A Suggestion For Changing The Definition Of The U.S. Money Stock

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A Suggestion For Changing The Definition Of The U.S. Money Stock

Abstract
The purpose of this paper is to propose a modest change in the definition of the demand deposit component of the U.S. money stock. The proposed change would not in principle affect the size of the money stock. However, it would improve the accuracy of money stock estimates and should also contribute to the ability of the Federal Reserve authorities to control the money stock...

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The purpose of this paper is to propose a modest change in the definition of the demand deposit component of the U.S. money stock. The proposed change would not in principle affect the size of the money stock. However, it would improve the accuracy of money stock estimates and should also contribute to the ability of the Federal Reserve authorities to control the money stock.

There are some rather complicated aspects of money stock measurement which involve Edge Act corporations, branches and agencies of foreign banks in New York, and New York State investment companies. The proposal contained in this paper is not primarily directed at these aspects of money stock measurement. Therefore, in order to keep the argument for the proposal as simple and straightforward as possible, the complexities connected with these international investment institutions are ignored throughout the first three sections of the paper. Section I presents both the current and proposed approaches to measuring the demand deposit component of the money stock. Section II explains why the proposed approach would result in more accurate estimates of the money stock, and Section III explains why the proposed approach would contribute to more precision in money stock control. The complexities of money stock measurement resulting from international financial transactions are
discussed in Section IV along with both the current and proposed definitions of the demand deposit component.

I. Current and Proposed Measurement Approaches

A. The Current Approach

The current approach to measuring the demand deposit component of the U.S. money stock is based upon the report of a Federal Reserve Ad Hoc Committee on Money Supply Statistics which was issued in October 1959. This committee recommended that the demand deposit component of the money stock consist of the nonbank public's holdings of demand deposits which are liabilities of U.S. commercial banks (i.e., all banks located in the United States including U.S. branches of foreign banks but excluding foreign branches of U.S. banks). Included in the "nonbank public" were individuals, business firms, nonbank financial institutions, mutual savings banks, state and local governments, foreign official institutions, and commercial banks in foreign countries (including foreign branches of U.S. banks). Thus, the only demand deposits which the committee recommended to be excluded from the definition of the money stock were those held by the U.S. Federal government and by domestic commercial banks.

What was desired was a measure of the nonbank public's holdings of demand deposits which the holders believe they have available for use. In the aggregate, this is not equal to the amount which bank records indicate they hold. The difference between total demand deposits as indicated by bank records and by holder records is the result of bank float, which develops when banks give depositors credit for checks deposited before the banks on which the checks were written debit the accounts of those who wrote the checks. With due recognition of the problems involved (some of which are discussed later on in this paper), the method advocated by the committee
to correct for this double counting was to subtract commercial bank cash items in the process of collection and Federal Reserve float from the amount which bank records indicate is the aggregate demand deposit holdings of the nonbank public. 2/

Acting on the recommendation of the committee, the Federal Reserve began publishing a money stock series in the October 1960 issue of the Federal Reserve Bulletin. 3/ For this series, the demand deposit component (DD) was defined as follows:

\[
DD = PDD - CIPC - FLT
\]  

(1)

where

- \( PDD \) = demand deposit liabilities of U.S. banks which are due to the nonbank public;
- \( CIPC \) = cash items in the process of collection of U.S. commercial banks; and
- \( FLT \) = Federal Reserve float.

This definition was modified twice by the Federal Reserve in subsequent years. The first modification occurred in 1962 and consisted of the inclusion of foreign official institution deposits at the Federal Reserve Banks as an additional component of DD. 4/ The second modification occurred in 1970 and concerned certain activities of Edge Act corporations, branches and agencies of foreign banks in New York, and New York State investment companies. But the basic approach to measuring that portion of DD which is a liability of U.S. commercial banks has remained unchanged.

B. The Proposed Approach

The proposed approach to measuring DD is given by the following equation:

\[
DD = PDD + DT - DF - CIPC - FLT
\]  

(2)

where
DT = demand deposit liabilities of U.S. banks which are due to U.S. banks;

DF = demand deposit balances of U.S. banks which are due from U.S. banks;

and all of the other symbols are as defined above. This equation is offered as a direct substitute for equation (1) for use in calculating the demand deposit component of the money stock. As is obvious from a comparison of equations (1) and (2), the only difference between the current approach and the proposed approach to measuring DD is that the former excludes interbank deposits as indicated by bank liability records while the latter excludes them as indicated by holder asset records (which in this case are bank asset records).

II. Why the Proposed Definition Would Improve the Accuracy of Money Stock Estimates

The major advantage of the proposed approach to measuring DD is that it would result in more accurate estimates of the money stock than is the case with the current definition. There are three reasons for this. First, the proposed approach would eliminate certain underestimation errors which are associated with check collection involving correspondent banks. Second, it would eliminate certain overestimation errors which are due to bank accounting practices with respect to the recording of CIPC and DF. Third, it would reduce the dependence of the Federal Reserve upon the nonmember bank data for the measurement of DD. Each of these is discussed individually.

