THE IMPLICATIONS OF THE INTERNATIONALIZATION OF
BANKING FOR THE DEFINITION AND MEASUREMENT OF
U.S. CREDIT AND MONETARY AGGREGATES

by

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1. Introduction

Macroeconomic analysts often assume that a "closed economy" model

of a country or region captures almost all important economic relation-

ships. They presume that a "foreign" sector can be added to the model

but that, at least for a large country such as the United States,

qualitative results are unchanged and quantitative results are only

slightly affected. The use of national monies and other political,

geographical, and technological barriers to trade in goods and financial

assets provide some basis for this fundamental simplification.

Many important contributions in international finance can be viewed

as attempts to determine degrees of independence provided by national

currencies. These contributions include comparisons of fixed and flexible

exchange rates, proposals for identification of optimum currency areas,

suggestions for the appropriate assignment of policy instruments, and

statements of the policy implications of the monetary approach to the

balance of payments, or currency substitution.

This paper explores a feature of international economic relations

that may become as fundamental as the use of different national currencies.

That feature is the increasing lack of correspondence between the location

of real economic activity and financial transactions related to that real

activity.[1] This phenomenon is important regardless of the currency

denomination of financial transaction relevant to economic activity in

[1] For a comprehensive discussion of this problem see Bryant (2, 1980).

a country or region. Difficulties introduced by this lack of correspondence
in defining, measuring and controlling financial variables such as monetary
or credit aggregates could prove to be the crucial problem for economic
policy in the 1980s.[1]

This paper focuses on dollar-denominated transactions of U.S.
residents in banking markets and markets for government securities.
This emphasis is motivated by the fact that a large part of U.S. inter-
national financial transactions take place in these two markets. Moreover,
domestic open-market operations and foreign exchange market intervention
involve these financial markets. Finally, special attention is paid to
U.S. banks' assets and liability structure in evaluating financial
conditions in the United States.

The conclusions reached are that the international transactions of
U.S. residents are likely to continue to expand rapidly. Such trans-
actions are related to monetary policy and can affect the interpretation
of both domestic monetary and credit aggregates. For this reason, it is
important that a somewhat detailed analysis of international transactions
be a part of any interpretation of U.S. financial markets or financial
policy.

In the next two sections data from recent years is presented which
shows the rapid growth in both net private capital flows and roundtrip
flows. The remaining sections of the paper present an analysis of the

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[1] This phenomenon is in some ways similar to the problem addressed
in the currency substitution literature. That literature explores the
implications of substitution among non-interest-bearing monies issued by
different governments. This paper argues that U.S. residents can hold
dollar-denominated assets that do not reflect the cost of non-interest-
bearing high-powered money. Thus, the burden of the inflation tax and
incentive for currency substitution is considerably reduced. See Girton
and Roper (6,1980) for a discussion of currency substitution.

relationship between these two types of capital flows and U.S. monetary policies. It is shown that international financial transactions induced by a change in U.S. monetary policy can distort the behavior of U.S. residents holdings of monetary and credit aggregates at domestic financial institutions.

2.   International activities of
      commercial banks

The consolidated balance sheets of large money-market banks are perhaps the best indicators of the degree to which banking markets have become international. More than half of the assets and earnings of some large U.S. banks are related to foreign activities. In the aggregate, Federal Reserve member banks had assets of $312 billion at the end of 1979 in about 800 foreign branches. In addition, foreign banks have become important in the U.S. domestic market; their standard banking assets now total $130 billion constituting almost ten per cent of all such assets in the United States.

The increased volume of international transactions of U.S. banking offices is related to two fundamental developments.[1] The first is the role that private capital movements have played in the managed floating exchange rate regime as it has developed since 1973. The floating rate period has been marked by large current account imbalances that do not seem to adjust rapidly to exchange rate changes and by a very high degree of private capital mobility. Moreover, massive exchange market intervention by governments has allowed desired changes in private portfolios to result in both net private international transactions and

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[1] For further discussion of the development of international banking see Aliber (1,1976), Freedman (4, 1977), Grubel (7, 1977), Giddy (5,1981).

exchange rate changes. In this environment, total net private capital
flows reflect the reactions of the private sector to relative changes in
monetary policy and other shocks to the system. The international trans-
actions of banks, in turn, reflect the competitive position of banks in
financial intermediation between U.S. residents and nonresidents.

