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Volume Title: Determinants and Effects of Changes in the Stock of Money, 1875–1960

Volume Author/Editor: Philip Cagan

Volume Publisher: NBER

Volume ISBN: 0-870-14097-3

Volume URL: <http://www.nber.org/books/caga65-1>

Publication Date: 1965

Chapter Title: The Currency Ratio

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Chapter URL: <http://www.nber.org/chapters/c1643>

Chapter pages in book: (p. 118 - 150)

THE CURRENCY RATIO

IF BANKS maintain fractional reserve ratios and convert deposits into currency upon request, as in the U.S. monetary system, the currency ratio affects the distribution of high-powered money between banks and the public and thereby helps to determine the quantity of deposits created. Except when banks suspend payments, free convertibility allows the public to maintain any ratio desired up to unity, and desired changes can be and usually are made quickly. In the United States, for the period of this study, all high-powered money held by the *nonbanking* public has been in the form of currency and vice versa; the two concepts pertain to the same quantity. Under those circumstances the currency ratio indicates the distribution of money balances between deposits and currency and also of high-powered money between banks and the public, a dual role which greatly simplifies the analysis. Until 1866, state commercial banks also issued notes,¹ clearly not high-powered money by our definition of it as money banks can use for reserves. In that period, therefore, the fraction of its money balances the public wanted at any time to hold in the form of gold coin was also an important determinant of the money stock. In general, the amounts of gold and of currency held by the public behave differently. After the retirement of state bank notes, however, the public's gold ratio was ordinarily not of great importance. Since 1934 it has been zero. The public's demand for gold was discussed briefly in Chapter 3 (under Silver Purchases). The present chapter is concerned solely with the currency ratio.

A variety of factors appears to influence the demand for currency. It is not held just to facilitate current transactions. Currency outside banks per person in the United States averaged \$164 in 1955 and \$30 in 1929. Multiplying these figures by three or four to put them on a per-household basis gives an amount that seems far above the average transactions needs of a typical family. Retail businesses probably

¹ In 1866, a prohibitive federal tax was placed on their issue. By the early 1870's nearly all had been retired.

hold but a minor part of the total. Apparently a large amount of currency is held as a store of wealth, though the nature of such holdings may have changed over the years. In the mid-1800's, currency was for many people the sole financial means of holding wealth. Since then the alternatives have greatly expanded with the growth of time and savings accounts, deposit insurance, U.S. savings bonds, pension plans, and so on. Such alternatives may have reduced currency holdings. To some wealthy individuals, however, currency stored in a safe deposit box provides secrecy—a special advantage that may have become more appealing in recent decades as estate and income tax rates have risen substantially.

The main substitute for currency as a means of payment is a checking account; and as a store of wealth, probably a savings deposit. Assuming that individuals account for most currency demand (businesses temporarily holding only what they take in through retail trade), we may express the demand in terms of the public's preferences for currency as a medium of exchange and as a store of wealth. To explain changes in the amount demanded, two sets of variables are involved, one for the transactions demand and one for the store-of-wealth demand. Two important variables in the first set might be the volume of consumer expenditures and the cost of a checking account; in the second set they might be total private wealth and the return on a savings deposit.

Since we are concerned with currency holdings relative to total money balances, the preceding variables are relevant only to the extent that they affect the demand for currency and deposits differently. Changes in the net rate of return on deposits do have differential effects on currency and deposits by inducing substitutions between them. Growth in expenditures and wealth may also help explain the differing growth rates in currency and deposit holdings. The following section on secular movements discusses these developments. Cyclical movements, taken up in the second section, appear quite different in nature.

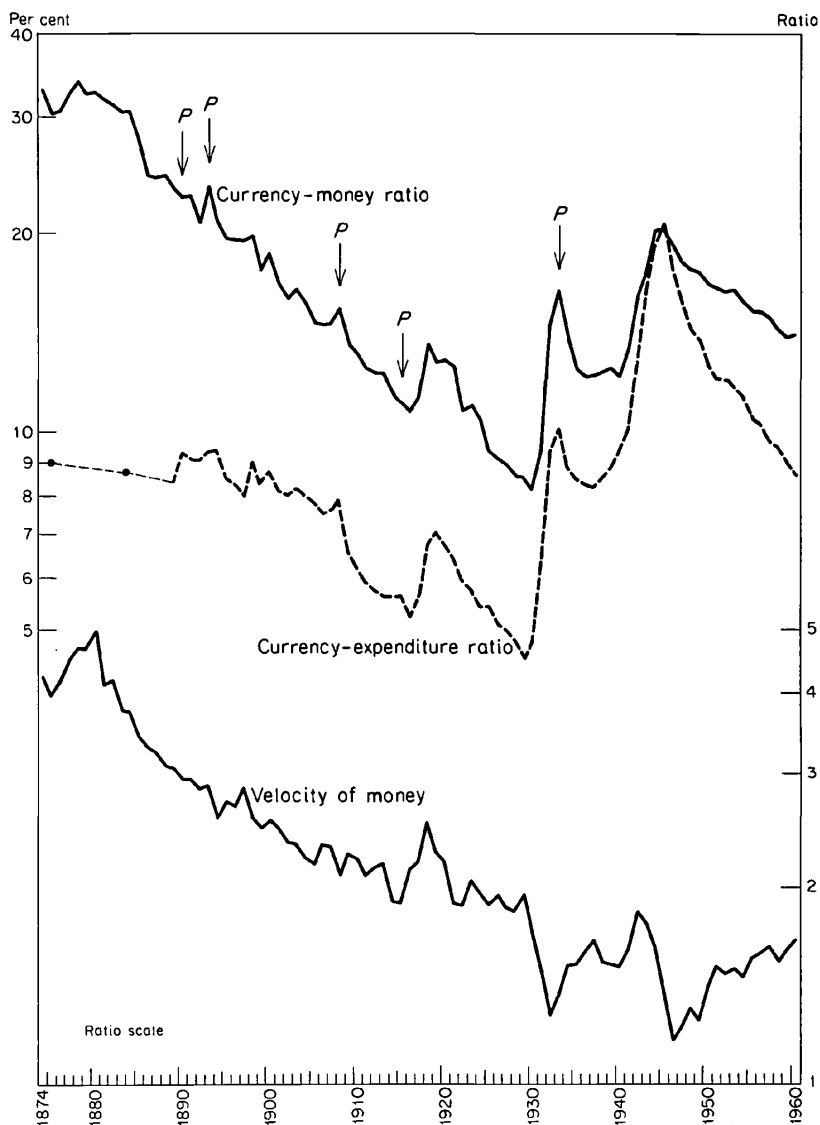
1. Secular Movements in the Demand for Currency

SHIFTS IN THE DEMAND RELATIVE TO OTHER ASSETS

The ratio of currency to the total money stock is affected by shifts between currency and deposits as well as shifts between either of these

CHART 10

*The Currency-Money Ratio, the Currency-Expenditures Ratio, and Velocity of Money,
Annually, 1874-1960
(per cent)*



Source: Currency-money ratio, same as for Chart 1, June. Currency-expenditures ratio, Table F-18. Figure for 1874 is an average for 1869-78 and figure for 1884, an average for 1879-88.

Velocity of money, ratio of net national product to money stock, from Friedman and Schwartz, *A Monetary History of the United States, 1869-1960*.

Note: P denotes years in which panics occurred.

two and other assets. To help identify the factors affecting currency demand, Chart 10 presents annual data on the currency-money ratio, currency-expenditures ratio, and income-money ratio (the familiar velocity of money, income approximated here by net national product). The middle ratio uses the annual volume of consumer expenditures as a scale factor to deflate currency held outside banks. This deflator serves as a first approximation to all factors associated with long-run growth in the economy affecting currency, through the transactions as well as the wealth demand. We cannot distinguish empirically the effects on currency demand of expenditures and of wealth, since their long-run movements are so similar.

The currency-money ratio had a downward trend from the 1870's until 1930. It rose appreciably during the early 1930's and World War II. The trend after 1930 appears slightly upward, but in view of the earlier decline the later period may be interpreted as two sharp short-run increases superimposed upon a slackening or termination of the earlier downtrend. The currency-expenditures ratio parallels these movements, though with a smaller percentage decline during the pre-1930 period and larger movements in the 1930's and 1940's. The income-money ratio also parallels the pre-1930 decline, but moves generally opposite to the other two ratios in the latter period.

