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Volume Title: Monetary Statistics of the United States: Estimates, Sources, Methods

Volume Author/Editor: Milton Friedman and Anna Jacobson Schwartz

Volume Publisher: NBER

Volume ISBN: 0-870-14210-0

Volume URL: <http://www.nber.org/books/frie70-1>

Publication Date: 1970

Chapter Title: Basis for Our Choice of Definition

Chapter Author: Milton Friedman, Anna Jacobson Schwartz

Chapter URL: <http://www.nber.org/chapters/c5282>

Chapter pages in book: (p. 147 - 196)

4

BASIS FOR OUR CHOICE OF DEFINITION

WE SELECTED a specific empirical counterpart to the term money after considering a limited number of alternatives corresponding to the totals in Table 1. One alternative that we did not consider nonetheless seems to us a promising line of approach. It involves regarding assets as joint products with different degrees of "moneyness" and defining the quantity of money as the weighted sum of the aggregate value of all assets, the weights varying with the degree of "moneyness" (section 1). After considering the alternatives, we chose the sum of currency held by the public plus adjusted deposits of commercial banks, both demand and time. We chose this total in preference to a narrower total including only currency and demand deposits, largely on the basis of a historical review of the meaning of commercial bank demand and time deposits in the United States and of the factors that produced changes in their relative magnitude (section 2). We chose this total in preference to broader totals on the basis of other evidence which also supported its superiority to the narrower total (section 3 and the appendix to this chapter). Further evidence that has become available since we made our choice partly supports and partly argues against it (section 4).

1. Alternatives Considered

The common procedure, and the one that we have followed, is to define money by classifying some assets as "money," and others as nonmoney assets. The quantity of money is then equal to the aggregate value of

the assets it is decided to treat as money. In practice, for any given country and period, only a small number of distinct asset categories deserve serious consideration for designation as "money," in the light of prior research and writing and the availability of data. As already noted, each such category could in principle be further subdivided, so that there is implied in listing categories an initial decision to neglect the differences among the items within the categories. For the United States, this limited set includes (in current terminology):

1. Currency (including coins and, in principle though not in practice, American Express travelers' checks)
2. Demand deposits adjusted at commercial banks
3. Time deposits at commercial banks (including the few stock savings banks in existence), which, since 1961, should be subdivided into (a) large negotiable certificates of deposits and (b) other time deposits ¹
4. Deposits at mutual savings banks and at the Postal Savings System
5. Savings and loan shares
6. Cash surrender value of life insurance policies (i.e., the stated amount which is available on demand by terminating a life insurance policy)

¹For the bulk of the period we cover it is correct to treat commercial bank time deposits as a single item, as we have done. However, the extensive development of large negotiable certificates of deposit since 1961 makes it currently desirable to divide this category into two parts: large certificates of deposit and other time deposits (see the division of col. 3, Table 1, beginning Feb. 1961). The large certificates of deposit are held primarily by firms and may be more like demand deposits or Treasury bills; the other time deposits are held primarily by individuals and are comparable to the category as a whole before 1961.

If not held to maturity, certificates are indistinguishable from other short-term money market instruments like Treasury bills and commercial paper. On the other hand, the practice of tailoring maturities to suit the needs of the persons or firms to which they are issued may make the certificates closer in practice to demand deposits than are other short-term money market instruments. We have no information on the extent of tailoring of maturities, but we know that a secondary market in certificates is in existence. Pending further information, our present inclination is to regard them as more nearly comparable to Treasury bills and commercial paper than to demand deposits.

Recent experience has reinforced the desirability of separating out the large negotiable certificates of deposit. In late 1968, market interest rates rose above the maximum rates that banks are permitted to pay on certificates of deposit under Regulation Q. The result was a rapid runoff of recorded certificates of deposit. However, this so-called "disintermediation" was largely formal. Banks found ways to pay higher rates by various devices that involved substituting other liabilities for recorded certificates of deposit. The most important device was to substitute certificates of deposit issued by overseas branches for certificates of deposit issued by head offices, the counterpart in the head offices' books being "due to branches." From Jan. 1, to July 30, 1969, certificates of deposit liabilities of U.S. banks declined \$9.3 billion; and U.S. banks' indebtedness to own branches rose \$8.6 billion.

7. Series E government savings bonds (i.e., those government bonds that are redeemable on demand for amounts stated in advance).

The distinctive characteristics of these seven items that make it plausible that they may be close substitutes in demand to their owners are as follows: (a) each has a "face" value stated in nominal monetary units and this "face" value is close to the nominal amount for which the asset can be acquired (the buying price) and is also close to the nominal amount that can be realized for the asset (the selling price); (b) in practice, despite the use of the word "time" in item 3 and the formal notice time required for items 4 and 5,² the assets can be sold within so short a period that all can be described as available on demand; (c) using the asset to finance purchases does not automatically involve incurring a matching liability. As far as we know, the only sizable sets of assets other than those listed that share these characteristics are balances at stockbrokers and policy dividends left at interest with life insurance companies (the return to policy-holders of part of the payments they have made on participating policies and annuity contracts). Perhaps these additional items should have been included in the list. Their omission simply reflects faithfulness to the literature.

It has often been argued that this list should also include "overdraft" facilities at banks or established lines of credit at banks or "borrowing power" on listed stocks and bonds and life insurance policies, or, more recently, borrowing power on credit cards. These items do share many of the characteristics of the seven listed—they are ways in which purchasing power can be acquired on demand at terms specified in advance. But they all differ in one important respect: acquiring purchasing power automatically involves assuming a matching specific liability. Realizing any of the seven items listed converts one asset into another; if the sum realized is spent in ways that do not add to assets or reduce liabilities, the result is a decline in net worth, but not in a form that involves specific obligations to make future payments. Drawing on a line of credit involves simultaneously adding in the first instance to assets and to liabilities; it means assuming obligations to make future payments.

Put differently, the sum of the seven items listed (plus the two omitted), adjusted for double-counting, can be regarded as approximately the theoretical concept $L(m)$, defined in Chapter 3 (pp. 134–

² No formal notice was required for Postal Savings System deposits. Though interest bearing, they were subject to withdrawal on demand.

135), as m tends toward zero, provided only that we limit $L(m)$ to refer solely to assets expressed in nominal values. The one apparent difference is that $L(m)$ is defined as the excess of assets over liabilities. However, for m approaching zero, demand obligations of nonbanks or, more generally, nonfinancial intermediaries, are the only ones that should be deducted. We can regard the omission of overdraft facilities, established lines of credit, and "borrowing power" on securities, life insurance policies, and credit cards as justified because the obligations established through their exercise would cancel the assets obtained—though this is not strictly valid since the maturity of the obligations is different from the maturity of the assets acquired. The only other major demand obligation over the period we cover has been call loans on stocks. In the late 1920's and early 1930's—the only time when such call loans were of considerable magnitude—most of the loans were made by nonbanks. These would have to be treated as assets as well as liabilities and would cancel each other. Such loans by banks were appreciable (ranging as high as 5 per cent of total commercial bank deposits) during those few years but not for most of the period we cover.

It may be that our neglect of overdraft facilities, lines of credit, "borrowing power," credit cards, and call loans is not the most useful procedure. That is an empirical question, on which unfortunately we have no evidence. In the absence of such evidence, we have followed the common practice in the literature of calling attention to such items and then subsequently ignoring them. More systematic attention to them would be highly desirable.

Each of the seven items listed is defined by the class or classes of institutions issuing the asset, although for currency this involves stretching the term "institutions" to include not only governments and banks but also gold or silver mines. This is a consequence of a point made earlier: the data are available mostly as a by-product of reports made for business reasons or to satisfy regulatory agencies. As noted earlier, it would be highly desirable to have data for classes of holders—particularly for individuals and business enterprises separately—but no such data exist that are anywhere nearly as comprehensive and accurate as the data for classes of issuers.

The seven categories listed can in principle be combined into 127 different combinations of one or more items. In choosing a definition we have in fact considered only four combinations:

- I: (1) plus (2)
- II: (1) plus (2) plus (3)
- III: (1) plus (2) plus (3) plus (4)
- IV: (1) plus (2) plus (3) plus (4) plus (5)

These four totals are shown in Table 1, suitably adjusted for double-counting. If we were starting over again, we would now consider also, for reasons stated above, these four combinations less item 2, and item 2 separately, with the idea of having two monetary totals, one approximating the balances of ultimate wealth-holders, and a second, the balances of business firms.

In extending these combinations beyond January 1961, we have also distinguished in Table 1 two variants of II, IIa, excluding large negotiable time certificates of deposit; IIb, including them.³ In making this distinction—which had no significance at the time we chose our definition of money—we were naturally faced with the problem of which total to regard as continuous with the earlier total II. As noted, we have decided that IIa is and hence designate that total “money.”

We restricted our attention to the four combinations listed, partly for practical reasons, partly because they seemed much the most likely candidates in light of earlier research and writing. The main practical reasons were the availability of comparable data for a long period and the fact that the main original data underlying our new estimates were for banks.

The restriction of our attention to these four combinations seems a less serious limitation to us than our acceptance of the common procedure of taking the quantity of money as equal to the aggregate value of the assets it is decided to treat as money. This procedure is a very special case of the more general approach discussed earlier. In brief, the general approach consists of regarding each asset as a joint product having different degrees of “moneyness,” and defining the quantity of money as the weighted sum of the aggregate value of all assets, the weights for individual assets varying from zero to unity with a weight of unity assigned to that asset or assets regarded as having the largest quantity of “moneyness” per dollar of aggregate value. The procedure we have followed implies that all weights are either zero or unity.

³ See footnote 1, above. Statistics on large negotiable time certificates of deposits began to be regularly reported weekly beginning June 1964. Weekly figures for earlier months of that year are given in a summary table for 1964 (see *Federal Reserve Bulletin*, Feb. 1965, p. 329). We constructed estimates beginning February 1961.

The more general approach has been suggested frequently but experimented with only occasionally.⁴ We conjecture that this approach deserves and will get much more attention than it has so far received. The chief problem with it is how to assign the weights and whether the weights assigned by a particular method will be relatively stable for different periods or places or highly erratic. So far there is only the barest beginning of an answer.⁵

Pesek and Saving implicitly suggest that the weight be defined by (or be proportional to) the ratio to the "market rate" of interest of the difference between the "market rate" and the rate paid on the asset in question. In application, the term "market rate" would be susceptible to different interpretations. In the spirit of their analysis, presumably it should be the rate on an asset like Treasury bills. If service charges on demand deposits are treated as negative interest paid, this method would currently assign a higher amount of "moneyness" (i.e., a higher weight) to demand deposits than to currency and on many occasions a negative

⁴ J. G. Gurley, *Liquidity and Financial Institutions in the Postwar Period*, Study Paper No. 14, U.S. Congress, Joint Economic Committee, Study of Employment, Growth, and Price Levels, Washington, D.C., 1960, pp. 7-8; E. J. Kane, "Money as a Weighted Aggregate," *Zeitschrift für Nationalökonomie*, No. 3, Sept. 1964, pp. 222-243; J. L. Ford and T. Stark, *Long and Short Term Interest Rates*, New York, 1967, pp. 1-3.

⁵ Roy Elliott, in an unpublished dissertation, "Savings Deposits as Money" (University of Chicago, 1964), considered a special case in which he assigned a weight of unity to currency plus demand deposits, of w to time deposits (defined as our items 3 and 4), and of zero to all other items. He estimated w by finding the value that gave the highest correlation between the weighted sum and income among states, and income plus various interest rates among time units for the country as a whole. His estimates of w varied widely, both those from cross-section data for different years (.26 for 1929, .35 for 1937, .65 for 1954) and those from time-series data for different periods.

A similar procedure has been used for time-series data by Richard H. Timberlake, Jr., and James Fortson, "Time Deposits in the Definition of Money," *American Economic Review*, Mar. 1967, pp. 190-194, and by G. S. Laumas, "The Degree of Moneyness of Savings Deposits," *American Economic Review*, June 1968, pp. 501-503. From annual data, 1897-1965, Timberlake and Fortson conclude that only for the 1930's should time deposits be included at all. From quarterly post-World War II data, Laumas concludes that commercial bank time deposits should have a weight of .69; these plus mutual and Postal Savings System deposits, an average weight of .48; and these plus savings and loan shares, an average weight of .32.