A. Elimination of Underestimation Errors

The sum of commercial bank demand deposit liabilities due to the nonbank public (PDD) is an appealing measure of that portion of the money stock which is a direct liability of the commercial banks. However, as
discussed in Section I, it involves some double counting. The double
counting arises in the fact that deposits are credited and debited at
different times when demand deposits are transferred between members of
the nonbank public who do their banking with different commercial banks.
Specifically, the account of the recipient is credited with a deposit by
his bank before the account of the issuer is debited by his bank.
Therefore, during this time span, total commercial bank PDD includes
both the new deposit of the recipient as well as the soon-to-be-debited
portion of the issuer's account.

The practice of subtracting commercial bank CIPC (and also Federal
Reserve float) from PDD is for the purpose of eliminating this double
counting. Unfortunately, with the existing approach to measuring DD,
the practice results in an underestimation of the money stock. This is
illustrated with the following example.

Assume that a Mr. A writes a check for some amount to a Mr. B.
Assume also that A and B are located in different cities, that the two
do their banking with banks in their home cities, and that the banks
are correspondents. (It is not really necessary for these two banks to
be correspondents, but to assume so greatly simplifies the example.
What is necessary is that a correspondent bank be involved in the check
collection process, for the whole purpose of this example is to show
that check collection via correspondent banks results in an underestima-
tion of the money stock when DD is measured according to the current
approach.)

**Day 1**

Having received A's check, B deposits it in his demand account
with his bank on day 1. Thus, by the end of day 1 the balance sheet
of B's bank has been changed as a result of this event as follows:

\[
\begin{array}{c|c|c}
\text{Assets} & \text{Liabilities} \\
\Delta \text{ACIPC} & \Delta \text{APDD} \\
\end{array}
\]

where the positive \( \Delta \text{APDD} \) is the credit to B's demand account and the positive \( \Delta \text{ACIPC} \) is the check, now in the possession of B's bank but not yet collected.

A's bank has not yet been informed that the check has been written or deposited with B's bank. Consequently, the balance sheet of A's bank is unaffected by the event of day 1.

The DD time series records no change in the money stock as a result of this event on day 1. This is because with the current approach

\[
\text{DD} = \text{PDD} - \text{CIPC} - \text{FLT} \tag{1}
\]

so the effect of the rise in PDD is exactly offset by the rise in CIPC.

**Day 2**

During day 2, B's bank sends the check to A's bank and requests payment in the form of a credit to its demand balance at A's bank. By the end of day 2, the balance sheet of A's bank will be changed as a result of this event as such:

\[
\begin{array}{c|c|c}
\text{Assets} & \text{Liabilities} \\
\text{APDD} & \text{ADT} \\
\end{array}
\]

The negative \( \Delta \text{PDD} \) is the debit to A's account, while the positive \( \Delta \text{ADT} \) (demand deposits due to other commercial banks) is the increase in the demand account of B's bank at A's bank.
The balance sheet of B's bank is not affected by the event of day 2, because it has not yet been notified by A's bank of the increase in its account.

On day 2 the DD time series records a decrease in the money stock because of the debit to A's account with his bank. This is an underestimation of the money stock as we would like to measure it. The problem is that the positive ΔCIPC item on the balance sheet of B's bank lingers on longer than is needed to eliminate the double counting.

Day 3

On day 3, A's bank notifies B's bank of the deposit credit, and this event affects the balance sheet of B's bank as follows:

\[
\begin{array}{c|c|c}
\text{B's Bank} & \text{Assets} & \text{Liabilities} \\
\hline
\Delta\text{CIPC} & - & + \\
\Delta\text{DF} & + & \\
\end{array}
\]

The positive ΔDF (demand deposits due from other commercial banks) is the deposit credit of B's bank at A's bank; while the negative ΔCIPC signifies that the check has now been collected in acceptable funds, thus canceling the positive ΔCIPC which came into existence on day 1.

Due to this event, the DD time series records an increase in the money stock on day 3 which is exactly equal to the amount of its underestimation on day 2. Hence, by the end of day 3 we are again measuring the money stock as we would like to measure it.

From day 1 to day 3, the DD time series recorded no permanent change in the money stock as the result of the transfer of funds from A to B. This is as it should be, for there has in fact been no actual change in
the money stock as a result of the events described above, only a transfer of a portion of it from Mr. A to Mr. B. Unfortunately, however, the DD time series did record a temporary and false decrease in the money stock during day 2. It would be desirable to avoid such money stock underestimation errors if possible.