Some changes in demand affect either the currency-expenditures ratio or the income-money ratio but not both, producing independent movements. Thus substitutions between currency and commercial bank deposits do not involve the total amount of money demanded, and the effect on the currency-money ratio is entirely reflected in the currency-expenditures ratio. Substitutions between commercial bank deposits and other earning assets do not involve currency demand, and the income-money ratio shows the entire effect on the currency-money ratio. Certain demand shifts, however, affect both. If both currency and deposits are substituted for nonmonetary assets, other things the same, the currency-expenditures ratio rises and the income-money ratio falls, both reflecting the same shift.² It is not always clear to

² As a formal expression, the currency-money ratio equals the product of three other ratios:

$$\frac{C}{M} \equiv \frac{C}{E} \cdot \frac{E}{Y} \cdot \frac{Y}{M},$$

where the first on the right side is currency C to consumer expenditures E ; the second, consumer expenditures to national income Y ; and the third, the income velocity

what extent currency demand takes part in such shifts, but the foregoing ratios suggest the direction of the net changes occurring, assuming that consumer expenditures and national income are appropriate scale factors. Declines in both the currency-expenditures and the money-income ratio point to substitutions of commercial bank deposits for currency and other assets—deposits are expanding and currency contracting relative to the scale factors; and conversely for increases in both ratios. A rise in the currency-expenditures ratio and decline in the income-money ratio point to gains in currency holdings at the expense of assets other than commercial bank deposits; the converse movements point to a shift from currency and perhaps deposits to other assets.

Chart 10 may thus be interpreted as follows: The decline in all three ratios up to 1930 suggests a shift in relative demand from currency and nonmonetary assets to commercial bank deposits. As indicated by the currency-expenditures ratio, the decline in currency demand accelerated after about 1904 (disregarding the 1907 panic). Currency demand rose thereafter, most sharply in response to the banking crisis of the early 1930's and wartime developments in the 1940's. The accompanying movements of the income-money ratio in those decades suggest that the increased demand for currency did not have neutral effects on the total amount of money demanded, but that the public shifted from nonmonetary assets to both currency and

of money. Even though the middle ratio on the right may be independent of the others in the long run, the other two will, as suggested, sometimes be related. Only when all three on the right move independently can changes in the left side be broken down into the three separate effects.

An argument that the currency-money ratio depends upon the velocity of money has been made by Frank Brechling (see "The Public's Preference for Cash," *Banca Nazionale del Lavoro Quarterly Review* 46, Sept. 1958). Brechling assumes that the demand for currency may be separated into demands for idle and active currency, and that these are each fractions of the demand for idle (M_1) and active (M_2) money balances, respectively. That is, $C = \alpha M_1 + \beta M_2$, whence $C/M = (\alpha M_1 + \beta M_2)/M$, where presumably $\beta > \alpha$. The currency ratio therefore depends on the distribution of money between active and idle balances, which may be measured by the velocity of total money balances.

The empirical implications of this formulation are brought out by assuming that α is virtually zero and that the ratio of active to total money balances is some function of velocity, $f(Y/M)$. Then we have $C/M = \beta f(Y/M)$. If we further assume that β is a function of the ratio of currency to consumer expenditures, we obtain a relationship similar to the preceding identity.

It is doubtful, however, that α is either small or constant, though it might be reasonably constant in the short run.

commercial bank deposits. The rise in the income-money ratio during the 1950's points to the opposite shift.

These secular movements in the relative demand for currency may be attributed to numerous developments. We may assess the contributions of three factors often cited—the net rate of return on deposits, growth in real income and wealth, and urbanization—and other special factors contributing to the wartime increases.

NET RATE OF RETURN ON DEPOSITS

The rate of interest paid on deposits net of service charges represents the attractiveness—if the rate is positive—or the cost—if negative—of holding deposits instead of currency. Do these rates behave in a way that could explain major movements in currency demand? The rates on demand and time or savings deposits have behaved differently and require separate discussion.

Demand Deposits. Although the average rate paid on all demand deposits was not inconsiderable before such payments were prohibited for member banks in 1934 and for insured banks in 1935, small accounts, which are the main substitutes for currency, have never earned interest. Before 1934, banks commonly paid interest on amounts due to other banks and the U.S. Treasury and on some large holdings of businesses and individuals. In 1927, for example, when interest payments on demand deposits were first reported separately, the average rate paid by member banks was $1\frac{1}{4}$ per cent (see Appendix E for data on rates). When paid, the typical rate was probably around 2 per cent, which implies over one-third of member bank demand deposits earned no interest. Also, in a special survey of all national banks made by the Comptroller of the Currency in 1870, one-third of the banks paid no interest on any deposits.

Service charges were not common in the 1920's and earlier, a reason large city banks and perhaps others typically did not encourage small checking accounts. When data on charges were first reported in 1933, those of member banks averaged 15 cents a year per \$100 of demand deposits. Although only small depositors paid such charges, the typical rate, when charged, was probably well below one-half of 1 per cent. Services charges have spread since the 1930's, and by 1960 the average charge, based on all publicly held demand deposits with insured banks, had risen to nearly one-half of 1 per cent. Federal

deposit insurance, introduced in 1934, has lowered losses on small accounts virtually to zero, but it does not fully compensate for the charges.³

The rise in service charges after 1933, while moderate, was of some consequence. The currency-expenditures ratio, as Chart 10 shows, reached an all-time low in 1929. It declined moderately from its high point after the 1933 panic⁴ but then started to rise again. The rise during World War II reflects special factors and is discussed later. The decline during the 1950's has erased the wartime rise but, so far, no more; by 1960 the ratio stood at about the 1939 level and seemed to be leveling off. The high level in 1939 and 1960 compared with 1929 seems partly to reflect the increase in service charges.

Whatever its effect later, the rate of return on demand deposits probably had negligible effect on currency use in the pre-1930 period, simply because the rate paid on small accounts was constant at zero and losses were generally low and not alarming, even in panic years.

Savings Deposits. These deposits⁵ have always paid interest, though the rate has varied from 5 or 6 per cent in the early 1870's to less than 1 per cent in the 1930's and 1940's. The data for commercial and mutual savings banks, discussed in Appendix E, indicate that most rates on these deposits move together. The rates generally fell after the 1870's until the turn of the century, and rose during the 1920's. Fragmentary evidence places a long-run trough in these rates in 1904. After 1930 they fell to the unusually low levels noted, reaching a trough in the second half of the 1940's. Thereafter there was a sharp rise continuing through the 1950's (see Chart 18, p. 168).

Insofar as savings deposits substitute for currency as a store of wealth, fluctuations in these rates produce opposite movements in the

³ The average annual rate of loss from 1920 to 1929 ran from 9 to 19 cents per \$100 of deposits (based on *Annual Report*, Federal Deposit Insurance Corporation, 1940, p. 66).

⁴ The increase in demand for currency from 1929 to 1933 is readily explained by a sharp rise in actual and expected losses on deposits. The demand shot up much higher than in previous panics, because the 1933 episode was the culmination of two years of ruinous bank failures. In earlier panics, suspension of payments usually came quickly, removing the obligation to pay out currency until the panic passed and allowing even most weak banks to survive.

⁵ The majority of time deposits at commercial banks are small savings accounts of individuals (see Chap. 5, "Shifts Between Time and Demand Deposits"), similar to deposits at savings banks. All such substitutes for currency are referred to here as savings deposits.

currency-expenditures ratio. This effect therefore helps explain the accelerated decline in the ratio from 1904 to 1930, the rise during the 1930's and 1940's, and the decline thereafter. The secular decline in the ratio from the 1870's to 1930, however, must reflect other factors, inasmuch as savings deposit rates fell until the turn of the century and apparently were higher in the early 1870's than at any time since. The wartime rise in currency demand seems much too steep to attribute more than a small part to the decline in these rates. However, they no doubt contributed, along with the rise in check charges, to the higher level of the currency-expenditures ratio in 1939 than in 1930.

The effect of deposit rates on the currency-*money* ratio is less certain because of parallel movements in general interest rates. A rise in deposit rates, for example, induces shifts from currency to deposits; but when interest rates at large also rise, the public may at the same time shift from demand deposits and perhaps time deposits to other assets, depending upon yield differentials. Parallel movements in the spectrum of interest rates are the rule. Although savings deposit rates move sluggishly, the differential yield on other assets generally widens less than the rise in the level of the rates, and narrows less than the decline. Therefore, shifts between deposits and other assets from this source, though they tend to moderate the effects of currency shifts on the currency-*money* ratio, probably do not reverse them. For demand deposits, however, which offered a zero return to small accounts before the 1930's and since then have imposed charges largely unrelated to general interest-rate movements, a rise in interest rates induces a shift from demand deposits to other assets but not from currency to demand deposits. With a rise in interest rates, therefore, the over-all demand for commercial bank deposits might decrease proportionately more than that for currency, producing a rise in the currency-*money* ratio, and conversely with declines in interest rates. Such opposite movements in the currency-*money* and currency-expenditures ratios have generally not occurred, however, suggesting that the demand for currency has a larger response to changes in deposit rates than the demand for commercial bank deposits has to interest-rate movements at large.

In any event, deposit rates partly explain the post-1930 movements in the currency-*money* ratio, but not the earlier secular decline.

INCOME GROWTH AND URBANIZATION

Although many factors might account for the secular decline in currency demand, only two seem capable of a sufficiently persistent and pervasive influence to be important—growth in income and wealth, and urbanization. Both could affect institutional arrangements for making payments and holding wealth, and most changes in such arrangements can be related to one or both of those two developments.

