal mechanism. But Duesenberry rightly emphasizes the importance of auxiliary financial mechanisms, especially in the short run. In the long run, financial markets are equilibrated not only by interest rates and other financial variables but by feed-backs from the "real" sector into financial supplies and demands; disequilibrium in financial markets has repercussions on output and prices, and changes in these real variables assist interest rates in eliminating the disequilibrium. The revival of concern for monetary and financial institutions and policies reflects a heightened conviction of the importance of two-way connections between the financial and real sectors. Flow-of-funds accounts are becoming available at a propitious time.

However, the emphasis both of flow-of-funds statistics and of Duesenberry's paper seems to me misplaced in one fundamental respect. The supply and demand functions for financial assets, which occupy the central place in Duesenberry's model, should be stated in terms of *stocks* as well as *flows*. The basic behavior behind the flow of funds is the adjustment of the balance sheets, or portfolios, of individuals, business firms, and financial enterprises toward a desired allocation of wealth among holdings of various assets and debts. In this adjustment, the basic decision variables are stocks; and flows will be dominated by attempts to adjust stocks to changes in total wealth, interest rates, and other determinants. In the late forties, for example, almost all financial behavior units were holding excessive liquid assets relative to real assets; both the flow-of-funds accounts and other economic records of the period can be understood as consequences of the processes that restored portfolio balance. In general, there will not be stable relationships among flows or between flows and interest rates without allowance for the effects of stocks. Duesenberry remarks that the Keynes of flow-of-funds analysis has yet to reveal himself. If Duesenberry's analogy to national income accounts is meant to imply that relationships among flows and among flows alone, as useful as Keynes's consumption function, are waiting

to be detected in the financial sphere, the new Keynes will be long delayed. The statistical moral of this basic theoretical point is that flow-of-funds accounts should be supplemented by balance sheets of equal detail. Moreover, as soon as flows are regarded as a mechanism for adjusting stocks, it must be recognized that they are not the only mechanism. Stocks are altered also by capital gains and losses; flows of funds cannot be properly interpreted without attention to the simultaneous changes in valuation of assets.

Although Duesenberry's paper is devoted to the mechanisms that remove disequilibrium in financial markets, he fails to specify clearly the initial sources of disequilibrium he has in mind. It may be useful to distinguish between (1) shifts in portfolio preferences and (2) changes in supplies of the basic constituents of private wealth. Private wealth is generally growing as a result of private capital formation or government dissaving or both. The market must not only balance total investment and total saving, but kinds of investment and kinds of saving. There will, in general, be discrepancies between the forms of increase of private wealth engineered by investors and the forms in which savers wish to hold their increases in net worth. It is the function of changes in the interest rate structure to eliminate these discrepancies. But there is normally, thanks to financial intermediaries, a considerable automatic congruence between the composition of saving and that of investment; so little short-period adjustment in the structure of rates is required. Consider the following examples:

(1) Individuals invest in their own businesses.

(2) Savers choose to hold increases in net worth in bank deposits, if only in part and temporarily, pending placement of the funds elsewhere; a corresponding amount of investment is in additions to inventories, financed by bank loans.

(3) Financial institutions, e.g. insurance companies, savings and loan associations, and pension funds, plan placements of funds in line with the expected growth of their liabilities. But if there are divergences from expectations—e.g. insurance companies get excess funds in relation to planned placements, and savings and loan associations have deficiencies—there are residual assets (cash and government securities) that can be shifted among institutions to absorb these discrepancies.

I welcome the unobtrusively stated heresy of Duesenberry concerning the determination of the quantity of bank deposits. Our textbook theory is that the supply of bank deposits does *not* adjust in response to depositors' and borrowers' preferences, but is normally

determined by the supply of bank reserves. In this respect, banks are distinguished sharply from other financial intermediaries, whose liabilities are regarded as variable in response to public preferences. Duesenberry properly blurs this time-honored distinction, and regards the quantity of reserves to which the banks are "loaned up" as partly within the control of the banks themselves. In consequence, the volumes of bank loans and deposits are themselves adjusting variables, rather than constants to which interest rates and other variables must adjust. For example, if the public should shift from cash to assets held by banks, the reduction in the profitability of these assets provides the banks with an incentive to curtail their asset holdings and to acquiesce in the reduction of their deposits. To make the example more specific, a shift by the public from deposits to Treasury bills, lowering bill yields, reduces the incentive of banks to borrow reserves from the Federal Reserve so long as the discount rate is held constant.

Duesenberry does not believe that corporate bill holdings are sensitive to bill yields in the short run. Evidently, much of the economy of cash to which the secular increase in short-term rates since the war has driven business firms is quite irreversibly institutionalized. But the clear evidence of an inverse relation between the transactions velocity of cash and the short-term rate suggests that considerable sensitivity still remains.

Demand deposits of households, I agree, depend not only on the interest rate on time deposits but also on security yields and turnover. New savings are initially in cash form, and portfolios tend by themselves to turn into cash as interest and dividends accrue and securities mature. It takes active management, with attendant costs of decision-making and of transactions, to keep the cash proportion down. Hence, the demand for cash depends on the costs of these financial decisions and transactions in relation to the level of yields and to the rewards from frequent shifting. Duesenberry's hypothesis is plausible, even though his statistical method for supporting it is vulnerable to the criticisms he himself suggests. An analogy may make this vulnerability clear. In a study of the substitutability of margarine for butter, one should not use the quantity of butter consumption to "explain" margarine consumption but rather relate both consumption quantities to the relative prices of the two substitutes.

Shifts between cash and bills, or between the liabilities of various intermediaries, are relatively easy adjustments for financial markets to absorb. But shifts between financial assets fixed in money values, on the one hand, and equities, inventories, and durable goods, on

the other, are much more difficult. The capacity and speed of financial adjustments to such shifts should not be exaggerated. Here, asset prices must move, altering both yields and valuations of existing holdings. These changes in prices may not be confined to the stock market and other markets in existing assets, but may spread also into GNP markets, with repercussions on economic activity and with feedbacks to the financial sector.

The specific examples Duesenberry gives of financial adjustment mechanisms underline the arbitrariness of institutions. That some institutions will arise to accomplish such adjustments is predictable. Why certain ones arise and others do not is hard to explain. Equally good rationalizations could be provided for institutional set-ups quite different from those which characterize the United States money market today. For example, why do not corporate borrowers create more open-market paper? Why is bank lending to government securities dealers so expensive here, compared to London? There is, perhaps, a scarcity in the supply of institutional mechanisms; so only a few of those that might logically arise actually do. But a given set of institutions will not last forever if circumstances change, and neither theorists nor policy makers should rely too heavily or too long on peculiarities of the current institutional structure.