V. Karuppan Chetty, "On Measuring the Nearness of Near-Moneys," *American Economic Review*, June 1969, pp. 270-281, followed a somewhat more indirect procedure. To get an adjusted stock of money he estimated indifference curves for various combinations of different assets by calculating the hypothetical amount of currency plus demand deposits which would be equivalent in utility to the actual amount of currency plus demand deposits and, say, commercial bank time deposits (i.e., he calculated one intercept of an indifference curve). His statistical findings imply that if the weight of currency plus demand deposits is taken to be unity, the weights of commercial bank time deposits, mutual savings deposits, and savings and loan shares are all very close to unity. However, his estimates are solely for the postwar period and are dominated by trends during that period and so cannot be considered reliable. The approach nonetheless has much appeal.

weight to mutual savings deposits or savings and loan shares. We have doubts about the theoretical validity of this approach for reasons noted in Chapter 3, section 1, above. However, as Elliott shows in his dissertation, the rates of interest paid on assets should enter into the determination of the weights, though perhaps in a somewhat different way.

Robert Noble has done much experimentation in the Workshop in Money and Banking at the University of Chicago with the assignment of weights by the use of factor analysis. These experiments are unpublished because they were uniformly unsuccessful, in the sense that the results do not appear reasonable when applied to special cases for which the correct answer seems clear in advance (e.g., different kinds of currency).

From time to time, there have been vague suggestions that the elasticity of substitution can be used to assign weights. Recently, V. K. Chetty has worked out a procedure for assigning weights that is a logical application of this idea. As yet, however, the procedure is in a very early stage.⁶

In choosing among the four combinations listed, we in effect proceeded in two stages. First, we decided to regard commercial bank deposits as an aggregate rather than as separated into demand and time components; in other words we combined items 2 and 3 instead of keeping them separate. Second, we compared combinations II, III, and IV. That is, in essence, we first chose between I and II, then among II, III, and IV, though in making the tests to choose among the latter, we included combination I as a further check on our initial decision.

This procedure was forced on us by purely statistical considerations. The most important was that, for reasons explained in the appendix to Chapter 8, we do not believe it is possible to get a reasonably accurate statistical breakdown of commercial bank deposits between demand and time deposits before 1914. After 1914 it is possible, and we present a breakdown in Table 1. Hence, if we had decided that it was preferable to use combination I instead of II after 1914, we would have had either to engage in further statistical attempts to get a satisfactory breakdown before 1914, or to reconcile ourselves to the use of two monetary totals, one before and one after 1914. A much less important statistical consideration is that the use of total commercial bank deposits makes it un-

⁶ See footnote 5, above.

necessary to divide high-powered money held by banks into the parts considered as separately related to demand and time deposits in order to eliminate double-counting correctly (see Chapter 1, section 4).

These statistical considerations, especially the first, were clearly strong arguments in favor of combination II instead of I, since it is a great advantage to be able to use a single concept for the whole period under investigation. Had all other considerations been equal or even slightly in favor of combination I, the statistical considerations would have tipped the scales. However, we decided, on the basis of the material presented in the next section, that other considerations also argued in favor of treating all commercial bank deposits as a single total. In section 3, we indicate the evidence that led us to choose combination II instead of III or IV.

2. Commercial Bank Demand and Time Deposits

The issue discussed in this section is whether the total of demand-plus-time deposits at commercial banks is a more homogeneous magnitude to holders of deposits over the period we cover than demand deposits alone. The total will be more homogeneous if changes in the proportions in which it is divided can be regarded either as a result predominantly of changes in conditions of supply with little reflex influence through demand (similar, for example, to changes in the ratio of silver certificates to national bank notes) or as reflecting near-perfect substitutability in supply (similar, for example, to different denominations of notes). Demand deposits alone will be more homogeneous if changes in the division of a given total produced, let us say, by changes in conditions of supply, exert a substantial reflex influence through demand, because holders of demand deposits seek to restore their former real value and can do so only by changing income flows, not by simply converting one type of deposit into another at unchanged terms. In that case demand and time deposits would be more nearly analogous to, say, currency and equity stocks than to national bank notes and silver certificates or to different denominations of currency.

The Period Before 1914

For the period before 1914, there can be little question about the answer: the total is more homogeneous than its parts. Precisely for this

reason data on the division of the total between demand and time deposits are hard to come by. As we have noted, banks had little reason to be concerned about the relative size of demand and time deposits, since reserve requirements for the two were the same. Their incentive was to make their deposits as a whole attractive to customers by tailoring them to their needs. Bank supervisory agencies had little reason to insist on uniform classification and did not do so. What one bank called time deposits, another might call demand deposits. So-called time deposits were often transferable by check. So-called demand deposits often paid interest. The situation was clearly analogous to that of different denominations of currency; the various kinds of deposits offered by the same institutions (commercial banks) displayed near-perfect elasticity of substitution in supply; the actual proportions were determined by the requirements of depositors. The only difference from the example of denominations of currency is that the rates of exchange were not rigidly fixed, since banks paid different rates of interest on different kinds of deposits to offset differences in other costs, and these rates changed relative to one another from time to time.

The Period 1914-29

Since 1914, the situation has been very different and the correct answer is much less clear. The division between demand deposits and time deposits has been important to banks themselves for reserve purposes, and supervisory agencies have had reason to insist on a uniform classification of deposits. The importance of the distinction to banks has meant that conditions of supply have played a much more important role in determining the form of the deposits. The importance of the distinction to supervisory agencies has meant that there has undoubtedly been a more stable and systematic connection between the words used to describe the deposits and their formal characteristics. However, it is very likely that this has gone along with a good deal less stability over either space or time in the economic significance of the distinction. The relative costs to banks of supplying the two kinds of liabilities have differed greatly among groups of banks at any one time and for any one group of banks over time. As a result, banks have had, to a varying degree at different times, incentives to enhance or reduce the relative attractiveness of time deposits to their depositors, and they have done so at least in part by changing the characteristics of deposits

labeled as "time" so as to make them either more like or less like deposits labeled "demand."

The introduction in the Federal Reserve Act of lower reserve requirements for time deposits than for demand deposits gave member banks an incentive to persuade their depositors to hold time deposits rather than demand deposits. Nonmember banks initially had no such incentive, though as time went by some states altered their laws to match the federal law.⁷ The differential impact on the two classes of banks is dramatically reflected in the figures (see Table 3). From June 1919 to June 1929, demand deposits grew at only a slightly higher rate at member than at nonmember banks, while time deposits grew over three times as rapidly. From June 1919 to June 1929, time deposits rose from 34 to 47 per cent of the sum of time deposits and adjusted demand deposits at all commercial banks. For member banks alone, they rose from 26 per cent to 44 per cent; for nonmember banks, from 48 per cent only to 51 per cent.⁸ As the table shows, almost the whole of the relative growth in time deposits occurred after 1919, although the change in reserve requirements occurred in 1914. The reason, presumably, is that banks were not under reserve pressure until discount rates were raised sharply in 1920.⁹

The changed reserve requirements did not affect all classes of member banks equally. For time deposits the reserve requirement was the same for all, but for demand deposits it was 13 per cent for banks in central reserve cities, 10 per cent for banks in reserve cities, and 7 per cent for country banks. Hence the differential varied sharply. As Table 4 shows, the differential incentive clearly had the expected effect: there is a definite tendency for the spread between the rates of growth of time and demand deposits to widen as the reserve differential widens.

⁷ See Cagan, *Determinants and Effects of Changes in the Stock of Money*, NBER, 1965, Table 20, p. 186. This table shows the average of state reserve requirements weighted by the demand or time deposits of the commercial banks subject to them in each state at ten different dates from 1909 to 1950. It does not indicate the number of states with a different reserve requirement for demand and time deposits, at any date, nor the growth in that number over time.

⁸ It should be noted explicitly that these figures are for changing groups of banks. Not only did some banks go out of business and others start, but many banks shifted from nonmember to member status. Such shifts might bias the results. For example, if banks which shifted had a high ratio of time to demand deposits, it would be arithmetically possible for the ratio for all member banks to rise even though every bank separately had a constant ratio. However, the shift in the ratio of time deposits is so large, and deposits in banks shifting so small, that it seems most unlikely that data for a stable group of member banks would differ much from those in Table 3.

⁹ See *A Monetary History*, p. 209.

TABLE 3

Average Annual Rates of Growth of Demand and Time Deposits at Member and Nonmember Banks, and Time Deposits as a Fraction of Total Deposits Adjusted,^a 1915-29
(per cent)

Period and Class of Deposit	Class of Banks		
	Member	Nonmember	Total
<i>Average Annual Rates of Growth</i>			
June 1915-June 1919			
Adjusted Demand	22.3	0.2	13.4
Time	29.4	6.6	14.8
June 1919-June 1929			
Adjusted Demand	2.9	2.0	2.6
Time	11.2	3.4	7.8
June 1915-June 1929			
Adjusted Demand	8.4	1.5	5.7
Time	16.4	4.3	9.8
<i>Time as Fraction of Total Deposits Adjusted^a</i>			
June 1915	20.7	41.6	33.0
June 1919	25.7	48.0	34.2
June 1929	44.4	51.4	46.6

^aOther than interbank and U.S. government deposits.

Source: All banks, from *All-Bank Statistics*, pp. 36, 60; member banks, from *Banking and Monetary Statistics*, p. 73; nonmember banks, by subtraction.

TABLE 4

*Average Annual Rates of Growth of Demand and Time Deposits
at Three Reserve Classes of Member Banks, June 1919–June 1929
(per cent)*

Reserve Class of Member Banks	Rate of Growth		Spread Between Rates of Growth of Demand and Time Deposits	Percentage Point Difference Between Reserve Requirements on Demand and Time Deposits
	Demand Deposits Adjusted	Time Deposits		
Central reserve				
city	3.0	17.0	14.0	10
Reserve city	3.7	14.1	10.4	7
Country	2.0	9.1	7.1	4

Source: *Banking and Monetary Statistics*, pp. 81, 87, 93, 99.

The devices by which the banks affected the ratio of time to demand deposits were fairly straightforward. As we noted in *A Monetary History*, "banks increased the differential between interest paid on the two kinds of deposits and offered services in connection with time deposits designed to assimilate them to demand deposits."¹⁰

How great an inducement did member banks have to offer their depositors to achieve such a dramatic shift in the proportion of time to demand deposits? Were depositors largely passive and easily induced to switch or were they highly resistant? Unfortunately, data on rates of interest paid by member banks on various classes of deposits are available only beginning 1927, and for insured nonmember banks only beginning 1934, so a precise answer is impossible. However, the data available are sufficient to permit an unambiguous answer.

The average rate paid by all member banks on all deposits is available from 1919 on (Table 5). It varied only from 1.81 to 2.06 per cent from 1919 to 1929 despite a rise in the ratio of time to demand deposits ad-

¹⁰ *A Monetary History*, p. 276. See *ibid.*, pp. 276–277, for evidence from Federal Reserve documents about the tendency and about Federal Reserve concern.

justed from .35 to .80, and despite a rate of interest on time deposits at the end of the period that was nearly three times as high as on demand deposits. The variations in the average rate paid are clearly related to variations in the rate earned on assets. However, if allowance is made for the rate of interest earned, the general trend over the period is upward; interest earned is lower in 1927–29 than in 1919–21, but interest paid is higher. Clearly, then, there was a rise in the average rate paid that can be interpreted as the inducement offered to depositors to shift from demand to time deposits.

The rise in average rate paid was sharpest from 1919 to 1921, when the ratio of time deposits to demand deposits adjusted also rose most rapidly. But the rise in those years as well as over the period as a whole was so moderate that it does little violence to the facts to describe the figures as showing a constant average rate of return to depositors over the period on the whole of their deposits.