The proposed approach to measuring DD would eliminate underestimation errors of the type just illustrated. To show this, the example is worked through again except that this time it is assumed that the proposed approach, rather than the current approach, is in effect.

Day 1

The story for day 1 is the same as in the previous example. Again, B deposits the check in his account and this event affects the balance sheet of his bank as before, i.e.,

\[ \text{B's Bank} \]

\[ \begin{array}{c|c}
\text{Assets} & \text{Liabilities} \\
\Delta \text{CIPC} + & \Delta \text{PDD} + \\
\end{array} \]

As with the current approach to measuring DD, the proposed approach results in no recorded change in the money stock due to day 1's event. This is because

\[ \text{DD} = \text{PDD} + \text{DT} - \text{DF} - \text{CIPC} - \text{FLT} \] (2)

--the increase in CIPC exactly offsets the effect upon DD of the increase in PDD.

Day 2

During day 2, B's bank sends the check to A's bank and requests payment in the form of a credit to its demand account with A's bank. As before, this event affects the balance sheet of A's bank as follows:
Unlike the case in the previous example, the event of day 2 does not result in an underestimation of the money stock for that day. With the proposed approach, the effect upon DD of the negative ΔPDD entry on the balance sheet of A's bank is exactly offset by the effect of the positive ΔDT entry. It doesn't matter that the positive ΔPDD entry on the balance sheet of B's bank lingers on longer than we might like it to, for the proposed approach gets around the effects of this phenomena.

Day 3

As before, during day 3, A's bank notifies B's bank of the increase in its account so the balance sheet of B's bank is changed due to this event as such:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔCIPC</td>
<td>ΔADF</td>
</tr>
</tbody>
</table>

In contrast with the first example, no increase in the money stock is recorded during day 3. The effect upon DD of the negative ΔCIPC entry on the balance sheet of B's bank is exactly offset by the effect of the positive ΔADF entry.

Like in the first example, DD recorded no permanent change in the money stock as a result of the transfer of funds from A to B. Unlike the first example, it also recorded no temporary and false decrease in
the money stock. The proposed approach to measuring DD would eliminate money stock underestimation errors which are associated with check collection via correspondent banks.

B. Elimination of Overestimation Errors

There has always been something of a problem in obtaining accurate data from commercial banks on their CIPC. Some commercial banks (particularly the smaller ones) often classify items as "demand deposits due from other commercial banks" (DF) when they are in fact "cash items in the process of collection". This is because, with check collection via correspondent banks, CIPC become DF with the passage of time, so banks frequently skip the intervening accounting step by initially classifying checks sent to correspondents for collection as DF.

Furthermore, banks have little incentive to distinguish sharply between CIPC and DF. They are required to hold reserves against net demand deposits (NDD) which are defined as such:

\[ NDD = PDD + DG + DT - DF - CIPC \]  

(3)

where DG are demand deposit liabilities which are due to the U.S. federal government and all the other symbols are as defined previously. Since both CIPC and DF enter with negative signs in the computation of NDD, banks have nothing to gain so far as reducing their required reserves is concerned by carefully and timely apportioning items between CIPC and DF.

To the extent that banks underreport their CIPC, of course, the money stock estimates under the current approach to measuring DD are biased upward. It would obviously be desirable to eliminate this source of bias in the money stock estimates if possible.
Under the proposed approach to measuring DD,
\[ DD = PDD + DT - DF - CIPC - FLT \] (2)

and for accurate estimates of DD it is of no importance that some banks
apportion items incorrectly between CIPC and DF. Since both CIPC and DF
enter into the computation of DD with negative signs, knowledge of their
exact distribution counts for nothing so far as accurate estimation of
the money stock is concerned.

C. The Member-Nonmember Bank Data Mix

Recognizing that some domestic commercial banks are members of the
Federal Reserve System while others are not, the current approach to the
measurement of DD can be restated with the following equation:
\[ DD = \left( PDD_m - CIPC_m \right) + \left( PDD_n - CIPC_n \right) - FLT \] (1a)

where the \( m \) and \( n \) subscripts indicate items which appear on the balance
sheets of member and nonmember banks, respectively. The proposed approach
can be similarly restated:
\[ DD = \left( PDD_m + DT_m - DF_m - CIPC_m \right) + \left( PDD_n + DT_n - DF_n - CIPC_n \right) - FLT \] (2a)

Under the proposed approach to measuring the money stock, that portion
of DD which comes from the reports of the member banks would be larger and
that portion which is based on the reports of the nonmember banks would be
smaller than under the current approach. This is because, under the pro-
posed approach, there is an "extra" component, \( DT_m - DF_m \), of the member
bank portion which is always positive and also an "extra" component,
\( DT_n - DF_n \), of the nonmember bank portion which is always negative.
(This in turn is due to the fact that nonmember banks tend to be respon-
dents, while most correspondent banks are members of the Federal Reserve System.)