The second fundamental development has been the rapid growth of
round-trip capital flows. These are transactions essentially among U.S.
residents that are motivated by lower costs in transactions involving a
nonresident at some point in the chain of financial intermediation. The
primary cost considered in this paper is maintaining non-interest-bearing
reserves against domestic bank liabilities. These transactions are
neither directly related to payments imbalance nor to changes in the
demand for dollar assets, but instead are influenced by the level of
nominal dollar interest rates, a measure of the cost of non-interest-
bearing bank reserves.

3.   Banks' international transactions
      and net private capital flows

Table 1 shows annual data for four major components of the U.S.
balance of payments: the current account, foreign official capital flows,
bank-reported capital flows, and all other private capital transactions.
As shown in the Table, the international positions of U.S. banks are a
large and volatile component of U.S. international transactions.

For example, in 1977 and 1978 the U.S. current account deficit was
more than financed by official capital inflows related to official inter-
vention purchases of dollars. The counterpart of this was large private
capital outflows. Bank-reported flows made up the bulk of this outflow
as banks in the United States increased their net claims on the rest of

the world by over $20 billion over the two-year period. In 1979 this

pattern was reversed as a generally stronger dollar led to official

capital outflows and private inflows. U.S. banking offices again played

a dominant role in total private capital flows as they reduced their net

claims on nonresidents by $15 billion during the year.

Table 1. Selected Components of the U.S. Balance of Payments

(Millions of $, + = surplus or increase in net liabilities)

Year	Current Account	Changes in Foreign Official Assets in the U.S.	Private-Capital Transactions	
			Banks	All other
1973	7,140	5,090	-1,278	-9,401
1974	2,124	10,244	-3,499	-8,068
1975	18,280	5,509	-12,904	-8,080
1976	4,384	13,066	-10,378	-4,927
1977	-14,068	35,416	-4,708	-13,730
1978	-14,259	31,072	-17,372	-2,251
1979	-788	-13,556	15,529	3,278

The apparent relationship between banks' international

transactions and conditions in foreign exchange markets is not attributable

to changes in U.S. banks' foreign currency positions. At times during

1977 and 1978 the public was unwilling to hold dollar assets at existing

interest differentials and exchange rates; consequently, foreign central

banks became the residual buyers of dollar assets resulting in private

capital flows from the United States. Foreign official institutions

purchased Treasury securities, which are held almost exclusively by U.S.

residents, generating a record official capital inflow.

Official inflows in the form of Treasury security purchases were larger than the current account deficit; necessarily the difference was matched by private capital outflows. The "pull" from U.S. banking markets during most of this period clearly was generated by the "public's" desire to sell dollar-denominated assets to foreign central banks in return for foreign currency-denominated assets. However, this did not imply that U.S. banks acquired foreign-currency-denominated assets.[1] In fact, it appears that U.S. banks and other U.S. residents were induced to make dollar-denominated loans to nonresidents, who in turn sold dollars to foreign central banks. U.S. banks acquired funds by selling deposit and nondeposit liabilities to U.S. residents. U.S. banks in turn advanced funds to their offshore branches. The funds then were loaned to another bank or nonbank that wished to acquire a dollar-denominated liability and to sell the dollars borrowed for a foreign currency asset (e.g., a mark-denominated bank deposit). The motive for all these transactions was a nonresident's willingness to bid a bit more aggressively for a dollar loan, based on the judgment that the dollar's exchange value would fall. In 1979 the opposite flows were induced by a net private demand for dollar-denominated assets and official sales of dollars on foreign exchange markets.

4. Banks' international transactions
   and round-trip capital flows

Another factor behind the increased international activity of U.S. banks has been so-called "round-trip" capital flows. These transactions essentially involve U.S. residents and are motivated by lower intermediation costs associated with offshore transactions.

1/ See Lowrey and Smith (10, 1980).