The relatively constant average rate presumably conceals a widened differential between separate rates paid on time and on demand deposits—the rate must have risen on time deposits and fallen on demand deposits, with the rise in the rate on time deposits adding more to interest payments than the fall in the rate on demand deposits subtracted. But even this shift could not have been large. At the extreme, both rates could have been 1.81 in 1919, and the rate on time deposits could have risen to 3.41 by 1929 and on demand deposits fallen to 1.23. But this is a drastic overstatement since we know that rates were considerably higher on time deposits than on demand deposits in 1919. Another indication of the mildness of the shift is provided by applying the 1929 rates to the amounts of deposits of each class in each year. The hypothetical average rate thus obtained differs only slightly from the actual rate (Table 5, column 6) and rises only slightly more.

These rates of return summarize the pecuniary return that depositors received and show that it was roughly constant per dollar of total deposits. However, a major return from bank deposits is nonpecuniary—the transfer of funds. The expenses incurred for this purpose explain why banks pay a lower rate on deposits transferable by check than on other deposits, and the value of the services explains why depositors are willing to accept a lower rate. One measure of the quantity of nonpecuniary services rendered is the volume of debits to bank accounts per dollar of deposits (“turnover”). Unfortunately, we have accurate

TABLE 5

*Interest Rates Earned and Paid by Member Banks and Ratio of Their
Time to Demand Deposits Adjusted, 1919-29*

Year	Interest Rate Earned on Loans and Investments (1)	Interest Rate Paid on			Hypothetical Average Rate on All Deposits Based on 1929 Rates on Different Classes of Deposits (6)	Ratio of Time to Demand Deposits Adjusted (7)
		All Deposits (2)	Demand Deposits (3)	Time Deposits (4)		
1919	5.68	1.81			1.73	.35
1920	6.29	1.86			1.81	.43
1921	6.32	2.01			1.88	.51
1922	5.84	2.05			1.91	.54
1923	5.69	2.01			1.95	.61
1924	5.52	2.00			1.97	.64
1925	5.45	1.99			1.99	.66
1926	5.50	2.00			2.00	.70
1927	5.24	2.03	1.19	3.37	2.04	.75
1928	5.40	2.06	1.23	3.36	2.07	.81
1929	5.70	2.05	1.23	3.41	2.06	.80

data only for weekly reporting member banks, not for all member banks. Table 6 summarizes turnover figures for the former, separated into banks in New York—where financial transactions make the turnover much higher than elsewhere—and in 100 other leading cities. For each category of banks the table gives turnover calculated in two ways: per dollar of demand plus time deposits and per dollar of demand deposits only.

The figures show an initial sharp drop in turnover. Undoubtedly this is a reflection of the shift from the inflationary boom of 1919–20 to the sharp contraction of 1920–21—since turnover typically varies cyclically. Thereafter all the turnover figures tend to rise. But the striking fact for our purposes is that they rise much more drastically when calculated per dollar of demand deposits alone than per dollar of total deposits—indeed, for banks outside New York City and for total deposits turnover can be described as having remained roughly constant from 1921 to 1929.

If we view deposits as an aggregate, these figures lend themselves to the interpretation that depositors received roughly the same return in both interest received and nonpecuniary services received per dollar of total deposits. What happened was simply that the mix from which they received this return varied, more of the interest coming from deposits labeled time deposits and less from the deposits labeled demand deposits.

Notes to Table 5

Source, by Column

1. *Banking and Monetary Statistics*, pp. 72 (loans and investments) and 262 (earnings). Earnings, 1919–26, include profits on securities sold and interest on interbank balances. Earnings were divided by annual average of total loans and investments at Dec. to Dec. call dates inclusive, each Dec. weighted one-half and other call dates unity.

2–5. *Banking and Monetary Statistics*, pp. 73 (classes of deposits) and 262 (interest paid). Rates were computed by dividing interest paid by annual average of relevant deposits; annual average computed as described above for earnings.

6. Rate of interest paid in 1929 on each class of deposits (cols. 3, 4, and 5) was applied to the actual annual average of demand, time, and interbank deposits, 1919–28. The sum of the hypothetical amounts paid in each year was then divided by the sum of the three classes of actual deposits.

7. Computed from deposit figures, *ibid*, p. 73.

TABLE 6

Debits to Deposit Accounts: Ratio to Demand Plus Time Deposits and to Demand Deposits Only, Weekly Reporting Member Banks in and Outside New York City, 1919-29

(annual turnover rate)

Year	New York		Outside New York	
	Demand Plus Time Deposits	Demand Deposits	Demand Plus Time Deposits	Demand Deposits
1919	56.7	59.9	28.4	36.1
1920	56.0	60.0	26.9	37.3
1921	51.4	54.9	22.3	32.3
1922	55.3	61.8	21.3	31.1
1923	56.1	65.5	21.7	32.6
1924	56.8	66.5	20.8	31.8
1925	60.8	71.9	21.3	33.4
1926	65.2	77.8	21.3	34.3
1927	70.4	85.3	21.5	35.7
1928	85.3	106.3	22.1	37.6
1929	99.5	124.4	23.8	40.5

Source: *Banking and Monetary Statistics*, p. 254.

The labeling of the ingredients was changed, but the combined package was much the same. And only a minor increase in total return was required to induce the customers to buy the new mix, suggesting that they had no strong preference about the proportions.

For the period 1914-29 it seems nearly crystal clear that the total of commercial bank deposits is a more homogeneous category to holders and more continuous with the corresponding total in earlier years than demand deposits alone.

This conclusion is reinforced by the cyclical behavior of total deposits. Their pattern during the 1920's seems entirely consistent with the pattern of the corresponding total during earlier years.¹¹

¹¹ See also R. T. Selden, "Monetary Velocity in the United States," in Milton Friedman, ed., *Studies in the Quantity Theory of Money*, Chicago, 1956, p. 237. The conclusion is reinforced also by the behavior of velocity. The velocity of currency plus demand deposits alone rose during the 1920's. The velocity of currency plus total commercial bank deposits fell slowly, continuing the trend of earlier decades, again suggesting that this monetary total was homogeneous over time.

The Great Contraction

During the Great Contraction, time and demand deposits at commercial banks fell by roughly the same percentage—over one-third—so that the percentage distribution between them remained unchanged. Mutual savings deposits, on the other hand, actually rose—the relatively low failure rate of mutual savings banks made them an attractive haven for funds. Commercial banks were under fairly steady reserve pressure, certainly until they started to accumulate reserves in excess of legal requirements in late 1932, so that they continued to have an incentive to expand time deposits relative to demand deposits. They did not succeed in doing so, either because they had already largely exhausted the worthwhile possibilities in this direction by 1929, or because the declining interest rates and the rising bank failure rates made their task so much more difficult that the best they could do was to stay in the same place.

Interest rates earned by member banks on their loans and securities fell drastically—from 5.70 per cent in 1929 to 4.06 in 1933—and so did rates of interest paid depositors—from 2.05 per cent on all deposits to 1.07 per cent (Table 7). The decline in the rate paid was smaller in absolute size than in the rate earned, the difference reflecting the pressure on other costs and on profits, for the most part the latter. Rates paid fell on both demand and time deposits, on time deposits from 3.41 per cent in 1929 to 2.74 in 1933, on demand deposits from 1.23 per cent in 1929 to 0.28 in 1933. The decline was slightly greater for demand deposits, so that the differential rose a trifle. Service charges on demand deposits—for which there are no data for this period—may have been imposed or may have risen. But this could hardly have affected significantly the main point—that the relative conditions of supply of time and demand deposits at commercial banks did not change appreciably during 1929–33.

Turnover fell drastically both for demand plus time deposits and for demand deposits only (Table 7)—a reflection of the business contraction and the associated decrease in velocity—whether measured for currency plus demand deposits or for currency plus total commercial bank deposits.

All in all, on the main issue of this section, these considerations suggest that the conclusion reached for 1914–29 holds for 1929–33 as well, except that for the Great Contraction not only the total of time and de-

TABLE 7

*Interest Rates Earned and Paid by Member Banks, and Ratio of Their Time to Demand Deposits Adjusted;
Debits to Deposit Accounts: Ratio to Demand Plus Time Deposits and to Demand
Deposits Only, Weekly Reporting Member Banks, 1929-33*

Year	Interest Rate Earned on Loans and Invest- ments (1)	Interest Rate Paid on			Ratio of Time to Demand Deposits Adjusted (6)	Annual Turnover Rate, New York			Annual Turnover Rate, Outside New York				
		All Deposits (2)		Demand Deposits (3)		Interbank Deposits (4)		Demand Plus Time Deposits (7)		Demand Plus Time Deposits (8)		Demand Plus Time Deposits (9)	
		Time Deposits (5)	Time Deposits (5)	Time Deposits (5)		Time Deposits (5)	Time Deposits (5)	Time Deposits (5)	Time Deposits (5)	Time Deposits (5)	Time Deposits (5)	Time Deposits (5)	Time Deposits (5)
1929	5.70	2.05	1.23	1.77	3.41	3.41	.80	99.5	124.4	23.8	40.5		
1930	5.15	2.03	1.17	1.63	3.41	3.41	.83	61.3	77.0	19.8	33.8		
1931	4.62	1.67	.79	1.18	3.09	3.09	.83	45.0	54.7	16.4	28.6		
1932	4.62	1.52	.64	1.01	3.01	3.01	.79	31.7	37.6	13.6	23.9		
1933	4.06	1.07	.28	.40	2.74	2.74	.68	29.7	34.8	13.5	22.4		

Source: Cols. 1-6, same as for Table 5; cols. 7-10, same as for Table 6.

mand deposits at commercial banks, but each component separately, was a homogeneous magnitude.

On an issue to be considered later, the rise in mutual savings deposits raises the possibility that, for this period, commercial bank deposits plus mutual savings deposits may be more continuous with the corresponding total before 1929 than are commercial bank deposits alone.

The Period 1933-45

After the Great Contraction, a number of developments, all on the supply side, affected, for the rest of the 1930's, the significance of the division between demand and time deposits at commercial banks: the emergence of large excess reserves, the prohibition of the payment of interest on demand deposits, and the imposition of a maximum rate that could be paid on time deposits.

The emergence of large reserves in excess of legal requirements after 1932 presumably reduced the importance to banks of the differential reserve requirement for demand and time deposits. However, banks accumulated excess reserves, we believe, primarily because their experience from 1929 to 1933 led them to regard the Federal Reserve as an undependable source of funds to meet unexpected drains; and so they felt the need to provide their own "prudential" reserves by accumulating cash in excess of required reserves.¹² Hence they still had an incentive to reduce required reserves, and therefore the differential requirements remained important to them. The rises in reserve requirements imposed in 1936 and 1937 and only partly rescinded in 1938 raised requirements against both demand and time deposits by roughly the same percentage. This had the effect of increasing the absolute differential between them.

The large excess reserves were almost surely the most important factor on the side of supply from 1932 to 1940, and they appear to have had the effect one might expect: time deposits at commercial banks fell sharply relative to demand deposits adjusted, from three-quarters of demand deposits to less than one-half. However, there is no very close connection between the size of the excess reserves in different groups of banks and the extent of the decline in time deposits. Hence, we cannot be sure that the decrease in time deposits was related to the increase in excess reserves. After 1940, excess reserves fell to negligible

¹² *A Monetary History*, pp. 449-462.

TABLE 8

*Interest Rates Earned and Paid by Member Banks and Ratio of
Their Time to Demand Deposits Adjusted, 1933-45*

Year	Interest Rate			Differential Between Demand and Time De- posit Rates (4)	Ratio of Time to Demand Deposits Adjusted (5)
	Earned on Loans and Investments (1)	Paid on Time Deposits (2)	Paid on Demand Deposits (service charges treated as nega- tive interest) (3)		
1933	4.06	2.74	.14	2.60	.68
1934	3.76	2.55	-.09	2.64	.63
1935	3.35	2.02	-.13	2.15	.56
1936	3.19	1.70	-.14	1.84	.52
1937	3.18	1.58	-.17	1.75	.52
1938	3.15	1.51	-.21	1.72	.54
1939	3.07	1.39	-.21	1.60	.48
1940	2.96	1.25	-.20	1.45	.43
1941	2.66	1.14	-.18	1.32	.38
1942	2.50	1.05	-.16	1.21	.33
1943	1.88	.88	-.12	1.10	.29
1944	1.87	.87	-.12	.99	.31
1945	1.20	.86	-.11	.97	.35

Source: Cols. 1-3 and 5: through 1941, same as for Table 5; thereafter, *Member Bank Call Report*, Board of Governors of the Federal Reserve System, is the source of loans and investments and deposits, and *Supplement to Banking and Monetary Statistics, Section 6, Bank Income*, Board of Governors of the Federal Reserve System, Dec. 1966, p. 6, is the source of income earned on loans and investments and service charges on deposits. Beginning 1942, "other charges on loans" are shown separately and were included with other income earned on loans and investments in calculating the rate of interest shown in col. 1. Col. 4: col. 2 minus col. 3.

levels and have remained small since. Whatever effect this factor might have had in the 1930's, it was of no importance thereafter.