The relative size of the member and nonmember bank portions of DD is important because of the great disparity in the availability of data from member and nonmember banks. Member banks supply daily deposit and reserve data to the Federal Reserve Banks on a weekly reporting schedule. In contrast, until relatively recently, the Federal Reserve authorities obtained nonmember bank balance-sheet data for only two days each year, the June 30 and December 31 call-report dates. The situation is somewhat better at the present time in that since 1973 the Federal Reserve has been able to obtain nonmember bank balance-sheet data for two additional days each year, the "surprise" call-report dates, one of which occurs in the spring and the other in the fall.

From the nonmember bank call-report data, staff members of the Federal Reserve interpolate a weekly time series of the nonmember bank portion of DD which is then used in the computation of the monthly money stock time series.5/

Because the nonmember bank data must be interpolated for dates between call reports, it would appear to be desirable for accurate estimation of the money stock to reduce as far as possible that portion which is based upon the nonmember bank data reports. Table 1 shows the ratio of nonmember bank (PDD - CIPC) to total commercial bank (PDD - CIPC) on the December 31 call-report dates of selected years from 1961 through 1974. The table also shows the ratio of nonmember bank (PDD + DT - DF - CIPC) to total commercial bank (PDD + DT - DF - CIPC) for these same dates. Notice that by either measure the nonmember banks have become more important compared with the member banks as sources of DD data.
<table>
<thead>
<tr>
<th>Date</th>
<th>( \frac{(PDD_n - CIPC_n)}{(PDD - CIPC)} )</th>
<th>( \frac{(PDD_n + DT_n - DF_n - CIPC_n)}{(PDD + DT - DF - CIPC)} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 31, 1961</td>
<td>.1793</td>
<td>.1376</td>
</tr>
<tr>
<td>Dec. 31, 1964</td>
<td>.1956</td>
<td>.1550</td>
</tr>
<tr>
<td>Dec. 31, 1968</td>
<td>.2133</td>
<td>.1707</td>
</tr>
<tr>
<td>Dec. 31, 1970</td>
<td>.2343</td>
<td>.1833</td>
</tr>
<tr>
<td>Dec. 31, 1973</td>
<td>.2688</td>
<td>.2168</td>
</tr>
<tr>
<td>Dec. 31, 1974</td>
<td>.2738</td>
<td>.2181</td>
</tr>
</tbody>
</table>

Source: Tables entitled "Assets by Class of Bank" and "Liabilities and Capital by Class of Bank" in various issues of the Federal Reserve Bulletin.
However, the Federal Reserve could effectively roll back the clock approximately five years so far as the relative importance of non-member bank data is concerned by adopting the proposed approach to measuring the money stock. At the present time, this would reduce the nonmember bank fraction of total commercial bank data used in the computation of DD by approximately 20 percent (from about .27 to about .22).

III. Why the Proposed Approach Would Contribute to Federal Reserve Control of the Money Stock

The money stock is an endogenous variable. The Federal Reserve authorities possess certain instruments which can be used to affect the money stock, but there are many other forces beyond their direct control which affect the money stock as well. Moreover, at any given time, the authorities have only a rather imprecise notion of the current magnitude of the money stock. This is partly because relatively error-free estimates of the member bank portion of DD are not available until a week or two after the statement week. But it is mainly due to the fact that the best estimates of the nonmember bank portion of DD are only available for call report dates and even this data is not available to the Federal Reserve authorities until from three to four months after the fact (it takes that long to collect and process the individual bank call reports).

It is easy to imagine an environment in which it would not matter in the slightest that the Federal Reserve authorities must make policy decisions when they are partially in the dark about the current size of the money stock. However, there is considerable empirical evidence to the effect that the past influences the future in money stock determination as well as in other economic processes. Thus, it seems likely that the Federal Reserve authorities could do a better job in controlling the
money stock if they had better estimates of its current size and its size in the recent past.

Adoption of the proposed approach to measuring DD would provide the Federal Reserve authorities with better estimates of the money stock in the current period and in the recent past. This is mainly because it would reduce the portion of DD which is estimated from the nonmember bank call-report data.

IV. The Current and Proposed Definitions of the Demand Deposit Component of the Money Stock

Equation (1) with the addition of foreign official institution deposits with the Federal Reserve Banks was used as the official definition of the demand deposit component from mid-1962 to August 1970, at which time it was changed. The most important aspect of the 1970 revision of the DD definition was an attempt to correct for a downward bias in its measurement due to international financial transactions involving the services of Edge Act corporations, branches and agencies of foreign banks in New York, and New York State investment companies. This downward bias was not new, but had been of trivial magnitude until the late-1960's when it grew rapidly in size in connection with an expansion in borrowing by domestic commercial banks from the Eurodollar market.