Table 2 provides some data that are suggestive of the importance of round-trip capital flows. Columns 1 and 2 show domestic and Eurodollar CD interest rates expressed in terms of cost of funds to a U.S. office of a member bank of the Federal Reserve System. That is, the market yields are adjusted for reserve requirements. Reserve requirements against Eurodollar borrowings were lowered to zero in August 1978 while required reserves against domestic CD's were raised from 2.5 per cent to 4.5 per cent in October 1979. As shown in column 3, the reserve requirement adjusted differences in costs to banks were quite small as banks closely arbitraged these two sources of funds. Column 4 shows banks' utilization of Eurodollar borrowings. U.S. bank borrowings rose rapidly in 1978 and 1979, a rise that accounted for about half of all managed liabilities raised over the two-year period.

The first two columns of Table 3 show the yield available to nonbank investors on Eurodollar and domestic CD's. The differential in favor of Eurodollar deposits, column 3, remained fairly large throughout the period. The rapid buildup in holdings of Eurodollar deposits by U.S. residents, shown in column 4, might indicate an increasing sensitivity to such arbitrage opportunities; the remaining incentive suggests that there is scope for continued growth in this type of capital outflow.

5. International banking and U.S. policy

The very great involvement of U.S. banks and nonbanks in offshore markets has led to questions concerning the adequacy of monetary policy tools. The volume of capital flows, outlined above, has generated considerable unease concerning the effectiveness of monetary restraint. This section addresses some of these issues. The problem is that the

Table 2.   Relative Cost of U.S. and Eurodollar CD's and Outstanding
            Amounts of Eurodollar Borrowing of U.S. Banks

	Domestic CD's [1]/ (1)	Eurodollar CD's [1]/ (2)	Differential (1) – (2) (3)	Net Liabilities to Own Foreign Offices (4)
	(In per cent)			(In billions of US$)
1978				
January	7.68	7.89	-0.21	-2.3
February	7.68	7.90	-0.22	-2.4
March	7.60	8.45	-0.84	-3.3
April	7.82	8.02	-0.20	-0.5
May	8.32	8.46	-0.15	0.1
June	8.75	9.10	-0.35	1.3
July	9.10	9.36	-0.26	2.9
August	8.97	9.14	-0.17	2.2
September	9.53	9.72	-0.19	4.3
October	10.49	10.86	-0.37	6.9
November	12.18	12.36	-0.18	8.1
December	12.32	12.58	-0.26	6.3
1979				
January	12.11	12.28	-0.17	6.9
February	11.58	11.53	0.05	12.0
March	11.41	11.36	0.06	17.3
April	11.27	11.22	0.04	19.8
May	11.38	11.37	0.01	23.4
June	10.87	10.95	-0.09	27.0
July	11.14	11.28	-0.14	28.5
August	11.85	12.03	-0.18	33.1
September	13.14	13.26	-0.12	35.5
October	16.19	16.14	0.05	34.4
November	16.77	16.87	-0.09	34.6
December	16.09	16.32	-0.22	28.1

1/ Adjusted for reserve requirements applied to Federal Reserve
Member Banks.

Table 3. Relative Yields to Investors of U.S. and Eurodollar CD's
and Holdings of Eurodollar Deposits of U.S. Nonbank Residents

	Domestic CD (1)	Eurodollar Deposits (2)	Differential (2) - (1) (3)	Eurodollar Deposits (4)	Overnight Eurodollar Deposits (5)
	(In per cent)			(In billions of US$)	
1978					
January	7.49	7.89	0.41	14.1	1.1
February	7.49	7.90	0.41	15.3	1.1
March	7.41	8.45	1.03	16.1	1.2
April	7.62	8.02	0.39	16.7	1.3
May	8.11	8.46	0.35	17.8	1.4
June	8.53	9.10	0.57	19.3	1.5
July	8.87	9.36	0.49	20.5	1.6
August	8.74	9.14	0.40	21.6	1.7
September	9.29	9.72	0.42	21.0	1.7
October	10.23	10.86	0.63	21.2	1.8
November	11.63	12.36	0.73	23.0	1.9
December	11.77	12.58	0.81	22.8	2.0
1979					
January	11.56	12.28	0.71	24.5	2.3
February	11.06	11.53	0.47	27.1	2.6
March	10.90	11.36	0.46	28.4	2.8
April	10.76	11.22	0.46	29.1	2.8
May	10.87	11.37	0.50	29.6	2.8
June	10.38	10.95	0.57	29.9	2.9
July	10.64	11.28	0.64	31.4	3.0
August	11.32	12.03	0.71	33.9	3.3
September	12.55	13.26	0.71	33.4	3.6
October	14.52	15.23	0.71	33.2	3.5
November	14.68	15.52	0.84	34.0	3.2
December	14.08	15.01	0.93	31.9	3.6