The prohibition of the payment of interest on demand deposits enacted in the Banking Acts of 1933 and 1935 might be expected to have mixed effects. Because banks were protected from price competition in respect of demand deposits but not time deposits, the banks became more eager to attract demand deposits. By the same token, the prohibi-

tion made it more difficult for banks to attract demand deposits, since they could offer only nonpecuniary inducements, and a widening of the difference in pecuniary returns would make the two categories more distinct for depositors. For the 1930's, none of these effects was of appreciable significance. Market rates of interest were so low that commercial banks offered low rates on time deposits and, even without the legal prohibition, would have paid negligible interest on demand deposits. The legally fixed ceiling was, as it were, above the market price.

This is shown clearly in Table 8, which gives the rates of interest earned and paid by member banks, 1933-45. This is the first period for which service charges on demand deposits are quantitatively significant, as well as the first for which separate data on them are available. Service charges have been subtracted from interest paid on demand deposits—of which there was a small and declining amount reported through 1937—to give the net yield on demand deposits. From 1934 on, this net yield was negative.

In order to achieve the reduction in time deposits that banks appear to have desired after 1933 because of their large excess reserves, they had to induce depositors to alter the proportions and, as Table 8 shows, they did so. The differential in favor of time deposits, which was 2.60 percentage points in 1933, fell to 1.32 by 1941. Again, depositors appear to have been very sensitive to the terms offered. A decline in the differential by about one percentage point was accompanied by a decline in the ratio of time to demand deposits adjusted from two-thirds to two-fifths.

The downward trend in the differential continued throughout the war years, though the ratio of time to demand deposits adjusted fell through 1943 only and then rose to 1945, nearly reversing the earlier wartime decline. This reversal probably reflects a shift in public preferences as total liquid asset holdings rose and as the low level of rates on time deposits was accepted as part of a structure of interest rates expected to persist.

The Postwar Period

Prohibition of the payment of interest on demand deposits became more important after World War II, when rising market interest rates produced rises in the rates paid on time deposits. In the absence of the prohibition, the rising market rates would have raised the rates

paid on demand deposits. Instead, the banks were driven to devising indirect means of paying interest on demand deposits, mostly through offering a variety of additional services. One device they used was to facilitate the substitutability of demand and time deposits—this time not primarily to reduce required reserves, but in order to pay interest on what, from the depositors' point of view, were the equivalent of demand deposits, just as in the 1920's they had done the same thing to enhance the attractiveness of time deposits. This offset to some extent, perhaps to a major extent, the dramatic widening of the differential between the pecuniary returns to time and demand deposits from 0.93 percentage points in 1946 to 4.63 percentage points in 1966.¹³

Frequently, the offset is explicit. The posted schedule of bank service charges consists of a stated charge for each item handled, less an allowance at a stated rate for each dollar of average or minimum ledger balance (or average less reserves). In a recent year the stated rate in a sample of banks ranged from 1.20 to 3.00 per cent per annum on regu-

¹³ The additional services vary widely: from making loans at favorable rates to holders of demand deposits (one reason for "compensating balances" on loans is to facilitate this form of recompensing holders of demand deposits) to providing advice on investments or, in other areas, to pushing the sales of items produced by holders of demand deposits to other borrowers, and to still other devices so varied as to defy organized description. See Albert H. Cox, Jr., *Regulation of Interest Rates on Bank Deposits*, Michigan Business Studies, Vol. XVII, No. 4, University of Michigan, 1966, p. 127.

The only component of these services that can be easily measured, even in principle, is that of check clearing and the like rendered specifically in connection with demand deposits. In a study of eighty small and medium-size member banks by the Federal Reserve Bank of Boston for 1959, total operating expenses of demand deposits were estimated at 2.31 per cent of demand deposits (Paul M. Horvitz, "A Close Look at Bank Earnings," *New England Business Review*, Federal Reserve Bank of Boston, Aug. 1959). No comparable figure is given for service charges on demand deposits, but for all member banks it was 0.38 per cent.

To derive from these figures an estimate of the contribution to the offset from these services, we need to know (a) the corresponding figure for time deposits; (b) the corresponding figures for both demand and time deposits in 1946; and (c) the change in service charges on demand deposits. The increase in the gap between the costs per dollar for demand and time deposits from 1946 to 1966 would be a measure of the increase in differential services on demand deposits; the excess of this increase over (c) would be a measure of the increase in uncompensated differential services. For all member banks, (c) is 0.28 per cent, so allowance for additional service charges is a minor factor. Unfortunately, we do not have figures for (a) and (b). On the extreme assumption that all were zero the maximum offset would be about 2 percentage points. The actual offset must be much less. Hence, if the figures for New England are reasonably representative for the United States as a whole, and if increased services offset a large part of the indirect interest differential, they have taken forms other than services directly allocable to the conduct of checking accounts.

Instead of trying to explain the change in the differential return from 1946 to 1966, we can use these figures to explain the absolute gap of 4.63 percentage points in 1966. The maximum contribution of direct operating costs to this gap would be 2.31 less service charges, or about 2 percentage points. This overestimates the contribution by the operating cost per dollar of time deposits.

lar checking and 1.50 to 4.50 per cent per annum on business checking accounts.¹⁴

Another factor that assumed importance only after the war was the maximum that the monetary authorities were authorized by the Banking Acts of 1933 and of 1935 to impose on the rates that commercial banks could pay on time deposits. The ceiling first imposed was meaningless for some years because it was well above the rates that banks were induced to pay by market considerations. However, as interest rates in general rose, the ceiling became effective, the rate of growth of commercial bank time deposits slowed down drastically, and pressure developed to raise the ceiling. When the ceiling was raised (on January 1, 1957), there was initially a sharp spurt in commercial bank time deposits. As interest rates rose further, this cycle was repeated sporadically, the ceiling being lifted again on January 1, 1962, July 17, 1963, November 4, 1964, and December 6, 1965, partly lowered on July 20, 1966, and again on September 26, 1966, and raised for selected classes on April 19, 1968, and January 21, 1970.¹⁵ Each rise followed a period of a slow rate of growth of commercial bank time deposits and ushered in a period of unusually rapid growth. The legal regulation of the rate thus clearly contributed to erratic behavior of time deposits relative to demand deposits.

Both the extraordinarily rapid growth of time deposits relative to demand deposits from 1946 to 1967, as the differential interest paid widened so dramatically, and the sensitivity of the time-demand deposit ratio to the ceiling interest rate are further testimony to the willingness of holders of deposits to change their form in response to rather modest

¹⁴ See O. S. Pugh and O. G. Wood, Jr., "Bank Service Charges in the South," *National Banking Review*, Dec. 1966, pp. 177-178; also, A. F. Jung, "Commercial Bank Charges in New York and Ontario," *ibid.*, Mar. 1965, p. 400.

¹⁵ In December 1965, the ceiling was raised only on time certificates of deposits of all maturities, the ceiling on returns to regular savings deposits remaining unchanged. On July 20, 1966, the ceiling on multiple-maturity time certificates was reduced, and on Sept. 26, 1966, the ceiling on single-maturity certificates less than \$100,000 was also reduced. On Apr. 19, 1968, single-maturity certificates of over \$100,000 were further subdivided by maturity, and the rates on maturities of sixty days and over raised. On Jan. 21, 1970, the ceiling was raised on savings deposits and eight classes of time certificates of deposit. The only classes on which the ceiling was not changed were multiple-maturity certificates of less than ninety days and up-to-one-year single-maturity certificates of less than \$100,000.

Since November 1964 ceiling rates applicable to time certificates of deposit have been higher than those applicable to savings deposits, except for certificates of less than ninety days (from November 1964 to December 1965 and, for multiple-maturity certificates of this maturity, again since July 1966), to which the same ceiling rate as on savings deposits applied.

incentives. The postwar changes in the ratio of time to demand deposits were larger than those that occurred earlier, but only because the changes in the incentive were also larger.

The erratic changes on the side of supply, in particular those produced by the discontinuous changes in ceiling interest rates, have made the changes in the ratio of time deposits to demand deposits more erratic as well. Undoubtedly, this means that both total deposits and demand deposits alone are less homogeneous magnitudes over time than they used to be, that both are cruder approximations to a concept that had unchanging significance to a holder of deposits. However, the continuity of the behavior of the ratio toward the forces affecting it, the major role of changes affecting conditions of supply, and the sensitivity of the response all suggest that, for the postwar as for the prewar period, total commercial bank deposits is the less imperfect of the two magnitudes.

One change that occurred toward the end of the period considered and that was referred to earlier very likely justifies a slight modification of that conclusion for the future. That change occurred in the composition of time and savings deposits held by individuals, partnerships, and corporations at commercial banks. At the end of 1960, savings deposits (which may be held only by individuals and certain nonprofit organizations and are usually evidenced by a passbook) accounted for nearly nine-tenths of total time and savings deposits held by the public at member banks; by mid-1967, the proportion had dropped to three-fifths. The remainder was about equally divided between consumer-type time deposits (savings certificates, savings bonds, other nonnegotiable certificates of deposit, and negotiable certificates in denominations of less than \$100,000), other time deposits (held mainly by business firms and other large investors in the form of marketable instruments—generally \$100,000 and over—at rates competitive with other money market instruments), and open account time deposits (evidenced by a written contract specifying terms and conditions and tailored to the needs of the depositor). A large secondary market has developed in negotiable certificates of deposit. Other time deposits held by business firms and other large investors have been growing rapidly since 1961, though they are still a minor part of total time and savings deposits held by individuals, partnerships, and corporations. They are more analogous to money market instruments than to household time deposits.

It seems likely that total commercial bank deposits less large certifi-

cates of deposit and possibly less large, open account time deposits will prove more homogeneous with the earlier total of commercial bank deposits than will the total itself. This is the reason we have given the two subtotals for the period since January 1961 in Table 1.

3. Comparison of Total Chosen with Broader Totals

The evidence presented in the preceding section argues strongly that monetary total II (currency held by the public plus all commercial bank deposits adjusted) was a more homogeneous magnitude to holders in the United States, both for the century 1867–1968 as a whole and for distinctive short periods within the century, than monetary total I (currency held by the public plus demand deposits adjusted). But that evidence gives no guidance in the choice between monetary total II and broader totals: total III, which adds deposits at mutual savings banks and the Postal Savings System, and total IV, which adds also savings and loan shares.

Total III shares with total II the practical advantage that it is available on a comparable basis for the whole period since 1867. Total IV shares with total I the disadvantage that it is available for only part of the period. However, the disadvantage of total IV on this score is much less serious. Our estimates go back further, to 1897 instead of 1914, and when they start, the total amount of savings and loan shares is only 6.7 per cent of total III, so that even fairly crude estimates for earlier years would serve to yield a conceptually homogeneous and statistically reliable total for the whole period. This consideration therefore played no role in our choice of II in preference to III and IV.

Deposits at mutual savings banks, postal savings, and savings and loan shares have clearly been assets with a different mixture of pecuniary and nonpecuniary returns than time deposits at commercial banks. During the 1920's and again in the postwar period, at least until 1962, the rate of interest paid on mutual savings deposits was about 1 percentage point higher than the rate paid on commercial bank time deposits, and the rate paid on savings and loan shares, $1\frac{1}{4}$ to $1\frac{1}{2}$ percentage points higher (Table 9).