The bias occurred in the measurement of DD through the procedure of subtracting commercial bank CIPC from PDD. For accurate measurement of DD only those commercial bank CIPC which result from checks drawn against deposits of the nonbank public should be subtracted from PDD. However, the CIPC data available from commercial banks does not meet this criteria. In particular, some portion of total CIPC is generated
by commercial bank deposit liabilities which are due to Edge Act corporations, U.S. branches and agencies of foreign banks, and New York State investment companies. The demand deposits of these institutions are not part of commercial bank demand deposit liabilities which are due to the nonbank public. It is clear from the definition of the nonbank public (stated earlier) that demand deposits due to U.S. branches of foreign banks are not part of PDD. Contrary to the spirit of this definition, however, it has long been the practice of commercial banks to also classify deposits due to Edge Act corporation, U.S. agencies of foreign banks, and New York State investment companies as "due to banks" or DT. Hence, when an Edge Act corporation (or one of these other institutions) deposited a check in its demand account with a commercial bank, the bank would enter the amount of the check as a DT liability and would also add the amount of the check to its CIPC. Of course, in the calculation of DD, this "extra" CIPC associated with the Edge Act corporation's deposit would be subtracted from PDD, thus biasing the estimate of DD downward.

The method which the Federal Reserve chose to remove this bias was to add an additional item to the previous definition of DD. This item was an estimate (based on data supplied by these international investment institutions) of the contribution to total commercial bank CIPC resulting from the activities of Edge Act corporations, branches and agencies of foreign banks in New York, and New York State investment companies in international financial transactions.

Another aspect of the 1970 revision was that the Federal Reserve began treating Edge Act corporations, agencies of foreign banks in New York, and New York State investment companies as part of the domestic
commercial banking system so far as the measurement of the money stock is concerned. This amounted to the inclusion of one more item—the deposit-like liabilities of these institutions which are due to the nonbank public—in the definition of the demand deposit component.

The current definition of DD is given by the following equation:

\[
DD = PDD' - \text{CIPC} - \text{FLT} + \text{FORN} + \text{PDE} + \text{CIPCE}
\]

(4)

where

\[
PDD' = \text{gross demand deposit liabilities of U.S. commercial banks less those due to the U.S. government, domestic commercial banks, Edge Act corporations, U.S. agencies of foreign banks, and New York State investment companies};^9
\]

\[
\text{FORN} = \text{foreign official institution deposits with the Federal Reserve Banks};
\]

\[
\text{PDE} = \text{deposit-like liabilities of Edge Act corporations, agencies of foreign banks in New York, and New York State investment companies which are due to the nonbank public};
\]

\[
\text{CIPCE} = \text{an estimate of commercial bank cash items in the process of collection which are generated by international financial transactions involving the services of Edge Act corporations, branches and agencies of foreign banks in New York, and New York State investment companies (data on this item are obtained from these institutions; they do not come from the commercial banks)};
\]

and all the other symbols are as defined previously.

The proposed definition of DD is as follows:

\[
DD = (PDD' + DT' - DF - \text{CIPC}) + (\text{PDE} + \text{DTE} - \text{DFE}) - \text{FLT} + \text{FORN}
\]

(5)

where

\[
\text{DT}' = \text{U.S. commercial bank liabilities which are due to domestic commercial banks, Edge Act corporations, U.S. agencies of foreign banks, and New York State investment companies};
\]

\[
\text{DTE} = \text{deposit-like liabilities of Edge Act corporations, agencies of foreign banks in New York, and New York State investment companies which are due to domestic commercial banks};
\]

\[
\text{DFE} = \text{demand deposits of Edge Act corporations, agencies of foreign banks in New York, and New York State investment companies which are due from U.S. commercial banks};
\]

and all the other symbols are as defined previously.
It is unnecessary to include CIPCE in the proposed definition. This is because demand deposit liabilities of U.S. commercial banks which are due to all institutions in the domestic commercial banking system, DT', appear in the proposed definition. Yet the proposed definition removes the "international transactions cash items bias" as does the current definition. This is illustrated in the Appendix with a step-by-step example of a U.S. commercial bank utilizing the services of an Edge Act corporation in the borrowing and repayment of Eurodollars.

V. Final Remarks

The proposed definition appears to have no disadvantages save the obvious one, that its acceptance would necessitate recomputation of the DD time series. However, all of the required data are in the possession of the Federal Reserve, so the cost of such a recomputation should be very minor given the benefits to be gained in terms of more accurate and timely money stock estimates and improved money stock control.