relationship between geography, currencies, and financial intermediation
is becoming more and more tenuous. In this environment it is important
to distinguish between a change in the demand for dollar-denominated
assets and a change in the demand for financial intermediation located
in the United States. Although both these phenomena can create capital
flows, they have very different policy implications. Even more perplexing
is the possibility that a monetary policy action can affect both the
demand for dollars and the relative cost of onshore and offshore inter-
mediation. Because they are at the centers of both policy actions and
international capital movements, the behavior of commercial banks provides
the natural focus for the analysis. It should be remembered, however,
that changes in the competitive position of banks will have profound
impacts on the role of banks in international markets.

A monetary shock has two short-run impacts on capital flows. First,
a restrictive monetary policy generates both gross private capital inflows
and outflows. The motivation for such round-trip capital movements is
straightforward. It is often possible for U.S. residents to avoid reserve
requirements and other costs by introducing a foreign name into the chain
of financial intermediation. The benefits of this procedure are narrower
intermediation spreads and, therefore, either lower loan rates or higher
deposit rates or some combination of the two depending on the usual
elasticity conditions for sharing a tax burden. In general, for a given
reserve-requirement differential, a rise in interest rates resulting from
a restrictive monetary policy will increase the incentive to avoid reserve
requirements, i.e., the opportunity cost of non-interest-bearing reserves
is higher.

If offshore deposits are reserve-free, the 4.5 per cent reserve requirement on domestic deposits (as existed in 1979) generates about a 23 basis point advantage for offshore deposits when the deposit rate is 5 per cent, a 45 point advantage when the deposits rate is 10 per cent, and a 90 point advantage when interest rates reach 20 per cent. The increasing yield to investors of six months CD's, shown in Table 3 during 1979, roughly reflects this relationship. Thus, we should expect to see increased use of offshore markets by U.S. residents during periods of monetary restraint or rapidly rising inflationary expectations.

The second effect of a restrictive monetary policy on international financial transactions is to generate an incipient private capital inflow (an excess demand for dollar-denominated assets) and in turn upward pressure on dollar exchange rates. If this pressure is met by official sales of dollars (an official capital outflow), then some form of private capital inflow will be necessary to clear credit markets.[1] It appears that until quite recently commercial banks were the pre-eminent channel for such private capital flows.

6.   The Balance of Payments Constraint

Evaluating the effect of international financial transactions on the U.S. economy requires placing a given transaction, such as a loan from abroad obtained by a U.S. resident, in the context of its counterpart transaction in the balance of payments. A foreign loan may have as a counterpart a U.S. current account deficit. For example, the current account deficit requires U.S. residents (including the U.S. government)

1/   The market clearing conditions for stocks of assets, interest rates, and exchange rates are the focus of a large number of open economy models. For reviews see Henderson (8, 1977), Isard (9,1979), Dornbush (3, 1980). This paper focuses on the definition and measurement of endogenous variables.

to raise an equivalent amount of funds, net, from nonresidents to finance
the net imports of goods and services. Such credit may be obtained by
selling private claims, net, Treasury securities, or both to nonresidents.

Net U.S. indebtedness to nonresidents will not change as a result of
Federal Reserve policy unless the net U.S. expenditures on foreign goods
and services (the current account deficit) also changes. One would not
expect a program of monetary and credit restraint to have a significant
impact on these expenditures in the very short run. Hence, U.S. residents
in the aggregate cannot evade a restrictive credit policy by borrowing
more, net, from nonresidents. Eventually, as restraint curtails domestic
economic activity, thereby tending to reduce the current account deficit,
net U.S. borrowing from abroad would be reduced correspondingly.