Because the rate paid on postal savings was held constant at 2 per cent, the differential between that rate and the rate on commercial bank time deposits is a mirror reflection of the latter, ranging, in the years

covered in Table 9, from a high of 1.16 in 1946 to a low of -2.03 in 1966. The differentials between the rate on postal savings and on mutual savings deposits and savings and loan shares show a similar pattern. Postal savings have responded sensitively to these differentials: from 1900 to 1929, when the differential was negative, they never exceeded \$150 million or about 1 per cent of commercial bank time deposits. They rose rapidly during the Great Contraction; reached a peak of \$3.4 billion in 1947, a year after the highest differential recorded in Table 9; and then declined rapidly to \$300 million in April 1966, when the Postal Savings System was discontinued. Never large relative to the other items, these deposits seem most nearly comparable in their characteristics to mutual savings deposits, with which we have tended to combine them.

The differentials between the rates paid on mutual savings deposits and savings and loan shares and the rate paid on commercial bank time deposits are about the same size or smaller than the differential between the rates paid on commercial bank time and demand deposits. Given our willingness to combine commercial bank time and demand deposits, we cannot regard these differentials as disqualifying the broader total from consideration.

However, the former differentials are in some respects more significant than the differential between the rates on commercial bank time and demand deposits. In the first place, the differential for commercial bank deposits is clearly overstated by the costs of the services rendered without charge in transferring and accounting for demand deposits. If all service charges were made explicitly and separately, and explicit interest on demand deposits replaced services rendered without charge, the differential between rates paid on time and demand deposits would be drastically reduced, possibly to a very small level.¹⁶ In the second place, because commercial bank demand and time deposits are at the same institutions, explicit or implicit arrangements are possible whereby an individual holds both at the same institution, and it is mutually recognized that what matters is primarily the total in both accounts, the mix being determined to facilitate the bank's accommodation to legal reserve requirements.

Given the general tendency for rates of return on debt instruments to rise, at least for some range, with term to maturity—i.e., for there to

¹⁶ See footnotes 13 and 14, above.

TABLE 9

Differential Between Interest Rate Paid on Commercial Bank Time Deposits and on Mutual Savings Bank Deposits, Postal Savings, and Savings and Loan Shares, 1920-29, 1946-66

Year	Interest Rate Paid On			Excess Over Rate Paid on Commercial Bank Time Deposits			
	Member or Insured Commercial Bank Time Deposits (1)	Mutual Savings Deposits (2)	Postal Savings Deposits ^a (3)	Savings and Loan Shares ^b (4)	Mutual Savings Deposits (5)	Postal Savings Deposits (6)	Savings and Loan Shares (7)
1920		3.85	2.00				
1921		3.95	2.00				
1922		3.95	2.00				
1923		4.04	2.00				
1924		4.06	2.00				
1925		4.09	2.00				
1926		4.19	2.00				
1927	3.37	4.21	2.00		0.84	-1.37	
1928	3.36	4.31	2.00		0.95	-1.36	
1929	3.41	4.48	2.00		1.07	-1.41	
1946	0.84	1.57	2.00	2.36	0.73	1.16	1.52
1947	0.87	1.62	2.00	2.38	0.75	1.13	1.51
1948	0.90	1.66	2.00	2.43	0.76	1.10	1.53
1949	0.91	1.82	2.00	2.51	0.91	1.09	1.60

(continued)

TABLE 9 (concluded)

Year	Interest Rate Paid On			Excess Over Rate Paid on			
	Member or Insured Commercial Bank Time Deposits (1)	Mutual Savings Deposits (2)	Postal Savings Deposits ^a (4)	Savings and Loan Shares ^b (5)	Mutual Savings Deposits (5)	Postal Savings Deposits (6)	Savings and Loan Shares (7)
1950	0.94	1.90	2.00	2.52	0.96	1.06	1.58
1951	1.03	1.96	2.00	2.58	0.93	0.97	1.55
1952	1.15	2.31	2.00	2.69	1.16	0.85	1.54
1953	1.24	2.40	2.00	2.81	1.16	0.76	1.57
1954	1.32	2.50	2.00	2.87	1.18	0.68	1.55
1955	1.37	2.64	2.00	2.93	1.27	0.63	1.56
1956	1.58	2.77	2.00	3.02	1.19	0.42	1.44
1957	2.08	2.94	2.00	3.26	0.86	-0.08	1.18
1958	2.21	3.07	2.00	3.37	0.86	-0.21	1.16
1959	2.36	3.19	2.00	3.53	0.83	-0.36	1.17
1960	2.56	3.47	2.00	3.85	0.91	-0.56	1.29
1961	2.68	3.55	2.00	3.91	0.87	-0.68	1.23
1962	3.12	3.85	2.00	4.06	0.73	-1.12	0.94
1963	3.28	3.96	2.00	4.16	0.68	-1.28	0.88
1964	3.41	4.06	2.00	4.17	0.65	-1.41	0.76
1965	3.68	4.11	2.00	4.21	0.43	-1.68	0.53
1966	4.03	4.50	2.00	4.34	0.47	-2.03	0.31

exist liquidity premiums¹⁷—the higher rates on mutual savings deposits and the still higher rates on savings and loan shares suggest that they are held for longer term contingencies than the time deposits at commercial banks—that if they are a temporary abode of purchasing power, the “temporary” is of longer duration than for commercial bank time deposits.

Another factor differentiating these savings deposits from commercial bank time deposits is the difference in geographical spread.

Mutual savings banks have operated in only eighteen states. If deposits at such banks are a very close substitute for time deposits at commercial banks, their exclusion would impart a geographical bias to the total. On the other hand, if they are not a close substitute, their

¹⁷R. A. Kessel, *The Cyclical Behavior of the Term Structure of Interest Rates*, Occasional Paper 91, NBER, 1965, pp. 44–58.

Notes to Table 9

^aDeposits were limited to a maximum of \$2,500 per depositor.

^bData on actual dividends paid by savings and loan associations during the 1920's are not available. However, the figure mentioned in the text is supported by a survey by states, as of 1924, conducted by the American Bankers Association. Information was obtained from 42 states on the nominal rate of interest paid by the associations compared to that by banks on savings deposits (*Building and Loan Associations: A Survey*, American Bankers Association, New York, n.d.).

Source, by Column

1. 1920–29 (member bank), Table 5, col. 4. 1946–66 (insured commercial bank), FDIC, *Annual Report*, 1953–66; annual interest on deposits divided by average time deposits, Dec., June, Dec.

2. 1920–29, Raymond Goldsmith, *A Study of Savings in the United States*, Princeton, 1955, Vol. I, pp. 413, 425; estimated annual U.S. dividends paid divided by two-year average of year-end mutual savings deposits. 1946–60, *Mutual Savings Banking*, National Association of Mutual Savings Banks, prepared for Commission on Money and Credit, Englewood Cliffs, N.J. 1962, p. 87. 1961–66, *Mutual Savings Banking*, *National Fact Book*, NAMSB, May 1967, p. 29.

3. Act of June 25, 1910, as amended 39 U.S.C. 5201–5224.

4. 1946–66, *Savings and Loan Fact Book*, 1967, U.S. Savings and Loan League, pp. 58, 66; annual dividends on shares divided by two-year average of year-end value of savings and loan shares outstanding.

5. Col. 1 minus col. 2.

6. Col. 1 minus col. 3.

7. Col. 1 minus col. 4.

inclusion would impart such a bias. To determine which is the case, we computed for individual states and particular years (1915, 1929, 1950) the ratios of mutual savings bank deposits to demand deposits (call this M) and of commercial bank time deposits to demand deposits (call this T)—with only the latter, of course, having any significance in states without mutual savings banks. It was expected that T would tend to be less in mutual savings bank states than in others, but $M + T$ greater, and that whether mutual savings deposits should be combined with commercial bank time deposits would be indicated by just where in this range the value of T fell for states not having mutual savings banks. To our surprise, T itself, and therefore a fortiori $M + T$, turned out to be larger in mutual savings bank states than in others.¹⁸ This test, therefore, did not give the reasonably direct answer that had been anticipated. Comparison of different mutual savings states showed some evidence of substitutability between the two types of deposits. However, both the evidence and the indicated degree of substitutability were weak. So far as this evidence goes, it probably argues for excluding mutual savings deposits (section 1 of appendix to this chapter).

Savings and loan associations are present in all states. However, savings and loan shares are somewhat more concentrated geographically than commercial bank time deposits. In December 1966 the four states with the largest amounts of savings and loan shares (California, Illinois, Ohio, and New York) accounted for 41 per cent of the aggregate of such shares, whereas the four states with the largest amounts of commercial bank time deposits (New York, California, Illinois, and Pennsylvania) accounted for 35 per cent of the aggregate of these deposits. Hence, savings and loan shares raise somewhat the same problem of geographical bias as mutual savings bank deposits.

These general considerations, though suggestive, offer a most uncertain guide. We therefore supplemented them with a number of more systematic and comprehensive tests designed to provide a quantitative criterion. In these tests we included total I as well as broader totals to check our earlier conclusions.

¹⁸ After the event, we rationalized our results by noting that states with mutual savings banks tend to be located in the older and more developed regions of the United States. Residents of those states probably have larger accumulated capital and liquid assets than residents of states without mutual savings banks. This is supported by the evidence that such states tend to have lower interest rates than other states and to be exporters of capital.

The general idea of these tests was to determine which total was likely to yield the most stable demand function involving a small number of variables. It is generally agreed that a scale variable—income, total transactions, wealth, or a similar aggregate—is the most important single variable affecting the quantity of money demanded.¹⁹ Hence we made our tests by relating differences in the various totals for various years or spatial units to corresponding differences in income. We checked also the relation between the individual components of a total and income to assure that the items combined are substitutes, as shown by a higher correlation for the total than for the individual components.

One such test was applied to data for 1929–58 for the United States in connection with a study of the relative stability of income velocity and the multiplier.²⁰ In that study a criterion was developed for choosing among alternative definitions along the lines just described.²¹ The conclusion was that total II satisfied the criterion best.

Another test was applied to data for individual states in selected years. Since there are no data on currency holdings, by states, this test had to be restricted to deposits only.

Deposits per capita in the various states were correlated with income per capita for each of the selected years (1929, 1935, 1940, 1950, 1955, 1960). The details are given in section 2 of the appendix to this chapter. The correlation between income and demand deposits alone is decidedly lower in each year than between income and either total commercial bank deposits or commercial bank deposits plus mutual savings deposits, or the latter total plus savings and loan shares, confirming the conclusion reached in section 2, above. For 1929, 1935, and 1940 the correlations are highest for income and total commercial bank deposits, though the correlations for income and the next broader total, including mutual savings deposits, are not much lower. For 1950, 1955, and 1960, the correlations are highest for the broadest total, including savings and loan shares, though again, the correlations are not

¹⁹ We note that the concept of "most important variable" is itself a complex one.

²⁰ Milton Friedman and David Meiselman, "The Relative Stability of Monetary Velocity and the Investment Multiplier in the United States, 1897–1958," *Stabilization Policies*, prepared for Commission on Money and Credit, Englewood Cliffs, N.J., 1963, pp. 182–183 and 242–244.

²¹ The criterion was that the correlation between the total called money and national income be higher than between each of the individual components of the total and national income. Note that this is *not* the same as saying that the best total is the one that has the highest correlation with national income, though in practice it turned out that this condition was also satisfied.

much lower for income and the next narrower total, including mutual savings deposits. The correlation between each class of deposits and income is considerably lower than that between the monetary totals in which each is included and income, suggesting that the three deposit items and savings and loan shares are substitutes.

This test alone suggests that the best definition of money until World War II includes both demand deposits adjusted and commercial bank time deposits, and after World War II includes, in addition, mutual saving deposits and saving and loan shares.²²

Though this evidence was not completely unmixed, it clearly confirmed our conclusion that total II was preferable to total I, and on the whole seemed to favor II over III and IV. Hence, we settled on II as the total to which we would apply the term "money" without additional modifiers.

Evidence from cyclical behavior, though also somewhat mixed, reinforced our decision to keep mutual savings deposits separate. For some individual cycles—notably in the World War I cycle, the 1929–33 contraction, and the 1933–38 cycle—mutual and postal savings deposits behave very differently from commercial bank time deposits, which move in close harmony with demand deposits. However, in other cycles—notably in 1924–27, 1945–49, and 1949–54—savings deposits move in close harmony with commercial bank time deposits, whereas the latter move quite differently from demand deposits.