Appendix: An Example of the Borrowing and Repayment of Eurodollars by a U.S. Bank Employing the Services of an Edge Act Corporation

The purpose of this example is to illustrate that the proposed definition of the demand deposit component of the money stock removes the "international transactions cash items bias" as does the current definition. In the example, a commercial bank in Chicago borrows Eurodollars for one day from a German bank, using the services of an Edge Act corporation, and then repays the loan through the Edge Act corporation. After each step in the example, the effect of that
Day 1

The Chicago bank instructs its foreign branch to borrow Eurodollars from a European bank for one day and have the funds paid to a particular Edge Act corporation (henceforth referred to as "the Edge Act") which will transfer the funds to Chicago. The foreign branch of the Chicago bank arranges the loan from a German bank, which notifies its New York correspondent bank to draw a check on its account payable to the Edge Act.

1. The initial transaction of the first day is by the New York correspondent of the German bank, which issues an Officers Check payable to the Edge Act. This affects the balance sheet of the correspondent bank as follows:

<table>
<thead>
<tr>
<th>Correspondent of German Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
</tr>
<tr>
<td>Δ Deposits of Foreigners -</td>
</tr>
</tbody>
</table>

This event does not affect DD by either definition because both commercial bank demand deposit liabilities to foreigners and Officers Checks are part of PDD'.

2. The Edge Act immediately takes the Officers Check to its clearing bank in New York and deposits the check to its demand account, affecting the balance sheet of the clearing bank as such:

<table>
<thead>
<tr>
<th>Edge Act's Clearing Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
</tr>
<tr>
<td>ΔCIPC +</td>
</tr>
</tbody>
</table>
The positive $\Delta DT'$ is the addition to the Edge Act's demand account, while the positive $\Delta CIPC$ is the Officers Check, now in possession of the clearing bank but not yet collected. This event results in a decline in $DD1$—the rise in $CIPC$ reduces $DD1$ by that amount, while the rise in $DT'$ has no effect upon $DD1$. On the other hand, $DD2$ does not change as the result of these entries on the books of the clearing bank. This is because $CIPC$ and $DT'$ enter with opposite signs in the computation of $DD2$.

3. Simultaneously, the Edge Act makes the following entries on its books:

<table>
<thead>
<tr>
<th>Edge Act</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
</tr>
<tr>
<td>$\Delta DFE$</td>
</tr>
</tbody>
</table>

The positive $\Delta DFE$ is the addition to the Edge Act's demand account at its clearing bank, and the positive $\Delta DTE$ is the deposit-like liability of the Edge Act due to the Chicago bank. The Federal Reserve would presumable be informed of the new foreign-transactions-related $DTE$ liability of the Edge Act and would add this amount to $CIPCE$. The rise in $CIPCE$ would cause $DD1$ to rise by the same amount, offsetting the decline in $DD1$ which occurred in step 2. $DD2$ is unaffected by the event of step 3, because $DTE$ and $DTE$ appear in the proposed definition with opposite signs.

4. The Edge Act immediately notifies the Chicago bank that it has borrowed the funds for one day from the German bank and that collection of the funds is in progress. This causes the Chicago bank to change its balance sheet as such:
At the end of day 1 both DD1 and DD2 record no change in the demand deposit component of the money stock. This is as it should be, for there has in fact been no change in DD, only an increase in Officers Checks outstanding and a decrease in demand deposits due to foreigners.

Day 2

On Day 2 the Officers Check of the New York correspondent of the German Bank will clear, reserves will be transferred from the New York correspondent bank to the Edge Act's clearing bank, and then to the Chicago bank. Meanwhile, the Chicago bank will initiate repayment of the loan through the Edge Act.

5. When the Officers Check clears, the New York correspondent of the German Bank loses reserves and also a liability item:

\[
\begin{array}{c|c}
\text{Correspondent of German Bank} & \\
\hline
\text{Assets} & \text{Liabilities} \\
\hline
\Delta \text{Reserves} - & \Delta \text{Officers Checks Outstanding} - \\
\end{array}
\]

This event causes both DD1 and DD2 to decline, because commercial bank Officers Checks are part of PDD'.

6. At the same time, the Edge Act's clearing bank gains reserves and reduces its CIPC:

\[
\begin{array}{c|c}
\text{Edge Act's Clearing Bank} & \\
\hline
\text{Assets} & \text{Liabilities} \\
\hline
\Delta \text{Reserves} + & \\
\Delta \text{CIPC} - \\
\end{array}
\]
The negative $\Delta$CIPC results from the collection by the clearing bank of the Officers Check issued by the German bank’s New York correspondent. This negative $\Delta$CIPC causes both DD1 and DD2 to rise by the same amount that they declined in step 5.

7. Upon receiving the reserves, the clearing bank initiates a transfer of funds to the Chicago bank, so the former loses the reserves it just received and also a "due to bank" liability:

<table>
<thead>
<tr>
<th>Edge Act's Clearing Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
</tr>
<tr>
<td>$\Delta$Reserves</td>
</tr>
</tbody>
</table>

The negative $\Delta$DT' is the clearing bank's liability to the Edge Act which came into existence in step 2. This event has no effect upon DD1, but causes DD2 to decline.