7.   Implications of "round-trip" capital
      flows for measures of domestic monetary
      and credit aggregates

While the balance of payments identity insures that changes in net
indebtedness must be equal to the current account, there remain difficult
problems for measuring money and credit aggregates in a world with inte-
grated banking markets. Some of these problems can be illustrated with
the following simplified set of balance sheets. In the analysis to follow
the assumption of a balanced current account is maintained so that there
is no transfer of net worth between the nonbank sectors:

Country 1 (United States)

Nonbanks 1

D^{n11}	L^{n11}
D^{n12}	L^{n12}
	NW^{n1}

Banks 1

H^{b1}	D^{n11}
L^{n11}	D^{n21}
L^{n21}	
G^{b11}	

Country 2 (Rest of the World)

Nonbanks 2

D^{n22}	L^{n22}
D^{n21}	L^{n21}
	NW^{n2}

Banks 2

H^{b2}	D^{n22}
L^{n22}	D^{n12}
L^{n12}	
G^{b22}	

Monetary Authority 1

G^{m11}	H^{b1}

Monetary Authority 2

G^{m22}	H^{b2}
G^{m21}	

where D = bank deposits

    L = loans

    G = government securities

    H = high powered money

    NW = net worth (assumed constant)

Superscripts indicate holder, residence of holder and residence of issuer, respectively. For example D^{n12} = bank deposits held by U.S. nonbank residents at Rest of World Banks.

For simplicity we assume:

(a) no excess reserves so that: $r(D^{n11} + D^{n21}) = H^{b1}$

$$r(D^{n22} + D^{n12}) = H^{b2}$$

    where r is a reserve requirement.

(b) only banks hold government securities

(c) r is the same for all bank deposits

(d) there are no interbank deposits

In this simplified world total bank credit available to U.S. residents consists of loans from domestic banks, L^{n11}, and foreign banks, L^{n12}. U.S. residents also hold domestic deposits, D^{n11}, and foreign deposits, D^{n12}. It is clear from the Nonbank 1 balance sheet that the supply of bank credit available to U.S. nonbanks cannot change unless their deposits at U.S. and foreign banks change. While this seems obvious, it has the important implication that a measure of monetary aggregate that includes offshore and onshore deposits is also a comprehensive measure of bank credit available to U.S. residents.

In order to evaluate the effects of an open market operation initiated by the U.S. monetary authority we can focus on the monetary or credit aggregates that appear on the balance sheet of U.S. nonbanks.

A restrictive domestic open market operation implies:

$$(2) \quad - \Delta H^{b1} = \Delta G^{b11}$$

and given assumption (a):

$$(3) \quad - \frac{1}{r} \Delta H^{b1} = -\Delta D^{n11} - \Delta D^{n21} = -\Delta L^{n11} - \Delta L^{n21}$$

which states that the sum of U.S. banks' deposit liabilities to U.S. and foreign nonbanks must fall and the sum of U.S. banks' loans to U.S. and foreign nonbanks must fall by an amount equal to the open market purchase divided by the reserve ratio. In order to know the ultimate impact on U.S. nonbank residents we would have to add behavioral relationships to the system of identities and derive equilibrium conditions, a task beyond this paper. But by simply manipulating the identities it can be shown that:

$$(4) \quad - \frac{1}{r} \Delta H^{b1} = -\Delta L^{n11} - \Delta L^{n12} + (\Delta D^{n12} - \Delta D^{n21})$$

which states that the effect on bank credit available to U.S. residents,

$\Delta L^{n11} + \Delta L^{n12}$, is equal to the full reduction in credit issued by U.S.

banks, $-\frac{1}{r} \Delta H^{b1}$, unless U.S. residents increase their holdings of deposits

in foreign banks, ΔD^{n12}, or foreign nonbanks decrease their domestic holdings

in U.S. banks, $-\Delta D^{n21}$.