4. More Recent Evidence

We made our decision about how to define money early in the course of our research, roughly a decade ago at the present writing (1968). Since then, additional evidence bearing on the problem has become

²² In his 1964 dissertation, "Savings Deposits as Money," Roy Elliott correlated data for per capita deposits and per capita income in the various states in 1929, 1937, and 1954, using per capita demand deposits in one set of correlations, and per capita total deposits, including time deposits at commercial banks, mutual savings banks, and the Postal Savings System, in the other. The r^2 's between the logarithms of per capita income and per capita demand deposits in 1929, 1937, and 1954 are .82, .76, and .49; and between per capita income and per capita total deposits in the same years, .85, .87, and .80. To test whether mutual savings differed from other savings, Elliott, working with 1929 and 1954 data, added a dummy variable of unity for eleven states with mutual savings banks and of zero for all other states in his sample. He concluded on the basis of the test that mutual savings and other savings did not differ significantly.

available, from our own work as well as the work of others. In addition, the question of the best definition has received much more explicit attention than it had earlier—partly in response to our work, partly as a by-product of the tremendous increase in the amount of research on monetary questions.

This additional light that has been shed on the question of definition has forced us to reexamine and spell out in much greater detail than we did initially the considerations that seem to us relevant to the choice. But we have not undertaken a thorough reexamination of the question. Though some of the additional evidence, like some that we considered, argues for a different total, nothing that has come to light seemed to us sufficient to compel a reexamination of our choice. Hence we cannot say for certain, though we believe it highly likely, that if we were to face the question anew at the present time, we would come out with the same answer.

Insofar as the new evidence is adverse to our conclusion, or insofar as the scholars interpreting the evidence believe that it is, the conflict is primarily on the point on which we feel most secure: namely, our decision to treat commercial bank deposits as a single total and hence to choose total II in preference to I. And none of this new evidence seems to us anything like so conclusive as that summarized in section 2, above.

We would find it easier to be persuaded that, at least for the period after World War II, total III or IV is preferable to II. But hardly any of the additional evidence bears on this question.

In the rest of this section, we list with only brief comment the additional material that has come to our attention.

1. In studying the relation between the variability of the rate of change in money and of the rate of change in net national product, we made computations for 1915–60 for both totals I and II. The correlations were consistently higher—though not by much—for total II.²⁸

2. In exploring the possibility of defining money as a weighted sum of different asset totals, Roy Elliott estimated the weight that should be assigned to savings deposits in combining demand deposits and savings deposits. His calculations are for savings deposits defined to include not only commercial bank time deposits but also deposits at mutual savings

²⁸ See M. Friedman and A. J. Schwartz, "Money and Business Cycles," *Review of Economics and Statistics*, Feb. 1963 Supplement, p. 45, footnote 16.

banks and the Postal Savings System. He estimated the weight of savings deposits in a total where currency and demand deposits had a weight of unity as .26 in 1929, .35 in 1937, and .65 in 1954. The implications of Elliott's work are mixed. The first two results argue for the narrow total of currency plus demand deposits; the final result, for a broader total. Unfortunately, Elliott did not make any corresponding estimate for commercial bank time deposits alone.²⁴ The differences among the years are consistent with our conclusion that narrower totals may be indicated for the pre-World War II period than for the postwar period.

More recently, related calculations have been made by Timberlake and Fortson, and by Laumas.²⁵ Timberlake and Fortson interpret their results as favoring total I. Laumas' results indicate that commercial bank time deposits alone should be given a weight of .69 and other time deposits decidedly lower weights. Thus his results favor total II.

3. In a recent study of cross-sectional state data for the United States for the eleven-year period 1949-59 Edgar L. Feige argues for the narrow definition, since he finds demand and time deposits at commercial banks to be weak substitutes, with a declining degree of substitutability over time.²⁶ However valid the evidence in Feige's study for the period since 1949, it may not be valid for earlier periods, especially the 1920's. Equally important, because of the nature of his data, Feige had no evidence on currency holdings.

In a review of Feige's book Donald Hester criticized Feige's results on statistical grounds that do not appear to us persuasive.²⁷ Tong Hun

²⁴ See footnote 22, above.

²⁵ See footnote 5, above.

²⁶ *The Demand for Liquid Assets: A Temporal Cross-Section Analysis*, Englewood Cliffs, N.J., 1964, pp. 25, 29, 37, 43.

²⁷ Donald Hester, Review of *The Demand for Liquid Assets*, *Journal of Political Economy*, Aug. 1966, pp. 409-410. Hester argues that there is simultaneous equation bias because (1) income and (2) rates of return on various categories of deposits are endogenous variables whereas Feige assumes them exogenous. This criticism might be valid if Feige had constructed his regressions from aggregate data for the United States, though even then some quantitative evidence would be required to show that the bias is important.

However, Feige's basic unit of analysis is the state, not the nation. Even though nominal income in the nation can be regarded as the endogenous resultant of an exogenously determined money supply, the distribution of the total money supply among the states in any year can be regarded as an endogenously determined resultant of an exogenously determined distribution of income among the states. And, for any single year, that is what Feige's regressions examine. At most this criticism has merit for Feige's pooled regressions in which temporal variation is given scope to affect his results. However, his results for the pooled regressions are roughly the same as for the average results for individual years, suggesting that any bias on this score is minor.

Lee has published a more extensive criticism of Feige's results, involving additional computations from both Feige's and other data. We consider this in the next item, because Lee considers that his results besides contradicting those of Feige also contradict our definition.

4. Lee concludes from his own calculations that "nonbank intermediary liabilities"—by which he means deposits at mutual savings banks and savings and loan shares—"are close substitutes for money" whether money is defined as equal to our total I or our total II. He also concludes that his results "contradict" the "supposition" that "time deposits are close or more perfect substitutes for demand deposits, but other nonbank intermediary liabilities are not substitutable for demand and time deposits," which he takes to be the basis for our choice of total II over total I. "It is difficult," he says, "to reconcile their reasoning especially where savings and loan shares appear to be better substitutes for demand deposits than do time deposits."²⁸

Lee does not himself indicate which definition of money he believes his estimates to favor, but we interpret him as implicitly endorsing total IV.

He explains the difference between his own results and the results obtained by Feige as the consequence of what he regards as "an excessive use of dummy variables" by Feige.²⁹ Feige uses these variables to allow for special circumstances of particular states or regions, such as states that permit establishment of mutual savings banks and those that do not and states that contain the main financial centers of each of four regions and those that do not. As evidence that the use of dummy variables is excessive, Lee cites multicollinearity between them and other independent variables. This does suggest a real problem with the statistical stability of Feige's estimates. However, it certainly does not mean that if the special features Feige seeks to control are present, as they clearly are, correct results can be obtained by neglecting them, as Lee

The same considerations apply to rates of return. For the nation as a whole, as Hester notes, it would be surprising if supply were perfectly elastic at an exogenously determined interest rate. But, surely, that is precisely what one would expect on theoretical grounds to be true for individual states in a national financial market—just as horizontal supply curves for individual consumers of a product are entirely consistent with an inelastic supply curve for the industry as a whole.

²⁸ Tong Hun Lee, "Substitutability of Non-Bank Intermediary Liabilities for Money: The Empirical Evidence," *Journal of Finance*, Sept. 1966, pp. 441-457, quotations from p. 455.

²⁹ *Ibid.*, p. 453.

does in a regression using Feige's data (though not in one using Consumer Survey data).

In part the difference between Lee and Feige is purely verbal. At one point Lee interprets elasticities of one category of deposits with respect to the return on another (cross-elasticities, for short) of $-.75$ and $-.31$ as "consistent with the substitution hypothesis of Gurley and Shaw," despite seven other cross-elasticities in the same set of regressions ranging from $-.28$ to $+.12$ with four negative and three positive.³⁰ Feige interprets cross-elasticities of $-.55$ and $-.28$, in a comparable set of regressions, in which the seven other cross-elasticities range from $-.13$ to $+.30$ also with four negative, as indicating little substitutability and as inconsistent with the Gurley-Shaw hypothesis. Clearly the difference in the words used is vastly greater than in the statistical results.

The value of $-.75$ cited above is the largest cross-elasticity Lee finds for aggregate data. In his principal regressions for 1934-64, his cross-elasticities vary from $-.28$ to $-.58$.³¹ By most standards these would be designated inelastic responses, not interpreted as exhibiting in the words of Lee, "strong support of the Gurley-Shaw hypothesis that non-bank intermediary liabilities are a close substitute for money." Lee has succumbed to the widespread confusion between statistical and economic significance.³²

But the difference is not only verbal. In some calculations, Lee gets results that are strikingly different from Feige's.

The outstanding example is Lee's conclusion, quoted above, that "savings and loan shares appear to be better substitutes for demand deposits than do time deposits," and also better substitutes for time

³⁰ *Ibid.*, p. 455, where Lee comments on Feige's regressions without dummy variables in Table 3 on p. 454.

³¹ From much experience, we are suspicious of this regression, which is for the period 1934-64, excluding 1942-45. In such regressions, we have found that the results are overly influenced by the difference between the period 1934-41 and 1946-64, i.e., the prewar and postwar periods. The difference between the averages for these periods provides only one degree of freedom of the twenty-one or twenty-two that Lee has; yet it may account for the bulk of his correlation and dominate the regression coefficients. Before interpreting these results as he does, we would have to check the consistency of behavior within the prewar and postwar periods separately with the difference between the averages for the two periods.

³² The confusion is well illustrated by a possibly apocryphal story concerning an early experience of Egon Pearson. On the basis of a statistical examination of the results of two techniques, he is reported to have told some textile manufacturers for whom the study was done that the difference between the two techniques was significant. One of the manufacturers is said to have responded, "Young man, you tell us what the difference is, and we will tell you if it is significant."

deposits than are mutual savings bank deposits. He finds further in the set of calculations yielding these results (a recalculation of Feige's regressions without dummy variables) that demand deposits display nearly as elastic a response to the yield on savings and loan shares as to their own yield, and time deposits a much more elastic response than to their own yield. Lee gets these results for data covering the deposits of all holders of money. For such aggregates, the results are hard to accept. Over half of demand deposits are held by business enterprises. These hold next to no savings and loan shares or mutual savings bank deposits but have held nonnegligible time deposits.

Lee also presents regressions using household data from the Survey of Consumer Finances. For these, which presumably cover only household demand deposits, high cross-elasticities for demand deposits and savings and loan shares are less implausible, and in fact Lee finds much higher cross-elasticities than for the aggregate data. But these regressions also yield results that seem highly implausible, to put it mildly, on internal grounds. For example, according to the regressions, a one percentage point decline in the yield on demand deposits (i.e., a one percentage point rise in service charges expressed as a ratio to deposits) will reduce the representative household's demand deposits by \$660 and raise its holdings of time and mutual savings bank deposits (treated as one variable) by \$441 and of savings and loan shares by \$510. That is, it will raise the total of the two categories of nondemand deposits by 50 per cent *more* than it will reduce the holdings of demand deposits.

For time and mutual savings bank deposits there is no such contradiction. A one percentage point decline in their yield will, according to Lee's regressions, reduce them by \$588 and also reduce demand deposits by \$88 while raising savings and loan shares by \$101. This may be a plausible result.

But for savings and loan shares, the results are again clearly most implausible. A one percentage point decline in their yield will, according to Lee's regressions, reduce them by \$262 but will raise demand deposits by \$227 and time and mutual savings bank deposits by \$706 or the two together by more than three and one-half times the reduction in savings and loan shares.

There is clearly something fundamentally wrong with interpreting these regressions as satisfactory demand functions. Yet they are the only ones Lee presents that display high absolute cross-elasticities (-1.6

for demand deposits and -2.9 for time and mutual savings bank deposits with respect to the yield on savings and loan shares).

We conclude that Lee has grossly overstated the economic significance of his calculations and the conflict between them and both Feige's and our own findings.

In a later study, he has correlated per capita M_1 and M_2 , in real terms, with permanent per capita real income, various interest rate differentials, and the lagged dependent variable. He uses annual data for the United States for 1951-65 and interprets the results as demand equations.³³ Lee concludes that "savings and loan shares are the closest money substitutes among alternative types of assets."