The rise in real income per capita would reduce the relative demand for currency if it enhanced the appeal of making payments by check and having a bank account, or, in technical terms, if the income elasticity of currency were less than unity. This may at first seem strange, because we customarily associate such a phenomenon with “necessities.” With higher incomes people switch from them to more expensive items; similarly, in their portfolios they might forego income to acquire lower-yielding securities that offer nonpecuniary advantages, such as liquidity. From this point of view, we should not be surprised to find a shift to money balances from higher-yielding assets when real income rises. But why a shift from currency to deposits? Before the 1930’s, a small checking account cost nothing, and a large account or a savings deposit paid interest. A shift from currency to deposits cannot be described as providing an asset with greater convenience at the expense of a lower yield. To be sure, some devices for avoiding currency may cost something (as with credit cards and checking accounts today), but this qualification is not applicable to most of the pre-1930 period except to the extent (apparently rare) that banks required a minimum balance to open a checking account.

The way out is not to argue that the income elasticity of currency cannot be less than unity but to recognize that income growth is a proxy for a host of other developments which, on balance, may work to increase the demand for deposits relative to currency. Rising real income changes our mode of life and somewhere along the way may convert practices of holding wealth and making payments from currency to deposits. Interrelated as these developments are, it may still be possible (and if possible, certainly revealing) to separate the effects on currency demand of some of them, such as urbanization, from the others, which may then be combined into an all-inclusive “income effect.”

Urbanization is a favorite explanation of the spread of banking, and it is tempting to assume that it must also have produced a substantial reduction in the use of currency. It must be remembered, however, that this factor works in two directions. First, the impersonal nature of urban trade discourages the use of checks and credit. Historical commentaries suggest that it was once much more common for laborers to buy on credit between pay periods, at least in small communities, and to settle their accumulated debts on payday. Payment of retail purchases in this way would decrease the use of currency. The growth of cities may have reduced this practice and so have increased the use of currency. To be sure, charge accounts are still widely used even in large cities, but their importance may be less than it was fifty or seventy-five years ago—the recent proliferation of credit cards to the contrary notwithstanding.

A second, quite different effect of urbanization on the demand for currency is sometimes deduced from various facts suggesting that larger bank deposits are held by individuals in cities than in country districts. The inference drawn is that urban life provides familiarity with the advantages of checking accounts and encourages the banking habit. For example, payment of wages by check is (or once was) more common in urban than in rural business. Inconveniences of banking by mail and possible inefficiencies of small banks may also have limited the spread of banking in rural communities, though only the most sparsely settled areas would seem to be unable to support one bank, or at least a branch of a nearby bank. Branch banking is illegal in many states, but it is questionable whether the prohibition would have endured if rural communities had demanded banking facilities that could be supplied economically only by branch banks.

Yet the same can be said of the use of currency. All the preceding argument says is that rural areas have less demand for all kinds of money than cities do, or at least until quite recently, because barter was prevalent in frontier areas and wages were paid partly in kind. This implies nothing about shifts in demand between currency and deposits. The question is whether migrants from rural areas to cities become familiar with banking practices and expand their use of checking facilities in place of currency. Without evidence, there is little basis on which to judge.

Combining the second effect of urbanization with the first throws the

over-all effect of this variable into doubt. These two supposed effects of urbanization on currency demand work in opposite directions, and there is no a priori basis for expecting their net effect to work one way or the other.

In an earlier study of mine on currency demand,⁶ a comparison of U.S. and British data indicated that urbanization alone might explain part but not all of the early decline in the currency-money ratio. Estimates of the British ratio of currency to consumer expenditures support the same conclusion. The British ratio had a downward trend from 1883 to 1914. While the urbanization movement in Britain declined sharply after 1900, the ratio fell 1 percentage point from 1903 to 1914 (from 7.8 to 6.8 per cent).⁷ The American ratio fell 2.6 points in that period (from 8.2 to 5.6 per cent, see Table F-18), suggesting that the larger decline here reflected a combination of continued urbanization and rising deposit rates.

Whether income growth or urbanization had the greater influence is relevant to the interpretation of later movements in the ratio. The urbanization movement declined sharply after the 1920's in the United States, while the income effect—unless it was merely a proxy for developments like urbanization or geographical expansion—has continued and therefore has influenced the ratio after 1930 as well. Later movements in the ratio are too volatile to resolve the question.

Although definite conclusions are not possible, we can narrow the possibilities. If urbanization, or some combination of like factors all of which diminished after 1930, accounts for the earlier downtrend in the currency-expenditures ratio, the future trend in the ratio will be horizontal, once the wartime rise has been fully erased and assuming no large changes in deposit rates. There is a slight indication that the ratio was leveling off in 1960 at about the 1938–39 level. On the other hand, if the ratio continues to decline, a leading explanation would be the continuing influence of income growth. In either event, we should explain the higher level in 1939 relative to 1929 by an increase

⁶ *The Demand for Currency Relative to the Total Money Supply*, Occasional Paper 62, New York, NBER, 1958 (originally published without appendix in *Journal of Political Economy*, Aug. 1958). The first part of this chapter summarizes and reinterprets the results of that study.

⁷ Currency figures are based on the sources cited for Table 2, *ibid.* Consumer expenditures are from J. B. Jefferys and D. Walters, "National Income and Expenditure of the United Kingdom 1870–1952," in *Income and Wealth*, London, International Association for Research in Income and Wealth, 1955, Table I, pp. 8–9.

in service charges on checking accounts and a decline in rates paid on savings deposits. By 1960 the factors associated solely with the war had largely disappeared, and the continued high level of the ratio relative to 1929 may be attributed to service charges, somewhat lower savings deposit rates despite their rise in the 1950's, and, since the 1940's, to evasion of income taxes, discussed further below.

FACTORS RESPONSIBLE FOR THE WARTIME RISE IN CURRENCY DEMAND

From 1939 to 1945 the currency-expenditures ratio rose 12.0 points. On the basis of the 1945 volume of consumer expenditures, \$14.6 billion of currency was hoarded in that year.⁸ By comparison, the rise from 1917 to 1919 was 1.4 points, or about \$600 million. (The British ratio also rose during both world wars.) This section discusses the rise in U.S. currency holdings during the second war.

Although the 1945 peak in the currency-expenditures ratio may be somewhat overstated because wartime controls led to illegal consumer expenditures of various kinds, which our data may in part omit, the error on this account cannot be large and indeed is probably negligible. Other factors mentioned for secular movements seem unimportant. Check charges were almost constant during World War II and rose slowly from 1946 to 1960, contributing to a currency-expenditures ratio only slightly higher after the war than earlier. The rate of return on savings deposits fell during the war and rose thereafter, which possibly explains part of the movement in currency demand. But the decline in the rate during the war was less than 1 percentage point, and it took more than a decade after the war to rise by that amount; its earlier movements were far greater (see Appendix E). The wartime peak in the currency-expenditures ratio therefore far exceeds effects attributable to deposit rates. Since the ratio declined

⁸ Calculations of that hoarding according to the currency-money ratio, which incorporates the offsetting effect of a fall in the velocity of money, put the "excess" at \$10 billion.

That "hoarding" is the right word to describe the excess currency in circulation is confirmed by the reduced rate of deterioration of large bills. Before the war, \$20 bills "normally circulated at a rate several times faster than \$100 bills judging by the rates of return of unfit currency to this bank. Currently, because such a large proportion of \$20's apparently are being hoarded, the turnover of the total amount outstanding is approximately the same as that for the \$100's" (*Monthly Review*, Federal Reserve Bank of New York, July 1948, p. 74). See also *Federal Reserve Bulletin*, Apr. 1942, pp. 312-316.

rapidly after 1945, and large increases in deposit rates came only after 1956, the wartime rise in currency demand appears to involve special factors which partly disappeared after the war.

The income-money ratio fell during, and rose after, the war. This no doubt reflected some of the same shifts in asset demand affecting currency holdings. The currency-money ratio nevertheless followed the movements in the currency expenditures ratio, but with less amplitude.

My earlier study reviewed all the factors that seem of possible importance: black-marketing, travel, changes of residence, foreign demand, and tax evasion. The first two were dismissed. Black-marketing did not lead to a rise in the amount outstanding of large-denomination bills (\$20 and up) over what the wartime inflation induced, as it would have if it had created an important demand for currency. Total miles traveled per person did not rise during the war; increased train travel was offset by limitation of automobile use by gasoline rationing and by restrictions on civilian flights.

The second two factors merit attention. Changes of residence under the impact of war were unprecedented, and all industries attracted workers of every type to new plants in southern towns and cities and to converted plants in the North and West. Many of the migrants may have been unfamiliar with money substitutes and may have found currency preferable to checking accounts in strange cities. Intending to return home at the end of hostilities they may have accumulated savings in the form of currency from their high wartime earnings.⁹ If they did, they might have gradually dishoarded their currency after the war wherever they lived, which would explain the sharp fall in the ratio after 1946. If so, the increased demand for currency in the 1940's was not at the expense of deposits, and the increase produced both the rise in the currency-expenditures ratio and part of the concurrent decline in the velocity of money.