An important determinant of the scope for shifts in deposits by

nonbanks in the United States and abroad is the nature of the offshore

banking system. If it is subject to a binding reserve requirement:

$$(5) \quad D^{22} + D^{21} = \frac{1}{r} H^{b2}$$

and since $\frac{1}{r} H^{b2}$ is fixed, it follows that in order to avoid a reduction

of bank credit implied by a restrictive open market operation, U.S.

residents would have to induce foreign nonbanks to reduce their holdings

of bank deposits and bank credit. The scope for this is probably quite

limited.

If the offshore banking system is not subject to a binding reserve

requirment, or if U.S. nonbanks' deposits in foreign banks are not subject

to reserve as is currently the case in most instances, U.S. residents

can avoid the reduction in credit available at U.S. banks implied by a

restrictive open market operation by selling loans to foreign banks if

they are willing to hold additional deposits at foreign banks. This is

a more precise description of the round-trip capital flows discussed

above.[1] If this sort of transaction is quantitatively important, as we

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[1] Ultimately, the control of such a system depends on a stable relationship between the world monetary base and the total size of the world's banking system. For a demonstration that this is possible in a closed economy model without required reserves see Johnson (10, 1976).

showed earlier it has been in recent years, it is likely that measures

of domestic credit, $\hat{L}^{11}$, and the domestic monetary aggregate, D^{n11}, are

insufficient as a quantitative measure of U.S. nonbanks financial

position.

An implication of the above analysis is that the propensity of U.S.

residents to obtain credit from offshore sources depends in part on the

attractiveness of offshore deposits. As insitutional changes occur making

offshore deposits good substitutes for a wider range of domestic deposits,

the potential measurement problems increase correspondingly. Throughout

the 1970s, the growth in offshore deposits and other domestic alternatives

to bank liabilities was concentrated nontransactions-type assets. As

shown in Table 3, holdings of term Eurodollar deposits by U.S. nonbank

residents more than doubled in the two-year period shown. While the level

of such deposits remains small relative to similar domestic aggregates,

the rapid growth suggests an increased sensitivity of U.S. residents to

the higher yields available on reserve free deposits.

A potentially more serious measurement problem would be the

continued expansion of transactions-type balances at offshore banking

offices. Data now available suggest that demand deposits of U.S. banking

offices remained the dominant transactions asset for U.S. nonbanks in the

1970s. But there are no theoretical or technical reasons for this to

remain the case in the 1980s. Indeed, the change to same day settlement

for Eurodollar transactions expected in 1981 will be an important step

in this direction. As shown in Table 3, U.S. nonbank holdings of over-

night Eurodollars at the Caribbean offices of Federal Reserve member

banks has grown rapidly although the level of such deposits was only

about $3.5 billion by the end of 1979. The overnight Eurodollars shown
here are included in the Federal Reserve measure of M2.[1] Such deposits
are available the next business day without penalty and earn interest
near the federal funds rate. As reserve requirements on domestic trans-
actions accounts outside of Federal Reserve member banks are raised over
the next eight years (as the Monetary Control Act of 1980 is implemented)
and as international communications and corporate cash management techniques
improve further, there will be incentives for U.S. residents to make
increasing use of transactions balances in offshore banking offices.

Round-trip transactions can generate particularly difficult
measurement problems during periods when the pattern of bank participa-
tion in the process is altered. An example of such a period was October 6,
1979 through March 15, 1980, when the Federal Reserve imposed a marginal
reserve requirement on managed liabilities, including Eurodollar borrowings,
of U.S. banks. If binding, the marginal reserve requirement would have
increased the cost of funds to U.S. banking offices and, in turn,
resulted in less favorable lending terms. Rather than absorbing this
cost, U.S. borrowers were apparently able to deal directly with foreign
sources of credit.[2] It seems likely that this has contributed to very
large unrecorded capital inflows estimated to have been about $50 billion
in the four quarters ending in June 1980. Under these circumstances it
seems likely that domestic bank-credit aggregates were a smaller than

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1/ See Simpson (12, 1980) for a discussion of the monetary aggregates.
2/ While such borrowing made it possible for U.S. residents to avoid
the costs of the marginal reserve requirements, it did not allow the U.S.
nonfinancial sector to avoid the effects of the sharp increases in
market interest rates which followed the October 6 and subsequent
measures.

usual share of total credit available to U.S. residents over this period, and that the normal relationship betwen bank-reported and total private capital flows was significantly distorted.