This conclusion is not a valid inference from Lee's results because they confound own-elasticity and cross-elasticity. Lee measures only the response to the *difference* between the yield on the money total considered and the yield on the other assets, not the response to each yield separately.

In an unpublished paper, Feige has recalculated Lee's regressions, separating out the (negative) yield on demand deposits from the yields on other assets. For two of Lee's regressions, which gave estimates of $-.63$ and $-.66$ for the elasticity of the response of M_1 to the difference between the yield on M_1 and on savings and loan shares, Feige estimates an own-elasticity of demand for M_1 with respect to the yield on demand deposits of $-.20$ (the same in both regressions) and a cross-elasticity with respect to the yield on savings and loan shares of $-.30$ and $-.19$ —hardly impressively high cross-elasticities. For all of the thirty-six regressions Feige replicated, the own-yield absorbs most of the response that is associated with the differentials used by Lee and that he erroneously attributed to cross-elasticities.³⁴

³³ "Alternative Interest Rates and the Demand for Money: The Empirical Evidence," *American Economic Review*, Dec. 1967, pp. 1168-1179. The interest rate differentials he uses are between the yields on M_1 or M_2 and (a) on savings and loan shares, (b) on four-to-six month commercial paper, (c) on twenty-year corporate bonds, (d) on common shares (dividend yield), and (e) for M_1 , on commercial bank time deposits.

³⁴ Since this was written, two comments on Lee's December 1967 *American Economic Review* article and a reply by him have been published (Harvey Galper, "Alternative Interest Rates and the Demand for Money: Comment," and Michael J. Hamburger, the identical title, *American Economic Review*, June 1969, pp. 401-412; Lee's reply is *ibid.*, pp. 412-418). None of these items has any additional evidence on the relative merits of M_1 and M_2 , since all deal solely with regressions for M_1 . All are restricted to time series data for 1951-65. None acknowledges explicitly how slender a basis this is for any far-reaching inferences—fifteen annual or sixty highly serially correlated quarterly observations, submitted to literally dozens of multiple regressions, of which only a sample are reported (twenty-eight based on annual data, and twelve based on quarterly

5. In research on the demand for money, Karl Brunner and Allan H. Meltzer experimented with two alternative definitions of money: the narrow total of currency plus demand deposits, which they designate M_1 , and the broader total we term money, which they designate M_2 . They concluded, "Our results seem to suggest clearly that currency plus demand deposits is the more appropriate definition. More inclusive definitions of money appear to mix the effects of general and relative changes in interest rates and to obscure a part of the wealth-adjustment process."³⁵ We do not ourselves regard the evidence presented by Brunner and Meltzer as giving anywhere nearly so clear a verdict.

Brunner and Meltzer describe four sets of comparisons between two definitions of money.³⁶ They assert that three sets of comparisons (1, 3, and 4 of footnote 36) favor M_1 , in the sense of yielding smaller percentage errors of estimate for M_1 than for M_2 , and that one set of comparisons (2 of footnote 36) favors M_2 .

For one set favoring each definition (1 and 2), the figures Brunner and Meltzer cite clearly justify their assertions. However, the differences in the set favoring M_2 should receive much greater weight, since the

data), and with some reported regressions based on the fifteen annual observations containing seven independent variables, leaving at best only seven degrees of freedom! To add to the difficulty, the series have strong trends, so that the effective number of degrees of freedom is surely still smaller. Any conclusions based on such extensive manipulation of so slender a body of data must be regarded as exceedingly tentative hypotheses until tested with independent evidence. Yet the several authors show no recognition that this is the case. Galper mainly simply repeats Lee's earlier calculations but with quarterly data. His main contribution is the construction of a quarterly series of advertised interest rates on savings and loan shares by interpolation of semiannual data. Given the strong trends in the data, it is not surprising that the quarterly data give about the same results as the annual data. Hamburger separates own-elasticity from cross-elasticity and finds that this reduces appreciably the calculated elasticity attributed to savings and loan shares. He also introduces a variety of different interest rates and concludes that there is a wide variety of different assets that are equally good substitutes for M_1 . Lee disputes Hamburger's results largely on statistical grounds, but, as in the difference between him and Feige, his reported regressions differ less from Hamburger's numerically than do the words he uses to describe them. In the nineteen multiple regressions of annual and quarterly data that he reports, the highest estimated cross-elasticity with respect to the rate on savings and loan shares is $-.48$ —and this in a regression that combines own- and cross-elasticity. The highest separate cross-elasticity is $-.33$. Yet he describes these results as substantiating "the substitution hypothesis of Gurley and Shaw . . . indicating that the nonbank intermediary liabilities are close substitutes for money" (p. 417)!

³⁵ Karl Brunner and Allan H. Meltzer, "Predicting Velocity: Implications for Theory and Policy," *Journal of Finance*, May 1963, p. 350.

³⁶ (1) Between equations K3 and K4, fitted alternatively, using M_1 (the narrow definition) and M_2 (our definition); (2) between equation F2, in which M_2 is used, and equation F3, in which M_1 is used; (3) between equations W1, W2, W3, and W4, in which M_1 and M_2 are used alternatively; and (4) between equation WF2, in which M_2 is used, and equation WF3, in which M_1 is used.

equations in that set give decidedly lower percentage errors than the equations in the other and hence provide more information. For one set (3), Brunner and Meltzer do not give figures on percentage errors for both definitions, so we cannot judge their assertion. For one set which they regard as favoring M_1 (4), their assertion is not justified by the data they present.³⁷

We conclude that the evidence is by no means "clear," though if we accept as correct their interpretation of the set (3) that we cannot judge independently, it weights the scales somewhat in favor of M_1 .

6. On the basis of a comparison of growth rates of money, defined narrowly and also as we do, and of the turning points of business cycles since June 1914, the St. Louis Federal Reserve Bank has concluded that the relationship is somewhat more reliable for the narrow definition. The rate of change of time deposits did not fall before the business cycle peaks of 1920, 1923, 1937, 1953, and 1957, nor rise before business cycle troughs in 1921, 1924, 1933, and 1949. According to the St. Louis study, the reason that rates of change in money *broadly defined* lead turns in business, by much the same time spans as do the rates of change in money *narrowly defined*, is that movements of the broader definition are dominated by movements of the narrow definition. "Adding time deposits to money does not appear to fashion a variable which is more closely related to business cycle peaks and troughs but simply creates the possibility of obscuring the relationship between monetary action and economic activity. In view of the rapid growth of time deposits relative to demand deposits, the relationship between changes in the growth rate of money plus time deposits and cyclical turning points may be less in the future than in the past."³⁸

7. In a paper dealing mostly with other issues, David Laidler incidentally compared the stability of demand functions for both total I and total II, using U.S. data for 1920-60. He concluded that "the

³⁷ They give two measures of predictive performance for the whole thirty-nine-year period covered (1910-40 and 1951-58): mean absolute percentage error, and root mean square absolute per cent error. They also give the first measure for four subperiods. For the period as a whole, the mean absolute errors are 4.6 per cent for equation WF2 and 4.2 per cent for equation WF3: the root mean square errors are 4.4 per cent and 5.0 per cent. Thus the two measures differ in direction. Moreover, equation WF2 has the smaller mean error for two of the four subperiods; equation WF3 for the other two. This appears to be rather a standoff and does not seem to us to justify the authors' assertion that "a comparison of WF2 shows that . . . demand functions for money defined as M_1 are subject to smaller errors of prediction than those in which money is defined as M_2 " (*ibid.*, p. 339).

³⁸ "Money Supply and Time Deposits, 1914-1964," Federal Reserve Bank of St. Louis Review, Sept. 1964, p. 8.

stability of the demand function for money is improved by including time deposits in the definition of money."³⁹

8. In a recent study William Gibson, using U.S. data, 1947-66, computed thirty-two pairs of comparable equations expressing interest rates (or first differences of interest rates) as a function of current and prior monetary magnitudes (levels, first, or second differences), the two equations in a pair differing only in that one used M_1 as the monetary total, the other M_2 . Of the thirty-two pairs, the correlation coefficient was higher for M_1 in ten, for M_2 in twenty-one, and the same for M_1 and M_2 in one.⁴⁰

9. George Kaufman has extended the Friedman-Meiselman correlations described in section 3 above.⁴¹ He correlated quarter-to-quarter first differences of gross national product and alternative monetary totals for 1953-66 and two subperiods. This interval covers eight years subsequent to those covered in the Friedman-Meiselman correlations, though it drops some of the earlier years. In his computations for leads—ranging from money leading by four quarters to money lagging by two quarters—as well as in his synchronous observations, Kaufman covered a wider variety of monetary totals than Friedman-Meiselman.

By the criterion described in footnote 21 above, Kaufman's correlations show M_2 to be preferable to M_1 when the monetary observation leads the GNP observation by either two or three quarters, for both 1953-66 as a whole and for each of the subperiods 1953-59 and 1960-66. They show M_1 to be preferable for synchronous observations for the period as a whole but only the first of the subperiods. For leads of two and three quarters for the period as a whole and for the first subperiod, and for leads of one and three quarters for the second subperiod, totals broader than M_2 are preferable to M_2 , though by very narrow margins.⁴² Kaufman himself concludes:

³⁹ David Laidler, "Some Evidence on the Demand for Money," *Journal of Political Economy*, Feb. 1966, pp. 55-68; quotation from p. 55.

⁴⁰ "The Effects of Money on Interest Rates," unpublished Ph.D. dissertation, University of Chicago, 1967.

⁴¹ "More on an Empirical Definition of Money," *American Economic Review*, Mar. 1969, pp. 78-87.

⁴² For the period as a whole, the broader totals that are preferable are our totals III and IV, and his M_4 equal to our IV plus U.S. government savings bonds (Kaufman excludes postal savings deposits for his counterpart to our totals III and IV, including them in his M_4 ; we have neglected this minor difference between his definitions and ours). For a lead of three quarters, the correlation for our total II (M_2) is .36, for M_4 , .40; for a lead of two quarters, the corresponding correlations are .44 and .46. Kaufman also computes a still broader total, equal to his M_4 plus U.S. government marketable securities maturing within one year. Generally this is decidedly inferior to the other totals except for leads of one and two quarters for the second subperiod.

. . . defining money according to the dual criteria established by F[riedman]-M[eiselman] involves not only tests of alternative groupings of financial assets but also tests of alternative definitions over a number of lead-lag relationships with respect to income. Different components show different correlations as they are associated with income in preceding, concurrent, and later periods. A definition that includes demand and time deposits at commercial banks [our M_2] appears best at explaining income two or more quarters later. Demand deposits and currency are best at explaining income observed concurrently and one quarter later. Currency alone is the money supply concept most highly correlated with income in earlier periods. . . . [I]nclusion of savings-type deposits beyond time deposits at commercial banks . . . adds relatively little explanatory power to the definition of money. . . . [T]he evidence is generally consistent with the conclusions of F-M that an important and relatively stable relationship exists between money and income in succeeding periods, although the precise characteristic of the relationship varies with the definition of money. Only when money is defined to include currency alone is support provided for a theory relating money to earlier observations of income.⁴⁸

10. V. Karuppan Chetty (see footnote 5 above) has estimated from postwar data the weights that should be assigned to commercial bank time deposits, mutual savings deposits, and savings and loan shares in constructing a monetary aggregate as a weighted sum of components (see footnote 5 above for a brief description of his procedure). He arbitrarily assigned a weight of unity to currency plus adjusted demand deposits and estimated the weights for the other components as unity for commercial bank time deposits, 0.88 for mutual savings deposits, and 0.615 for savings and loan shares.

These results confirm our own, both in indicating that total commercial bank deposits should be included in the monetary aggregate rather than only demand deposits and that, for the postwar period, a still broader aggregate may be better yet.

However, while we believe that this approach is extremely promising, we have serious reservations about how much confidence can be placed in Chetty's specific results for two reasons. First, they are derived entirely from post-World War II data which are dominated by trends. Second, on a purely theoretical level, we believe his formulation has the defect that it makes the results depend on a strictly arbitrary choice of the time unit used in stating interest rates (see footnote 2 of Chetty's article).