Another factor was foreign hoarding of U.S. currency. In such times of inconvertibility and worldwide upheaval, many foreigners may have picked U.S. currency as the safest refuge for their funds. One estimate of foreign demand is \$4 billion.¹⁰ This would then

⁹ There were of course many attractive alternatives available, in particular, U.S. savings bonds, their purchase in payroll savings plans being actively encouraged. Those plans likely siphoned off much of the currency hoarded by migrants.

¹⁰ *Monthly Review*, Federal Reserve Bank of N.Y., July 1948, p. 75.

explain part of the wartime rise in the ratio and also part of its subsequent decline during the 1950's with the return of convertibility and political stability.¹¹

While it seems impossible to say definitely whether changes of residence and foreign demand alone accounted for the extra currency outstanding in 1945, by almost any reckoning they seem inadequate. Even an assumed \$4 billion due to foreign demand leaves over \$10 billion of the total \$14.6 billion to be explained by changes of residence—an unreasonably large figure. A rough estimate of migration between 1940 and 1945 is 5 million people, or at most 2.5 million families. Savings of \$10 billion during the war would mean \$4,000 for the average family, an inordinate amount for even a five-year period, when the annual gross earnings of manufacturing workers averaged less than \$2,500 even in 1945.¹² And surely not all savings were held as currency.

By implication, the fifth factor listed—tax evasion—appears to be important. Some people evade income taxes by making as many transactions as possible with currency, not reporting currency receipts. Obviously, evasion will occur on a large scale only if tax rates are high enough to create an incentive. The only widely levied tax on transactions with high rates is the income tax, though the rates have become exceptionally high only since the late 1930's. For practical reasons the possibility of evasion by use of currency is limited to professional and unincorporated business income. An estimate of the unreported amount of income from this combined source for 1945 is \$10 billion.¹³ If unreported income required a stock of currency equal to one-half of annual transactions—approximately true of total money balances in relation to national income—currency demand for this purpose (not counting currency hoards for storing wealth secretly) would be \$5 billion. Whether this estimate is too high or too low is difficult to determine.

¹¹ Another wartime factor worth a glancing reference was the deterioration of bank services due to employee shortages. Long queues at tellers' windows during peak hours led some government agencies and perhaps other employers to pay wages in currency instead of by check, for the duration.

¹² See my *The Demand for Currency*, p. 16, for discussion of the figures on migration and earnings.

¹³ C. Harry Kahn, *Business and Professional Income Under the Personal Income Tax*, Princeton for NBER, 1964, Table 6. This estimate has been revised downward from the one cited in *The Demand for Currency*.

Hoarding due to income-tax evasion might therefore account for what remains unexplained of the wartime rise in the currency-expenditures ratio. Since income taxes have not declined much from wartime levels, evasion probably accounts for little if any of the subsequent fall in the ratio—assuming that improved enforcement of taxes or new methods of evading payment have not materially reduced the use of currency for evasion. Most of the decline in the ratio immediately after the war may therefore be attributed to the disappearance of demand from foreigners and migrants, and most of the decline thereafter to the rise in deposit rates.

SUMMARY OF SECULAR MOVEMENTS

The secular decline in currency demand in the period preceding 1930 may be explained by myriad developments in pay practices. No technological revolution occurred in the cost or convenience of banking services, and presumably at any time in the nation's development the public could have had whatever banking facilities it was willing to pay for. Demand factors seem paramount, among them geographical expansion; growth of public education; shift to payment of wages by check; increasing expenditures on consumer durables requiring large payments and often credit financing; expansion of use of charge accounts of many types, including credit cards; growth of various financial means of storing wealth. All these factors might reduce currency demand. Merely enumerating the possibilities does not supply a satisfactory explanation, however, since many of them reflected declining use of currency but did not cause it. Most of them, moreover, are not independent developments. They reflect or are related to growth in real income, and this variable serves conveniently to represent all related factors that on balance reduce currency demand. Similarly, urbanization represents all such factors that became less important after 1930. It is plausible to attribute the pre-1930 decline in the currency-expenditures ratio to the steady growth in real income and of urban centers.

Rates of return on savings deposits apparently fell from 1873 to around the turn of the century, then generally rose until 1930. They were lower at the end of that period than at the beginning and so cannot account for the decline in currency demand. They may explain the accelerated decline in the currency-expenditures ratio after 1904, however.

The rise in the ratio during the first half of the 1930's can be attributed to bank failures and panic; during the second half, to the introduction of service charges on checking accounts and decline in savings deposit rates. The continued high level of the ratio in 1939, compared with 1929, despite the slackening of urbanization and spread of deposit insurance, is not readily explained in any other way. That the long-run developments reducing the use of currency until 1929 suddenly reversed direction during the 1930's is possible but doubtful.

Hoarding of currency and deposits during World War II absorbed unprecedented quantities of money and then, after the war, subsided. People laid away their high wartime earnings, and businesses their profits, in anticipation of plentiful consumer and producer goods after the war. Two reasons usually given for hoarding bank deposits were, first, that many people were not familiar with or distrusted savings institutions and bonds and, second, that low rates of return on assets invested in those ways were extremely unattractive. Whatever the reason for hoarding demand and time deposits, there was no parallel reason for hoarding currency. Judged by the subsequent decline in the currency-expenditures ratio, currency hoarding gradually disappeared after the war. The wartime rise evidently reflected temporary factors, of which changes of residence by workers and foreign hoarding of U.S. currency seem the most important. These alone were probably inadequate to explain fully the wartime increase and subsequent decline in currency, and it was suggested that a combination of tax evasion and changes in deposit rates might account for what remains unexplained. The smaller magnitude of changes in these factors in World War I would explain why the rise in currency demand was so much smaller in the first than in the second war.

The wartime rise is fascinating but is important only because its explanation holds the key to interpreting the postwar decline in the currency-expenditures ratio. The relative importance of the various factors in the postwar decline is, likewise, relevant to an interpretation of the pre-1930 downtrend and the future trend of the ratio. The ratio in 1960, after receding from its wartime peak, had the same level as in 1939, because the effect of tax evasion and rising check charges had offset the effect of rising savings deposit rates. The ratio was higher in 1960 and 1939 than in 1929 apparently because of continuing tax

evasion and higher check charges, even though rates on savings deposits were still somewhat lower in 1960 than in the 1920's.

The relatively high levels of the ratio since the 1920's suggest that the pre-1930 institutional developments reducing currency demand associated with income growth have not continued. On the other hand, they may have continued but were offset since 1930 by the other factors discussed. In that event the downtrend will reappear in the future unless there are large reductions in savings deposit rates or increases in check charges.

The post-1930 behavior of the currency-expenditures ratio has produced similar but smaller movements in the currency-money ratio because of the income-money ratio. The demands for commercial bank deposits and for currency shifted in the same directions over this period, no doubt partly for related reasons, and thus partly canceled their effects on the currency-money ratio.

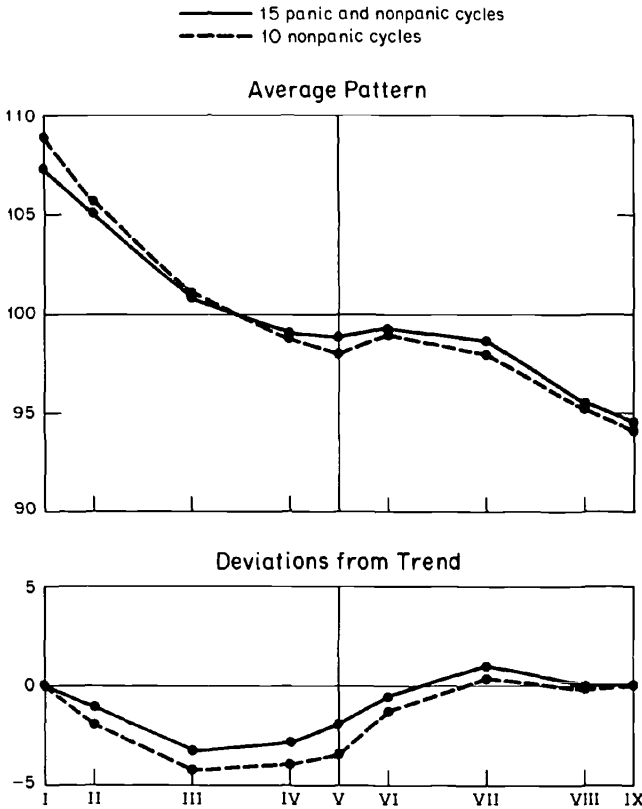
2. Cyclical Movements in the Demand for Currency

THE GENERAL PATTERN

Besides strong secular movements, the currency-money ratio also displays short-run fluctuations. Although not prominent or easy to identify in the graph of the series in Chart 1, those fluctuations were the proximate source of half the cyclical variation in the rate of change in the money stock (disregarding the offsetting movements of high-powered money in part of the post-1918 cycles). The fluctuations show up clearly in Chart 2 and, as Table 6 indicates, the contribution of this ratio to cycles in the money series is the most regular found for the three determinants. Another way to describe its behavior is by reference cycle patterns. In view of their regularity, cyclical movements in the ratio are adequately summarized by the average reference cycle patterns plotted in Chart 11. It should be emphasized that these patterns show the level of the ratio, not its contribution to the rate of change in the money stock, as in Chart 2. The solid line is an average for fifteen reference cycles. Atypical reference patterns for four cycles are excluded: the two war cycles, in which the currency-money ratio rose for special reasons examined earlier; and the 1927-33 and 1933-38 reference cycles, in which the banking panic of 1933 produced an unusually large rise in the ratio.