8.   Implications of official intervention
     in foreign exchange markets for
     measures of domestic credit

A program of monetary and credit restraint generates higher (relative) interest rates on dollar-denominated assets, an increased demand for such assets and for net borrowing in foreign currencies by U.S. residents, and upward pressure on the exchange value of the dollar. If such pressure is met with official sales of dollars in foreign exchange markets, the private purchasers of the dollars will invest them, by definition, in dollar-demoninated assets.

The dollars might be invested in a loan to a U.S. nonfinancial corporation apparently adding to credit extended to U.S. private residents. But it would be incorrect to conclude that credit to U.S. private residents had expanded since one must also consider the other side of the foreign exchange market intervention. The foreign central banks first must have sold some dollar asset, in the most common case a U.S. Treasury security, to obtain the dollars sold in the exchange market intervention. Hence, the increase in dollar funds available for lending to the private sector is matched by an increase in the supply of Treasury securities that must be held by the private sector.

The balance sheets presented in the previous section can be utilized to show that capital flows associated with official intervention in foreign exchange markets do not, in themselves, affect total credit available to U.S. nonbanks.

Assume an official intervention sale of dollars is initiated by the foreign central bank and that it is fully sterilized so that $-\Delta G^{m21} = + \Delta G^{m22}$ and H^{B1} and H^{B2} are unchanged.[1]

Utilizing the balance of payments identity:

$$(6) \quad \Delta L^{n12} - \Delta D^{n12} - \Delta L^{n21} + \Delta D^{n21} - \Delta G^{m21} \equiv 0$$

and the U.S. Bank Balance Sheet Identity:

$$(7) \quad -\Delta D^{n11} - \Delta D^{n21} + \Delta L^{n11} + \Delta L^{n21} + \Delta H^{b1} + \Delta G^{b11} \equiv 0$$

And adding equations (6) and (7) and noting that $-\Delta G^{m21} = \Delta G^{b11}$:

$$(8) \quad \Delta L^{n12} + \Delta L^{n11} \equiv \Delta D^{n12} + \Delta D^{n11}$$

which states that the condition noted above, that total bank credit available to U.S. nonbanks depends only on the total bank deposits held by U.S. residents, is unaffected by sterilized intervention.

The ultimate holders of the U.S. Treasury securities will be determined by the relative preferences of different holders for various dollar assets. Most often a U.S. resident, and frequently U.S. commercial banks, have acquired Treasury securities as foreign central banks have sold them. To the extent that U.S. banks increased their holdings of Treasury securities, the amount of bank credit that they can provide (with a given level of deposits) to private U.S. residents is reduced by an amount equal to the increase in credit extended to U.S. residents from abroad.

However, data covering business loans extended by U.S. banking offices and other funds raised in U.S. credit markets will not encompass

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[1] In the case of U.S. intervention sales of dollars, the Treasury (or the Federal Reserve) would be selling additional Treasury securities in the market.

all the funds obtained by U.S. private borrowers. Thus, data on domestic banks credit and international capital flows must be analyzed together to obtain a complete picture. In practice, information on the international component is less comprehensive, and available with a longer lag, than information on the domestic component.

9. Conclusions

The factors identified in this paper that have led to the expansion of banks' international transactions suggest a continued rapid growth of such transactions in the 1980s. The implication of this process focused on in this paper is the increasing difficulty it generates for measuring monetary and credit aggregates relevant for evaluating the financial positions of U.S. nonbank residents. It is ironic that in a time when quantitative monetary and credit aggregates have played an increasing role in the implementation of monetary policy in many countries that the measurement of such aggregates is becoming increasingly difficult. In this regard the recent and potential growth of transactions-type deposits in offshore banking offices and the apparent inability of the balance of payments reporting system to capture recent capital inflows are particularly troublesome.

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