⁴⁸ *Ibid.*, pp. 86-87.

Appendix to Chapter 4

EVIDENCE ON ALTERNATIVE DEFINITIONS OF MONEY

This appendix presents the evidence summarized in section 3.

1. Comparison of States with and without Savings Banks

Mutual savings banks are in existence in only a minority of the states. A comparison of states with and without mutual savings banks should shed some light on the treatment of deposits in such banks. If these deposits are regarded by their holders as essentially equivalent to—that is, as nearly perfect substitutes for—commercial bank time deposits, the total of the two in states with mutual savings banks should be comparable with commercial bank time deposits alone in other states. On the other hand, if they are regarded as very different from commercial bank time deposits and as substitutes rather for other assets such as government bonds, then commercial bank time deposits alone should be comparable for states with and without mutual savings banks. Given the differences among states in population, per capita income, and economic structure, however, the absolute amount of deposits in different states can hardly be meaningfully compared; some scale adjustment is needed. For our scale adjustment we expressed the various types of time deposits as a ratio to demand deposits; it would be preferable to use currency plus demand deposits, but, unfortunately, no data are available on the distribution of currency among the states.

These ratios are given in Table 10 for 1915, 1929, and 1950. The results were surprising to us. We had expected that the ratio of commercial bank time deposits alone to demand deposits (call this T) in states without mutual savings banks would be between the corresponding ratio for states with mutual savings banks and the ratio of commercial bank plus mutual savings deposits to demand deposits (call this $M + T$) in such states. What we had hoped for from the numerical evidence was an indication of whether T for states without mutual savings banks was closer to the one extreme or the other. In fact, in each of the three years for which the ratios were computed, the value of T alone in states with mutual savings banks tends to be higher than the value of T in states without mutual savings banks! The average ratio of commercial

TABLE 10

Ratio of Time Deposits to Demand Deposits, by States With and Without Mutual Savings Banks, 1915, 1929, 1950
 T = Time deposits in commercial banks/demand deposits; M+T = deposits in commercial banks plus mutual savings bank deposits/demand deposits

States Without Mutual Savings Banks	1915		1929		1950	
	T	M+T	T	M+T	T	M+T
Ala.	.346		.830		.316	
Ariz.	.377		.724		.318	
Ark.	.241		.609		.170	
Calif.	1.208		1.670		.886	
Colo.	.592		.742		.282	
Conn.	.211	2.902	.797	2.689	.415	1.756
Del.	.303	.898	.508	.835	.270	.529
D.C.	.358		.698		.271	
Fla.	.520		.787		.256	
Ga.	.613		.943		.295	
Idaho	.349		.691		.362	
Ill.	.650		.774		.427	
Ind.	.395	.447	.913	.969	.443	.462
Iowa	1.419		1.501		.344	
Kan.	.332		.386		.128	
Ky.	.414		.998		.211	
La.	.521		.534		.240	

(continued)

TABLE 10 (continued)

	States Without Mutual Sav- ings Banks	States With Mutual Savings Banks	1915		1929		1950	
			T	M+T	T	M+T	T	M+T
		Maine	1.694	4.315	2.551	3.973	.842	1.861
		Md.	.441	1.174	1.072	1.767	.442	.822
		Mass.	.114	1.604	.614	2.447	.266	1.437
	Mich.	Minn.	1.167		1.276		.783	
	Miss.		1.007	1.137	1.259	1.459	.553	.658
	Mo.		.481		.899		.248	
	Mont.		.460		.614		.267	
	Nebr.		.601		.977		.253	
	Nev.		.602		.758		.152	
			.604		1.146		.578	
		N.H.	.769	5.425	1.572	5.817	.831	2.910
		N.J.	.629	1.023	1.283	1.582	.878	1.114
			.432		.398		.165	
	N.M.	N.Y.	.138	.675	.356	.922	.191	.744
	N.C.		.492		.956		.385	
	N.D.		1.337		1.256		.448	
		Ohio	.773	.904	1.208	1.303	.646	.704

(continued)

TABLE 10 (concluded)

States Without Mutual Sav- ings Banks	States With Mutual Savings Banks	1915		1929		1950	
		T	M+T	T	M+T	T	M+T
Okla.		.183		.412		.962	
Ore. ^a	Ore.	.480		.891		.439	.458
	Penna.	.475	.675	1.077	1.278	.515	.688
	R.I.	.713	1.675	1.462	2.730	.775	1.464
S.C.		.952		1.248		.174	
S.D.		1.106		.913		.241	
Tenn.		.500		.859		.387	
Tex.		.127		.309		.131	
Utah		.961		1.320		.576	
	Vt.	3.361	7.053	3.795	7.005	1.748	2.709
Va.		.595		1.224		.587	
Wash. ^a	Wash.	.743		.676	.906	.433	.597
W. Va. ^a	W. Va.	.842	.864	.975		.434	
	Wisc.	1.224	1.237	1.454	1.477	.826	.835
Wyo.		.702		.781		.254	
Average	Average	.620	2.000	.882	2.326	.360	1.162
		.818		1.287		.617	

^aNo mutual savings banks in operation in Oregon, 1915 and 1929, in Washington, 1915, and in West Virginia, in 1929 and 1950

Source: *All-Bank Statistics, 1896-1955.*

bank time deposits to demand deposits in the states with mutual savings banks is .82, 1.29, and .62 for 1915, 1929, and 1950, respectively, and only .62, .88, and .36 in the other states. A glance at the figures in Table 10 shows that this is not an accident produced by one or two extreme values. Apparently there is some relationship between the presence of mutual savings banks and a high preference for time deposits whether in such banks or in others. As we suggest in the text, the fact that mutual savings banks are mostly in older and more highly developed areas may produce such a relationship.

Examination of the ratios for neighboring and reasonably similar states does not resolve the difficulty or give any clear indication of the status of mutual savings deposits. The ratios are closer together for New York and New Jersey, and for New Hampshire and Vermont, when mutual savings deposits are included than when they are excluded; on the other hand, they are closer together for Ohio and Indiana, Maryland and Virginia, when mutual savings deposits are excluded.

It is hard to know how to interpret these data. They clearly raise more questions than they answer. For our purpose, it seems perhaps more reasonable to regard the data as an argument for excluding mutual savings bank deposits than for including them. In either treatment, states with mutual savings banks make a heavier contribution to time than to demand deposits. The inclusion of mutual savings deposits makes this difference greater than their exclusion.

2. Cross-Section Correlations of Deposits and Personal Income

We can use the state-by-state data in still another way by correlating various deposit items and totals with personal income, all the variables being expressed per capita to eliminate the effect of population differences. Table 11 shows, for six selected years (1929, 1935, 1940, 1950, 1955, and 1960), correlation coefficients between personal income and demand deposits, commercial bank time deposits, mutual savings deposits, and two subtotals: (1) demand deposit plus commercial bank time deposits and (2) total 1 plus mutual savings deposits. In addition, for 1950, 1955, and 1960, Table 11 gives correlation coefficients between personal income and savings and loan shares and (3), total 2 plus savings and loan shares.

One striking uniformity is that the correlations with individual deposit components are all lower than, or (in one case only) equal to,

TABLE 11
*Correlation Between Per Capita Personal Income and
 Various Per Capita Monetary Components and Totals,
 by States, Selected Years, 1929-60*

Year	Demand Deposits (D) (1)	Commercial Bank Time Deposits (CT) (2)	Mutual Savings Bank Deposits (MSB) (3)	Savings and Loan Shares (S&L) (4)	Total 1 D+CT (5)	Total 2 D+CT+ MSB (6)	Total 3 D+CT+MSB+ S&L (7)
	1929	.91	.81	.40		.93	.91
1935	.87	.82	.50		.92	.88	
1940	.88	.82	.44		.94	.91	
1950	.77	.75	.10	.62	.9067	.9106	.9189
1955	.69	.71	.24	.54	.82	.88	.90
1960	.65	.61	.18	.88	.75	.8089	.8107

Source: (a) Per capita personal income, by states: *Personal Income by States Since 1929*, U. S. Department of Commerce, OBE, Washington, 1956, pp. 142-143; *Statistical Abstract of the U. S.*, 1962, p. 319.

(b) Demand, time, mutual savings deposits: *All-Bank Statistics, 1896-1955; Assets, Liabilities, and Capital Accounts, Commercial and Mutual Savings Banks*, Report on Call No. 53, FDIC.

(c) Savings and loan shares: *Trends in the Savings and Loan Field*, FHLBB, 1950, 1951, 1955, 1956, 1960, 1961.

(d) Population: *Current Population Reports, Population Estimates*, U. S. Bureau of the Census, Series P-25, No. 139, June 27, 1956; *Statistical Abstract of the U. S.*, 1962, p. 9.

TABLE 12
*Mean and Standard Deviation of Natural Logarithms of Per Capita Deposits and
Per Capita Personal Income, by States*

Year	Commercial				Mutual Savings			Savings and		D+CT+		Personal Income PI
	Demand Deposits D	Bank Time Deposits CT	Bank Deposits MSB	Loan Shares S&L	Bank Deposits MSB	Loan Shares S&L	D+CT MSB	D+CT+ MSB+S&L	D+CT+ MSB	D+CT+ MSB+S&L		
1929	4.8578 (0.4846)	4.7698 (0.6307)	4.2867 (1.5312)		4.2867 (1.5312)		5.5340 (0.5093)		5.6344 (0.6151)		6.3687 (0.3766)	
1935	4.5974 (0.5019)	4.2573 (0.6912)	3.9001 (2.0370)		3.9001 (2.0370)		5.1677 (0.5374)		5.2907 (0.6790)		6.0106 (0.3703)	
1940	4.9632 (0.5076)	4.4039 (0.6692)	4.2036 (1.7863)		4.2036 (1.7863)		5.4447 (0.5231)		5.5596 (0.6416)		6.2438 (0.3727)	
1950	6.1509 (0.3792)	5.1467 (0.6259)	4.6431 (1.5698)		4.6431 (1.5698)	4.2361 (0.6032)	6.4974 (0.3703)		6.5840 (0.4161)	6.6851 (0.4156)	7.2151 (0.2524)	
1955	6.2990 (0.3468)	5.3795 (0.5328)	4.8723 (1.5484)		4.8723 (1.5484)	4.9206 (0.5517)	6.6600 (0.3370)		6.7533 (0.3853)	6.9165 (0.3767)	7.4311 (0.2282)	
1960	6.3238 (0.3082)	5.6906 (0.4519)	4.8605 (1.8605)		4.8605 (1.8605)	5.4631 (0.5694)	6.7682 (0.3016)		6.8649 (0.3543)	7.1074 (0.3469)	7.6237 (0.2165)	

Note: The first entry for each year is the mean. The second entry, in parentheses, is the standard deviation.
Source: Same as for Table 11.

the correlations with totals of the components. So far as this goes, it suggests that the components are in some measure substitutes and that one of the broader totals is preferable as a concept of money to demand deposits alone. As among the totals for 1929, 1935, and 1940 the correlations are highest for the sum of demand deposits and commercial bank time deposits. For 1950, 1955, and 1960, the correlations are highest for the total that also includes mutual savings bank deposits and savings and loan shares. This supports for the pre-World War II period the total we have used, but a broader total for the post-World War II period.

The correlations for the components are roughly the same for the first three years in the table but appreciably lower for 1950, 1955, and 1960 than for the earlier years. There is a similar difference for total 1, commercial bank deposits. For total 2, which adds mutual savings deposits, only the correlation for 1960 is appreciably lower than the others. One possible explanation for these differences is the lower relative variability of personal income among states in the final three years than in the earlier three years (Table 12). The logarithmic standard deviations of personal income, in natural logarithms (these can be regarded as estimates of the coefficients of variation of the original observations), are .38, .37, .37, .25, .22, and .22 in the six years. Such a decline means that there is less of a systematic difference in personal income among states to produce systematic differences in deposits; hence the variation in deposit holdings *attributable* to income differences will tend to be smaller. Unless the other variables affecting deposit holding have also become more uniform among states, the effect is to reduce the fraction of the variation accounted for by income, and hence the correlation coefficient. For total 2, this effect appears to have been overcome, at least to some extent, by the emergence of a closer connection between that deposit total and personal income.