CHART 11

Average Pattern and Deviations from Trend of the Currency-Money Ratio for Two Sets of Reference Cycles, 1879-1954



Source: Same as for Chart 2 and Table F-1.

Note: The fifteen panic and nonpanic cycles exclude the two war cycles and the 1927-33 and 1933-38 cycles. The ten nonpanic cycles exclude four cycles omitted from the other pattern and all other panic cycles (see Table 14 for identification of panic cycles). Stages II, IV, VI, and VIII are based on the post-1908 cycles only. Trend determined by a straight line connecting stages I and IX.

The average pattern for fifteen cycles levels off relative to its trend from stage III to stage VII, more clearly shown by the deviations from trend in the lower panel of the chart. Nearly all the individual reference cycle patterns have that break in the rate of decline, though there are differences in amplitude and timing. The typical cycle in

the currency-money ratio is inverted and, adjusted for trend, has an expansion phase starting about stage III or IV and ending about stage VII. Without adjustment for trend, the expansion phase is often only a sidewise movement starting with stage IV or V. (Stages II, IV, VI, and VIII are not computed for annual data; their standings in Chart 11 are based on monthly data for the post-1908 cycles only.) Of the nine nonwar reference cycles covered by our monthly data, only four have higher levels in stage VII than in stage IV or V, and all four rise from IV to V. Of the others, most have a monthly rate of decline lower from IV to V than from I to IV. The tendency of the currency-money ratio to decline at a diminishing rate during reference expansions means that the peak in its contribution to the rate of change of the money stock occurred long before reference cycle peaks.

Banking panics, which sharply increase the demand for currency, do not account for these cyclical fluctuations in the ratio. The dash lines in Chart 11 show the average pattern and deviations from trend after excluding all panic cycles (identified later in Table 14). The two patterns are virtually the same in timing and amplitude. An average pattern excluding cycles that followed panic cycles (not shown in the chart) is also the same, indicating that the diminishing rate of decline in the ratio during reference expansions does not reflect recoveries from preceding panics. Such episodes usually had little effect on the patterns, therefore, in part because panics generally did not last long and the ratio fell rapidly afterward to a normal level, and in part for other reasons discussed below. By contrast, the 1933 panic, which forms the dividing trough for the two cycles of the 1930's and affected the behavior of the ratio to an unusual extent, was the culmination of an extended period of banking difficulties and, unlike most other panics, came at the end of the business contraction. It was therefore excluded.

Since the series in the bottom panel of Chart 11 remove the trend imperfectly, we should not be overly precise in describing the cyclical pattern. We may simply say that, even after excluding panics and their after effects, cycles in the currency ratio have an expansion phase beginning in the latter part of reference expansions and ending midway through contractions. Whether the ratio is a leading or lagging series in terms of reference dates is not clear; its behavior may be

described as roughly 90 degrees out of phase.¹⁴ It has positive or inverted conformity depending on whether one views the phasing as 90 degrees behind or ahead of reference cycles. As suggested in Chapter 6, there may in fact be a mutual relationship reflecting effects of business on the money stock together with the effects of money on business. Since the largest increases in the ratio have usually occurred from stage V to stage VII, I shall speak of the pattern as inverted.

Important differences between individual cycles can be inferred from Table 14. It gives the change per month in reference cycle relatives of each cycle from stage IV or V to stage VII—the typical period for which the downward trend is suspended and the currency-money ratio remains level or rises—and compares it with the change per month during the preceding and succeeding stages of the reference cycle. As shown in column 1, the change for that period of suspended trend was upward in only about half the cycles. Even in cycles without a rise, however, the decline was usually less than that in the other stages of the cycle, as shown by the preponderance of positive values in columns 2 and 3. Moreover, the few negative values in these two columns are fairly small, indicating that the exceptions to the typical pattern were moderate in amplitude. Indeed, the largest of the negative values, that in column 2 for the 1891–94 cycle, is spurious; it would probably be positive and not an exception if we had monthly data for that period. That cycle contains the 1893 panic, which produced the usual sharp rise in the currency-money ratio in June, well

¹⁴ To check the nature of the relation, first differences in the currency ratio were plotted on an inverted basis (to show its contribution to rates of change in the money stock positively) and compared with reference cycles. Cyclical turning points in the contribution series were selected that match reference turns, first on a negative basis (that is, peaks in the former with reference troughs, and troughs with peaks) and then on a positive basis (peaks with peaks, etc.). The period was 1877–1957 excluding wars, covering 18 reference cycles. In the first comparison, turning points in the first differences lag reference turns on the average by 2.8 months at reference peaks and 5.6 months at troughs. This comparison views the currency ratio as having positive lagging conformity to reference cycles. In the second comparison, turning points in the first differences lead reference turns on the average by 10.5 months at reference peaks and 11.1 months at troughs. This comparison views the currency ratio as having inverted leading conformity to reference cycles.

To help identify the dominant relation, standard deviations of the leads and lags were computed according to each relation. On the first comparison of reference cycles with first differences inverted, the standard deviation of lags was five months at reference peaks and thirteen months at troughs. On the second comparison, the standard deviation of leads was eleven months at both reference peaks and troughs. This evidence is therefore mixed: for reference peaks, the first basis of comparison has the more stable timing relation; for reference troughs, the second has.

TABLE 14
CHANGE IN THE CURRENCY-MONEY RATIO DURING REFERENCE CYCLES, 1879-1954

					CHANGE PER MONTH OF REFERENCE CYCLE RELATIVES			
Reference Cycle Dates ^a					Special Cycles ^b	Stages IV or V to VII, Minus the Change for:		
Trough	Peak	Trough				Stages IV or V to VII (1)	Stages I to IV or V (2)	Stages VII to IX (3)
ANNUAL DATA ^c								
Mar. '79	Mar. '82	May '85			pf	-0.1	+0.1	+0.4
May '85	Mar. '87	Apr. '88				0.0	+0.6	-0.1
Apr. '88	July '90	May '91			p	+0.1	+0.4	0.0
May '91	Jan. '93	June '94			pf	-0.5	-0.6	+0.4
June '94	Dec. '95	June '97			f	-0.1	+0.3	-0.1
June '97	June '99	Dec. '00				+0.4	+0.8	+0.8
Dec. '00	Sept. '02	Aug. '04				+0.1	+0.6	+0.4
Aug. '04	May '07	June '08			p	+0.8	+1.0	+1.4
MONTHLY DATA								
June '08	Jan. '10	Jan. '12				-0.3	+1.0	+0.5
Jan. '12	Jan. '13	Dec. '14			p	-0.2	-0.4	+0.1
Dec. '14	Aug. '18	Apr. '19			w	+1.5	+1.2	+3.6
Apr. '19	Jan. '20	Sept. '21			f	+0.4	+1.3	+1.2
Sept. '21	May '23	July '24			f	+0.1	+1.0	+0.8
July '24	Oct. '26	Dec. '27			f	-0.2	+0.3	+0.6
Dec. '27	June '29	Mar. '33			pf	+0.4	+0.5	+4.2
Mar. '33	May '37	May '38				+0.3	+1.2	+0.6
May '38	Feb. '45	Oct. '45			w	+0.4	-0.2	+0.9
Oct. '45	Nov. '48	Oct. '49				-0.1	+0.3	+0.1
Oct. '49	July '53	Aug. '54				-0.1	+0.1	+0.4
Average of nonwar cycles:								
6 panic cycles						+0.08	+0.02	+1.08(0.46) ^d
10 panic cycles and high-failure-rate cycles						+0.07	+0.30	+0.90(0.53) ^d
7 other cycles						+0.04	+0.66	+0.39

Source: Currency ratio figures same as for Chart 2 and Table F-1.

^aSome of the dates have been revised since this table was computed, but the revisions would not affect the measures significantly. (Revised reference dates are used in Table 1.)

^bMeaning of symbols:

p = panic cycles, so designated because payments were suspended or Clearing House loan certificates were issued in New York City.

f = high failure rate among commercial banks; defined as ratio of bank failures (*Historical Statistics of the United States, 1789-1945*, Bureau of the Census, 1949, Series N-135) to total commercial banks at midyear (*ibid.*, Series N-27, N-45, and N-47) above 1.5 per cent for any full year of the reference contraction. Before 1892, the ratio pertains to fiscal years and excludes private banks; thereafter, to calendar years and includes all commercial banks.

w = war cycles.