8. With the transfer of reserves, the Chicago bank enters the following items on its books:

<table>
<thead>
<tr>
<th>Chicago Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
</tr>
<tr>
<td>$\Delta$Reserves</td>
</tr>
<tr>
<td>$\Delta$Due from Edge Act</td>
</tr>
</tbody>
</table>

The negative "$\Delta$Due from Edge Act" removes the corresponding item which was created in step 4. This event has no effect upon DD1 or DD2, because neither of these new entries on the books of the Chicago bank are elements of DD by either definition.

9. Simultaneously, the Edge Act clears the loan transaction from its books:

<table>
<thead>
<tr>
<th>Edge Act</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
</tr>
<tr>
<td>$\Delta$DFE</td>
</tr>
<tr>
<td>$\Delta$DEE</td>
</tr>
</tbody>
</table>
These negative entries cancel the corresponding positive entries which occurred in step 3. DDL declines as a result. Just as the positive ADTE entry on the books of the Edge Act in step 3 was regarded as a positive ACIPCE element in the computation of DDL, the negative ADTE entry of this step is regarded as a negative ACIPCE element. On the other hand, DD2 is unaffected by these negative entries on the books of the Edge Act, because DFE and DTE appear in the proposed definition of DD with opposite signs.

10. To initiate repayment of the borrowing of the previous day, the Chicago bank tells the Edge Act to make a deposit to the account of the German bank (at the latter's New York correspondent bank) and enters the following items on its balance sheet:

<table>
<thead>
<tr>
<th>Chicago Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
</tr>
<tr>
<td>ΔDT' +</td>
</tr>
</tbody>
</table>

The negative "ΔLoans" represents the Chicago bank's repayment of the loan from the German bank, and the positive ΔDT' is its new demand liability to the Edge Act. This event has no effect upon DDL, but the positive ΔDT' causes DD2 to rise, thus offsetting the decline recorded in step 7.

11. The Edge Act writes an Officers Check drawn on its account at its clearing bank, deposits the check to the account of the German bank with the latter's New York correspondent, and make the following changes on its books:

<table>
<thead>
<tr>
<th>Edge Act</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
</tr>
<tr>
<td>ΔDFE +</td>
</tr>
<tr>
<td>(to German bank) +</td>
</tr>
</tbody>
</table>
The Edge Act's Officers Check to the German bank is a type of DTE. Therefore, this event has no effect upon DD2—the rise in both DFE and DTE offset one another in the computation of DD2. However, the Edge Act's Officers Check would be regarded by the Federal Reserve as a positive CIPCE item, resulting in a rise in DD1 which offsets its decline in step 9.

12. Simultaneously, the books of the German Bank's New York correspondent are changed with the following entries:

<table>
<thead>
<tr>
<th>Correspondent of German Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
</tr>
<tr>
<td>ΔCIPC +</td>
</tr>
<tr>
<td>Liabilities</td>
</tr>
<tr>
<td>ΔDeposits of Foreigners +</td>
</tr>
</tbody>
</table>

The positive "ΔDeposits of Foreigners" is the increase in the demand account of the German bank and is a positive ΔDDP' (since foreign commercial banks are part of the nonbank public). The positive ΔCIPC entry is the Edge Act's Officers Check, now in the possession of the correspondent bank but not yet collected. These new entries on the books of the German bank's New York correspondent have no effect upon the magnitude of DD by either definition.

In summary, neither DD1 nor DD2 record any change in the demand deposit component of the money stock as a result of the transactions of day 2. This is as it should be for there has in fact been no change in the demand deposit holdings of the nonbank public, only an increase in demand deposits due to foreigners and a decrease in commercial bank Officers Checks outstanding.

Day 3

On the third day reserves will be transferred from the Chicago bank to the Edge Act's clearing bank and then to the New York correspondent of
the German bank, thus clearing the Officers Check written by the Edge Act and completing the repayment of the Chicago bank's borrowing.

13. At the start of day 3, the Chicago bank transfers funds to the account of the Edge Act at the latter's clearing bank and makes the following changes on its balance sheet:

<table>
<thead>
<tr>
<th>Chicago Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
</tr>
<tr>
<td>ΔReserves -</td>
</tr>
</tbody>
</table>

The negative ΔDT' removes the Chicago bank's liability to the Edge Act which was created in step 10, while the negative "ΔReserves" is the transfer of funds to New York. This event does not affect DD1, but it causes DD2 to decline.