^cSemiannual data 1879-81; monthly data beginning May 1907.

^dFigures in parentheses: excluding the 1927-33 cycle.

after the date of the reference peak in January 1893. The computed currency ratio does not show this timing because the data are annual. The figure for the reference cycle peak is an interpolation of adjacent June figures. The figure for June 1893, which is high because of the panic, makes the computed level for stage V higher than the computed level for stage VII. As a result, the computed change from I to V is positive and from V to VII, negative. Such distortions were probably unimportant in the other cycles.

All sudden large increases in the currency-money ratio during peacetime have reflected banking panics, stemming from expectations that banks might suspend payments. The attempt by the public to convert deposits into currency at such times produced sharp increases in the currency ratio. All panics since the Civil War occurred during reference contractions. Four of them—in 1873, 1893, 1907, and 1933—involved suspension of payments by the banking system, though in the first three, banks remained open to handle checks that circulated through local clearing houses. Further conversions of deposits into currency were then cut off, except for partial accommodation of important and needy depositors, and the computed currency-money ratio understates the desired ratio. Hence, the figures in Table 14 for the four cycles with suspensions do not fully reflect desired changes in the currency ratio. For this table and Chart 11, a panic is interpreted broadly to include periods of financial stringency which, for our purposes, can be identified by the issue of loan certificates by the New York Clearing House to settle interbank payments.¹⁵ The certificates helped avert suspension by facilitating transfer of deposits between member banks of the Clearing House. Although the certificates were issued at the first signs of trouble in the 1873, 1893, and 1907 panics (none were issued in 1933), they did not in those panics prevent a subsequent suspension of payments.

Panics in which unauthorized note issues circulated to alleviate the "shortage" of currency had greater increases in the currency-money ratio than our figures show. There are no official estimates of those issues, and their amounts have not been included in the time series.

¹⁵ Loan certificates were backed by assets pledged by member banks of the Clearing House. Except in 1884, clearing houses in other cities also issued certificates when the New York Clearing House did. In a few unimportant instances certificates were issued in some cities but not in New York. See J. G. Cannon, *Clearing Houses* (S. Doc. 491, 61st Cong., 2d sess.), National Monetary Commission, 1910, Chap. X.

In 1893 and 1907, clearing house certificates were printed in small denominations and paid out to the public. In those two panics as well as that in 1933, scrip currencies were also issued by manufacturers and various kinds of "town councils" to facilitate payroll disbursements and retail trade. All such issues, no less than the suspension of payments by banks except during legally established state banking holidays, were illegal, but their legality was not seriously questioned by the

TABLE 15
CORRECTION OF CURRENCY-MONEY RATIO FOR UNAUTHORIZED NOTE
ISSUES IN PANICS OF 1893, 1907, AND 1933

Date of High Point in Uncorrected Currency Ratio	Currency Outside Banks (\$ millions)		Currency-Money Ratio with Unauthorized Issues (per cent)	
	Excluding Unauthorized Issues	Estimated Maximum Issue of Unauthorized Currency	Issues	
			Excluded	Included
June 1893	985	80 ^a	23.5	25.0
Jan. 1908	1,857	270 ^b	17.1	19.1
Mar. 1933	5,223	1,000 ^c	17.3	19.9

^aJohn D. Warner, "The Currency Famine of 1893," Sound Currency, Feb. 15, 1895, p. 8.

^bA. Piatt Andrew, "Substitutes for Cash in the Panic of 1907," Quarterly Journal of Economics, Aug. 1908, p. 515.

^cA rough guess from H.P. Willis and J.M. Chapman, The Banking Situation, New York, 1934, p. 35.

public or government authorities. At least no lawsuits appear to have been initiated against the offending parties. Yet their amounts were not insignificant. Table 15 cites rough estimates of the quantity of unauthorized notes circulated in 1893, 1907, and 1933, and the implied correction in the currency-money ratio. In terms of the usual cyclical fluctuations in the ratio, increases of 1.5 to 2.6 percentage points, as estimated for those three panics, are extremely large.

On the other hand, the currency-money ratio is overstated by the treatment of banks that closed rather than just suspended payments temporarily. The ratio excludes deposits at such banks and includes their vault cash in currency outside banks. A closed bank may open again, and even a bankrupt bank eventually makes good on a large fraction of its deposits. Temporarily, these funds are not available and, technically speaking, pass out of the money stock. From the holder's point of view, however, they are not all lost, and he no doubt counts some fraction of them as still part of his money balances in the

expectation of receiving them some day, even though in the meantime they cannot be spent. Most such inaccessible deposits were eventually paid off. Their total quantity was relatively minor in the pre-World War I panics, simply because failures were not extensive, but it was certainly not minor in 1933, when a large number of banks remained closed after the banking holiday until licensed to reopen by federal authorities, and some never reopened. The deposits of unlicensed banks in 1933-34 are excluded from the money stock, but not all such funds should be excluded from what individuals considered to be their money balances and from the money stock as herein defined, to which part of those funds were eventually restored. Consequently, our series for the stock shows a sharp dip in the spring of 1933 and then rises sharply whereas, if properly adjusted, most of the dip would disappear. While no attempt to adjust for closed banks in any of the panic periods has been made, we may guess that the adjustment would lower the difference between the last two columns in Table 15, though probably not reverse it or eliminate it entirely.

The only authorized issue of emergency currency occurred in the 1914 panic. The Aldrich-Vreeland Act allowed banks to form national currency associations and to obtain, for issue with collateral other than U.S. bonds, notes from the Treasury. The amounts issued in 1914 under that act are recorded in Treasury figures on national bank notes outstanding and are included in our data. The bulk of them circulated for but a few months¹⁶ and had little effect on the pattern of the currency-money ratio in the 1912-14 reference cycle. That panic, the only one in which emergency currencies were issued early and freely, was the mildest and shortest of the lot—no doubt not entirely a coincidence.

The computed ratios used for Table 14 therefore greatly understate the panic-induced increases in currency demand. In part for this reason, the panic cycles are not responsible for the expansion phase of the ratio, as indicated in Chart 11 and confirmed by the averages at the bottom of Table 14. The ratio increased on the average very little more from stage IV or V to stage VII in the six panic cycles than it did in the other cycles (as shown by column 2) and rose considerably less in the panic cycles than in the others relative to the decline in the

¹⁶ See O. M. W. Sprague, "The Crisis of 1914 in the United States," *American Economic Review*, Sept. 1915, pp. 522-523.

preceding stages (as shown by column 3). To be sure, the rise from stage IV or V to stage VII relative to the decline in the *succeeding* stages was greater on the average for the panic cycles, but the difference is cut down considerably when the exceptional rise of the 1927-33 cycle is excluded (as shown by the figures in parentheses). If we could measure the large increase in the *desired* ratio during bank suspensions, we should no doubt find a larger difference between panic cycles and all others, though perhaps not by much, since currency hoarding usually started to decline as soon as banks reopened. In any event, the expansion phase of the cyclical pattern depicted in Chart 11 is not due to panics.

Nor can that expansion phase be attributed to fear of suspensions that never occurred or to expectations of increased losses on deposits through bank failures. If we add to panic cycles those cycles in which the annual rate of bank failures was especially high, the resulting averages (second line from the bottom of Table 14) differ little from the averages for panic cycles alone. There is little relation between the amplitude of cyclical movements in the ratio and the ability of the banking system to avoid suspension of payments or large losses on deposits through default.¹⁷

These results, at first sight surprising, can be explained by the sudden and largely unexpected occurrence of most panics. The widespread bank failures and panic that characterized some reference contractions were generally short-lived affairs; they could not immediately lead to large increases in currency hoarding, because with suspension of payments the public could not obtain currency. Moreover, expectations of future loss probably depend on past experience, for which the "past" includes considerably more than just the very recent scene. The total response to a sudden high rate of loss on deposits appears to be small if the upheaval does not last long.

All financial panics in the past have come after the downturn in business activity, and financial institutions usually do not show the strains of a business contraction until it has progressed for some time.

¹⁷ The same conclusion is suggested by the behavior of the total amount of change in the reference cycle relatives, which disregards the duration of individual cycles and is not shown in Table 14. For the six panic cycles alone and the ten cycles grouped together in the next line, the average change in the currency-money ratio from stage IV or V to stage VII is +0.26 and +0.25, respectively. For the seven other nonwar cycles, it is even higher, +0.39.

The resulting increase in the currency-money ratio may come even later in the reference contraction if the response to a rise in the rate of bank failures is delayed. This sequence, however, does not explain the typical behavior of the currency-money ratio. The ratio displays a diminishing rate of decline, or even a rise, before the peak in business activity. It therefore seems most unlikely that public apprehension about the solvency of banks or increased losses on deposits can account for the expansion phase in the ratio, though such fears might subsequently reinforce the rise in the ratio.

The timing of the rise makes service charges on checking accounts or rates paid on savings deposits unlikely causes. These fluctuate little over the typical cycle. Any alterations banks do make in charges and rates in competing for funds tend to reflect variations in the interest rates they receive on earning assets (or changes in legal ceilings). Interest rates have generally risen during reference expansions and usually have not turned down until after the reference peak. Hence the turning points in charges and rates probably occur much later than those displayed by the currency-money ratio.

EXPLANATIONS OF CYCLES IN CURRENCY DEMAND EXAMINED

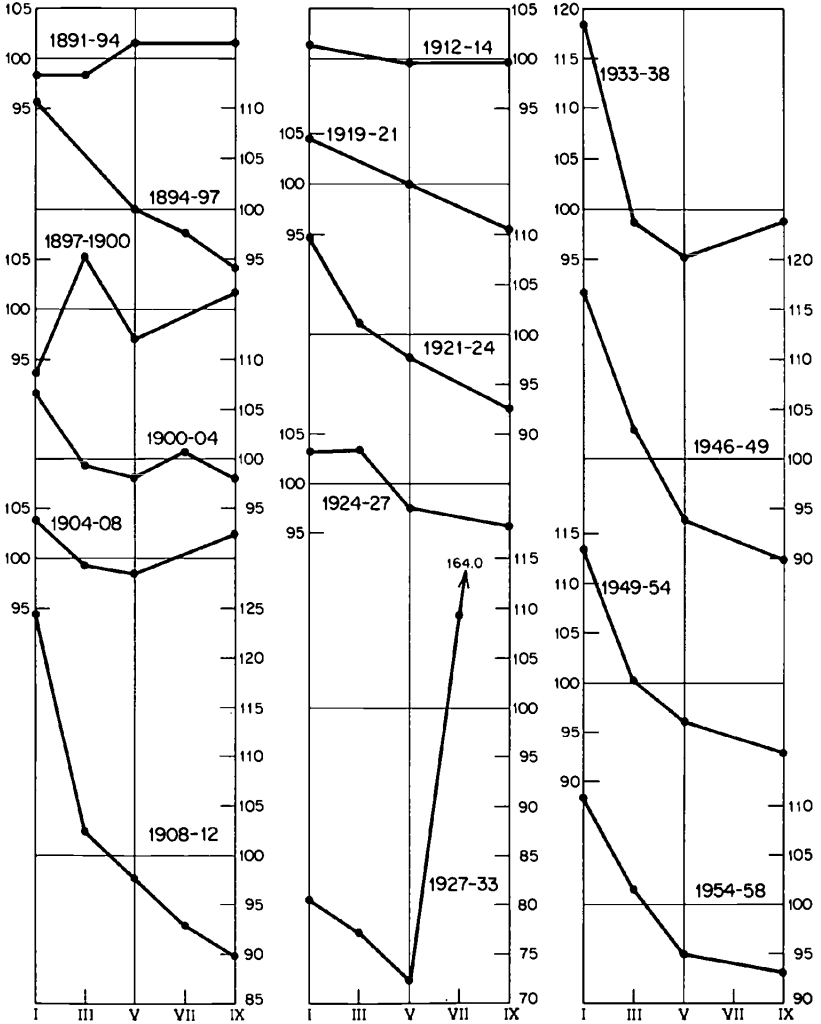
The Mitchell-Hawtrey Theory. The most famous theory of currency demand comes from the work of Wesley Mitchell and R. G. Hawtrey.¹⁸ Their arguments are quite similar and can be summarized together as follows: Two relationships allegedly work to raise and lower the use of currency with ups and downs in business activity. First, retail transactions, which use more currency per dollar of payment than other transactions do, rise relative to total transactions during expansions

¹⁸ See W. C. Mitchell, *Business Cycles and Their Causes*, Berkeley, 1950, pp. 47-48 and 137-138 (originally published as Part III of his *Business Cycles*, 1913); and R. G. Hawtrey, "The Trade Cycle," *Readings in Business Cycle Theory*, American Economic Association, pp. 343-344 (originally published in 1926), and *Currency and Credit*, 4th ed., London, 1950, pp. 20-25 (1st ed., 1919). The importance to Mitchell and Hawtrey of a rising use of currency in expansions was that it drains banks of reserves and thereby eventually contributes to a contraction of bank credit. In their writings, that contraction has an important role in downturns of business activity. The original works were published before central banks began as a normal procedure to offset such drains.

See also F. Lavington, *The English Capital Market*, London, 1921, pp. 174-175; and a more recent reference, J. Polak and W. White, "The Effect of Income Expansion on the Quantity of Money," *Staff Papers*, Vol. IV, International Monetary Fund, 1954-55, pp. 398-433.

CHART 12

Nonwar Reference Cycle Patterns of Currency-Expenditures Ratio, Annual Data, 1891-1958



Source: Computed from the data in Table F-18.

Note: Stage III has been omitted from 1894-97 and 1919-21 cycles, and stage VII from all cycles except 1894-97, 1900-04, 1908-12, and 1927-33.

in business activity and fall during contractions. Second, the relative income of wage earners (who, it is assumed, spend most of their income in retail outlets and are the largest users of currency) conforms positively to business activity and helps to explain the cyclical behavior of retail trade.

So far as it goes, this theory is consistent with the facts. The evidence is clear that retail trade prospers more or less directly with the level of employment, which in turn is a close barometer of business conditions. While neither Mitchell nor Hawtrey had direct evidence on cycles in the relative income of wage earners, recent research confirms their hypothesis: wage income tends to rise relative to total income during reference expansions and to fall during reference contractions, though the amplitude of variation is quite small and the behavior is not the same in all cycles.¹⁹ This implies that the *quantity* of currency rises and falls with business activity. Mitchell observed such behavior with annual data for the period 1890–1911 in his early study of business cycles.²⁰

This argument seems to assume that the ratio of currency to *consumer* expenditures is fairly constant over cycles. In fact, however, it is not. Charts 12 and 13 show nonwar reference cycle patterns of the currency-expenditures ratio since 1891 and include the 1954–58 cycle not covered by Chart 11. Chart 12 is based on ratios of annual data. Where stage III or VII is too short to be computed from annual data, it is omitted and the line connects adjacent stages. To show the pattern in more detail, Chart 13 presents nine stages and is based on the monthly ratio of currency to personal income, which is not available for a full cycle earlier than 1933–38. This approximates the behavior of the product of the currency-expenditures ratio and the average propensity to consume. We might expect this propensity to exhibit an inverted conformity to reference cycles, in which case the patterns in Chart 13 would show less tendency to rise before reference peaks and to fall before troughs than corresponding patterns for the currency-expenditures ratio show—to some extent apparently true.

In broad outline, the patterns in the two charts have the same shape as those for the currency-money ratio summarized in Chart 11. The

¹⁹ Daniel Creamer, *Personal Income During Business Cycles*, Princeton for NBER, 1956, pp. xvii–xviii.

²⁰ Mitchell, *Business Cycles* (1913), pp. 295–300.

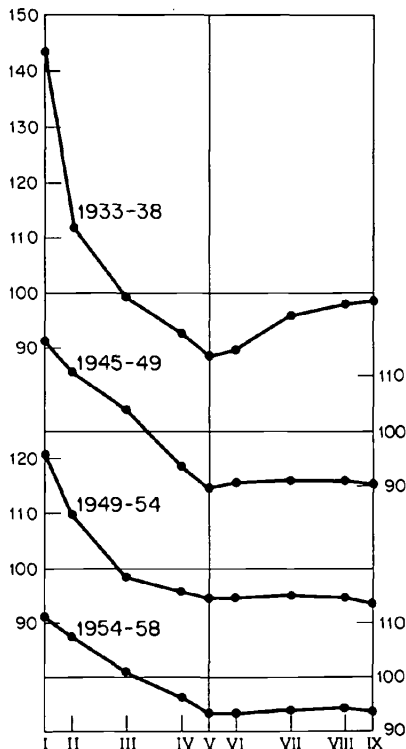


CHART 13

Nonwar Reference Cycle Patterns of Currency-Personal Income Ratio, Monthly Data, 1933-58

Source: Currency outside banks, same as for Chart 12 and Table F-18; personal income, Department of Commerce seasonally adjusted monthly data.

patterns in Charts 12 and 13 generally fall during reference expansions, and most of them fall at a slower rate during contractions, or even rise. This is also true for changes on a per-year basis (not shown), and so is not a statistical artifact resulting from the combination of a downward trend and the shorter duration of reference contractions than of expansions. There is also a tendency for the rate of decline during expansions to slow down after stage III, though it is far from uniform and less clear (particularly in Chart 13, as we might expect) than for the currency-money ratio.