14. When the reserves from the Chicago bank are received by the Edge Act's clearing bank, the latter changes its books as such:

<table>
<thead>
<tr>
<th>Edge Act's Clearing Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
</tr>
<tr>
<td>ΔReserves +</td>
</tr>
</tbody>
</table>

The positive ΔDT' is the clearing bank's new liability to the Edge Act resulting from the Chicago bank's transfer of funds in step 13. This positive ΔDT' causes DD2 to rise by the same amount that it declined in step 13. However, DD1 is not affected.

15. When the Edge Act's Officers Check clears, the clearing bank loses the reserves it just received and also a liability to the Edge Act:

<table>
<thead>
<tr>
<th>Edge Act's Clearing Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
</tr>
<tr>
<td>ΔReserves -</td>
</tr>
</tbody>
</table>
The negative "ΔReserves" is the transfer of funds to the New York correspondent of the German bank as a result of the clearing of the Edge Act's Officers Check, while the negative ΔDT' is the debit to the Edge Act's demand account. This event does not affect DD1 but it causes DD2 to decline.

16. Simultaneously, the books of the German bank's New York correspondent are changed as follows:

<table>
<thead>
<tr>
<th>Correspondent of German Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
</tr>
<tr>
<td>ΔReserves +</td>
</tr>
</tbody>
</table>

The negative ΔCIPC results from the collection in acceptable funds (reserves) of the Edge Act's Officers Check. This negative ΔCIPC causes both DD1 and DD2 to increase by that amount.

17. At the same time, the Edge Act clears its books of the entries connected with the Chicago bank's repayment of the borrowed funds:

<table>
<thead>
<tr>
<th>Edge Act</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
</tr>
<tr>
<td>ΔDFE -</td>
</tr>
</tbody>
</table>

The negative "ΔOfficers Checks Outstanding" is due to the collection of this check, and the negative ΔDFE results from the Chicago bank fulfilling (in step 13) its obligation to the Edge Act which came into existence in steps 10 and 11. Just as the positive "ΔOfficers Checks Outstanding" entry on the books of the Edge Act in step 11 caused CIPCE to rise, so the negative "ΔOfficers Checks Outstanding" in this step causes CIPCE to decline. This decline in CIPCE in turn causes DD1 to decrease by the amount which is rose in step 16. On the other hand,
DD2 is not affected by the changes on the balance sheet of the Edge Act in this step—Edge Act Officers Checks are a type of DTE, and DFE and DTE enter in the computation of DD2 with opposite signs.

Thus, the sum of the transactions which occurred on the third day has no effect upon the magnitude of DD as measured by either the current or proposed definition. Since no change in the nonbank public's holdings of demand deposits occurred during day 3, this is as it should be.

Over the course of each of the three days in this example, demand deposit holdings of the nonbank public remained unchanged. As was the purpose of the example, we have shown that the sum of the events of each day have no effect upon the value of DD as measured according to either the current or the proposed definition.
Literature Cited


Footnotes

* An earlier version of this paper was completed in June 1974 while the author was a visiting professor with the Board of Governors of the Federal Reserve System. It was written for the consideration of a Special Committee created by the Federal Reserve to study the definition and measurement of the U.S. money stock. The committee members were George L. Bach (chairman), Phillip D. Cagan, Milton Friedman, Clifford Hildreth, Paul McCracken, Franco Modigliani, and Arthur M. Okun.

** Professor of Economics, Iowa State University. The author is indebted (with the usual reservations with respect to remaining errors) to Darwin Beck for explanations of some of the technical details involved in money stock measurement and to an anonymous referee for very helpful comments on an earlier version of this paper.


2. See [1], pp. 1108-1112, for a thorough and yet concise description of the problems connected with the use of commercial bank "cash items" in an attempt to correct for the double counting.

3. Before this date, the Federal Reserve did not publish a time series identified as the money stock (or money supply). However, the Bulletin did contain a table entitled "Consolidated Condition Statement for Banks and the Monetary System" in which demand deposits adjusted and
currency outside banks were reported. The demand deposits adjusted series was very frequently used by monetary economists as the demand deposit component of the money stock. Demand deposits adjusted are commercial bank demand deposit liabilities other than those due to domestic commercial banks, mutual savings banks, and the U.S. federal government; less commercial bank cash items in the process of collection.

4. FDD was also redefined in 1962 to include demand deposits that banks in U.S. territories and possessions hold at U.S. commercial banks. See [2].

5. A description of the Federal Reserve's interpolation procedure for nonmember bank data is contained in [3].

6. See [5] and [4].

7. These are subsidiaries of U.S. banks organized under the Edge Act of 1919 to engage in international banking.

8. Unlike FDD, PDD explicitly excludes demand deposit liabilities of U.S. commercial banks which are due to Edge Act corporations, U.S. agencies of foreign banks, and New York State investment companies.

9. This example is a modified version of one which appeared in the appendix of [4].

10. Similar examples can be constructed with a New York State investment company or a branch or agency of a foreign bank (rather than an Edge Act corporation) providing the financial transfer services.