These generalizations are of course rough. The currency-expenditures ratio displays several large noncyclical movements which make its cyclical fluctuations difficult to isolate. In addition, measurement errors in the year-to-year changes of consumer expenditures further handicap analysis, particularly for the cycles before 1900, which might otherwise be revealing because they seem less distorted by irregular secular movements. Granted the qualifications, this ratio nevertheless

seems to account for a substantial part of the cycles in the currency-money ratio.²¹

Sectoral Shifts in Money Holdings and Currency Demand. Since the currency-expenditures ratio is not constant over cycles but indeed accounts for much of the variation in the currency-money ratio, Mitchell's and Hawtrey's theory seems unsatisfactory. Yet both authors discussed the *quantity* of currency outstanding rather than the currency-money *ratio*,²² which makes the full implication of their theory unclear. Perhaps a better interpretation, which avoids some of the drawbacks of the preceding one, is that their theory assumes a redistribution of money holdings between consumers and businesses over the cycle. If the currency-money ratios maintained by these sectors differ, as is most likely, the aggregate ratio will vary, even though the ratio of each sector does not change. Specifically, if the sector ratios differ by a constant, changes in the aggregate ratio are proportional to changes in the distribution of money holdings.²³

²¹ The positive conformity of the income-money ratio to business cycles partly offsets the cyclical effect of the currency-expenditures ratio on the currency-money ratio.

²² To look at the quantity of currency alone can be misleading. Although the public can maintain any ratio of currency to deposits it wants, since it can exchange the two freely, it cannot unilaterally hold any quantity of currency it may want. From the basic identity presented in Chap. 1, we have the following:

$$C = H \left(1 - \frac{1}{\frac{C}{D} + \frac{R}{D}} \right) \quad \text{where} \quad \frac{C}{D} = \frac{\frac{C}{M}}{1 - \frac{C}{M}}.$$

The division of a given quantity of high-powered money between banks and the public is jointly determined by the two. In the face of a currency drain, of course, it may take time for banks to contract credit, and for short periods they may find themselves with a reserve ratio lower than desired. But large differences between actual and desired reserves are not likely to exist for long.

Cyclical variations in the reserve ratio have an amplitude 30 per cent larger on the average than variations in the currency ratio have (based on Table 16, Chap. 5, and Table 14). Over half the cyclical fluctuation in the quantity of currency outside banks, therefore, reflects the behavior of the reserve ratio.

²³ The aggregate currency-money ratio may be expressed as follows:

$$\begin{aligned} \left(\frac{C}{M} \right)_a &\equiv \left(\frac{C}{M} \right)_c \frac{M_c}{M_a} + \left(\frac{C}{M} \right)_b \frac{M_b}{M_a} \\ &\equiv \left[\left[\frac{C}{M} \right]_c - \left[\frac{C}{M} \right]_b \right) \frac{M_c}{M_a} + \left(\frac{C}{M} \right)_b, \end{aligned}$$

where the subscript *c* stands for the consumer sector, *b* for business, and *a* for the aggregate. Hence, if the sector currency ratios remain constant,

$$\frac{d \left(\frac{C}{M} \right)_a}{dt} = \left[\left(\frac{C}{M} \right)_c - \left(\frac{C}{M} \right)_b \right] \frac{d \left(\frac{M_c}{M_a} \right)}{dt}.$$

There are various reasons money holdings might shift among sectors. Changes in the money stock, from whatever source, are largely channeled through banks and, in the first instance, affect the balances of borrowers, mainly businesses. Later on, the changes work into the spending stream and affect consumer balances. With this sequence, changes in the money stock may cause temporary variations in the distribution of money holdings (which, of course, have repercussions on the money stock). Or, alternatively, a redistribution of money holdings between consumers and businesses may reflect different responses of the two sectors to business cycles. Business firms may be more alert than consumers are to profitable uses for funds during periods of high activity and may act more quickly to take advantage of them. During periods of slack activity, when opportunities for investment are poor, firms may have few inducements to keep money balances low and may allow them to accumulate. Consumers may be less affected by economic conditions in these matters. To make these explanations fit the particular timing of the currency-money ratio over cycles requires introducing some lags at certain points, but such lags do not seem implausible.

The attempt to determine whether the distribution of money holdings does in fact fluctuate in a way to explain cycles in the aggregate currency-money and currency-expenditures ratios is impeded by limited data. The flow-of-funds accounts provide quarterly estimates on the distribution of money holdings back only to 1952 and annual estimates back only to 1945. Similar (though not entirely comparable) estimates are available for the 1930's. That is all, and even these are far from reliable. The nature of these estimates raises the suspicion that they may tend to understate cyclical variations. The estimates—for what they are worth—are presented in Chart 14, which shows the nonwar reference cycle patterns from 1933 to 1961 of the fraction of the money stock (including time deposits) held by consumers.

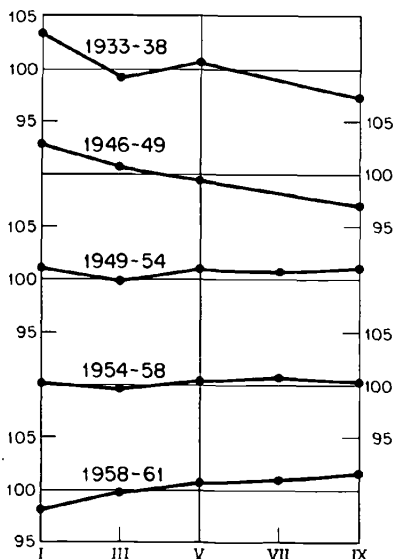
The timing of some of the patterns is similar to that for the currency-expenditures ratio; however, their amplitude is much too small to have an important effect on that ratio. To see this, we may apply the formula of footnote 23. Most of the cyclical movements in Chart 14, abstracting from trend, have an amplitude of at most 2 per cent. Since the fraction of the money stock held by consumers over the period covered has been about 60 per cent, the cyclical change in the fraction has been 2 per cent of 60 or about 1 percentage point. The

CHART 14

Nonwar Reference Cycle Patterns of the Fraction of the Money Stock Held by the Consumer Sector, Annual and Quarterly Data, 1933-61

Source: *Flow of Funds/Savings Accounts 1946-60*, Suppl. 5, Board of Governors of the Federal Reserve System, 1961, Table 8; and S. Shapiro, "The Distribution of Deposits and Currency in the United States, 1929-39," *Journal of the American Statistical Association*, December 1943, Table II, p. 441. Annual data to 1951; thereafter, quarterly data seasonally adjusted by NBER.

Note: Stage VII has been omitted from 1933-38 and 1946-49 cycles.



maximum difference between the fraction of money held by consumers and by all other sectors may be estimated by assuming that the former holds all currency outstanding. The estimate of the difference for 1960 is 23 percentage points, and it is roughly the same for the other periods covered. Hence, by the formula, the cyclical movements produced by changes in distribution have been around one-fourth to one-half a percentage point. Charts 12 and 13 show that the actual movements were much larger. The redistribution of money holdings does not appear, therefore, to account for cycles in the currency-expenditures ratio.

Permanent Expenditures and Currency Demand. If the fraction of the money stock held by consumers does in fact fluctuate no more than the patterns indicate, the currency-expenditures ratio of this sector, which holds most of the currency outstanding, must account for cycles in the aggregate ratio. Since none of the usual explanations appears satisfactory, we may discuss one other possibility.

Since the currency-expenditures ratio might be described as conforming more or less inversely to reference cycles, its reciprocal—the velocity of currency—conforms positively, just as the velocity of money does. Though similar, the patterns are obviously not identical for, if they were, the ratio of the two would not vary cyclically and would have no effect on the currency-money ratio. The main difference in

timing is that the velocity of currency seems to level off its rate of rise from stage III to stage V and to rise gently in the final stages of reference contractions. The velocity of money often levels off in a similar fashion but not always or typically. The similarity of patterns for the two velocities suggests the influence of common factors.

What factors affecting the velocity of money might also explain the velocity of currency? A popular explanation of the velocity of money is based on movements in interest rates over the cycle. As already suggested, however, this cannot be applied to the velocity of currency, because the relevant interest rates—check charges and savings deposit rates—move too slowly during most cycles.

One interpretation of cycles in the velocity of money proposes that the demand for money depends on permanent income.²⁴ Conceivably, the demand for currency depends on “permanent” expenditures. The meaning of such a dependence would be that the demand for currency adjusts slowly to changes in expenditures and wealth. Then cyclical fluctuations in the ratio of measured expenditures to currency would be dominated—though not determined—by the fluctuations in the numerator. This could occur if changes in the volume of expenditures between cyclical peaks and troughs (in large part for durables) were mostly handled by checks, so that transactions made with currency varied much less than total consumer expenditures did over the cycle, and if adjustments in currency holdings as a store of wealth were made slowly.

A direct test of this explanation is whether currency outstanding can be satisfactorily related to permanent consumer expenditures or wealth, estimated perhaps by a weighted average of past expenditures. It does seem that a ratio of currency to such a weighted average would approximate the patterns in Chart 13 after adjustment for trends, though not perhaps in all details. A definite answer is not at present possible, however. Much depends on the particular weighting scheme used, and that cannot be properly estimated because there have been so few cycles undistorted by steep secular trends or other influences like panics and wars. With luck, the future will be more sparing with special influences and give us undistorted cycles in greater abundance, allowing a better test of this explanation.

²⁴ Milton Friedman, *The Demand for Money: Some Theoretical and Empirical Results*, Occasional Paper 68, New York, NBER, 1959.