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Inflation and Personal Saving: An Update

CLAUDIA R. CAMPBELL and JEAN M. LOVATI

FROM 1965 to 1974, a decade of rapid inflation, households saved relatively more of their current income than they had in the previous decade of generally stable prices. Following the 1974 recession, however, the saving response of U.S. households to inflation appeared to undergo a major change. Despite the higher average rates of inflation from 1975-78, the proportion of current income saved fell below that of the previous decade (Table 1).

Earlier studies of inflation and household saving generally concluded that U.S. households respond to price level increases by cutting back on borrowing and spending, thereby increasing their saving.[1] Most of these studies encompass the period prior to 1975, before saving rates plunged to post-World War II lows. If the positive relationship between saving and inflation no longer holds, a rising rate of inflation in the future is no guarantee of higher average rates of household saving. This development could have an adverse effect on future economic growth since lower average rates of household saving tend to restrict the future supply of funds used for investment in plant and equipment.

This paper updates earlier investigations of the relationship between inflation and saving to include the years, 1975 through 1978. In particular, it examines the long-run saving response to inflation in order to determine whether the observed impact of inflation on saving is merely a temporary phenomenon.

The long-run effect of inflation on household saving was estimated previously in a 1977 study by Paul Wachtel. Wachtel found that the uncertainty generated by inflation helped to explain the persistent rise in saving with price level increases in the I/1955 to III/1974 period. Using Wachtel's model with a different measure of inflation uncertainty yields a long-run response of saving to inflation uncertainty that is positive but statistically insignificant over the I/1955-IV/1978 sample period. However, the composition of household assets — the forms of saving — is altered by changes in the rate of inflation. These results are consistent with traditional economic theory which indicates that inflation has no significant impact on saving in the long run except, under certain circumstances, to produce readjustment in the components of household wealth.

Table 1

Personal Saving and Inflation

Year	Personal Saving Rate[1]	Inflation Rate[2]
1955-64	5.8%	1.4%
1965-74	6.9	4.7
1975-78	5.9	7.2

[1]Personal saving/disposable personal income, average of annual rates.
[2]Annual rate of change in Consumer Price Index.

SOURCE: *Survey of Current Business.*

WACHTEL'S SAVING EQUATION

Wachtel assumed that the long-run effect of inflation on saving resulted from uncertainty created by higher and more variable inflation rates.[2] Because households are unable to forecast prices accurately,

[1]Recent work on this subject indicates that the positive response of saving to inflation is partially the result of uncertainty created by high and variable rates of inflation. See Paul Wachtel, "Inflation, Uncertainty and Saving Behavior Since the Mid-1950's," *Explorations in Economic Research* (Fall 1977), pp. 558-78. Coupled with uncertainty, household saving has been affected by the failure of corporate stocks to provide an adequate hedge against inflation. This is discussed in Philip Cagan and Robert Lipsey, *The Financial Effects of Inflation*, (Cambridge, Mass.: Ballinger Publishing Company, 1978). Another study suggests that households downgrade the quality of their purchases in response to a rise in the rate of price increases, producing the observed positive saving response to inflation. See Susan Burch and Diane Werneke, "The Stock of Consumer Durables, Inflation and Personal Saving Decisions," *The Review of Economics and Statistics* (May 1975), pp. 141-54.

[2]Some recent studies suggest that countries with higher average inflation rates experience more variation in the rate of inflation and that the variability of inflation contributes to the welfare costs of inflation. See A. Okun, "The Mirage of Steady Inflation," *Brookings Papers on Economic Activity* (2:1971), pp. 485-98, D. E. Logue, and T. D. Willet, "A Note on the Relation between the Rate and Variability of Inflation," *Economica* (May 1976), pp. 151-58, and E. Foster, "The Variability of Inflation," *Review of Economics and Statistics*, (August 1978), pp. 346-50.

Table 2

Derivation of National Income and Product Accounts Saving

	1978 (Billions of Dollars)	
(1) PERSONAL INCOME		$1,717.4
less Personal Tax and Nontax Payments (includes net payments to social security)	$259.0	
(2) DISPOSABLE PERSONAL INCOME (includes imputed rental income from owner-occupied housing)		1,458.4
less PERSONAL OUTLAYS		
(3) Personal Consumption Expenditures (includes consumer durables and mobile homes and imputed rental payments on owner-occupied housing)	1,350.8	
(4) Interest Paid by Consumers to Business	34.8	
(5) Personal Net Transfer Payments to Foreigners	0.8	
PERSONAL SAVING (2–(3+4+5)) (includes net investment in housing)		72.0

SOURCE: *Survey of Current Business.*

they become uncertain about future prices and real income and, as a result, save more. Wachtel asserted that other effects of inflation on saving, such as money illusion, intertemporal substitutions, and indirect wealth and interest rate effects, have no lasting influence on saving behavior.

In order to test this hypothesis, Wachtel used the stock adjustment demand function developed earlier by Houthakker and Taylor.[3] According to the specifications of this model, real saving per household (q) is a linear function of the stock of accumulated real saving (s), real income per household (y), and inflation uncertainty (X):

$$(1) \qquad q = \alpha + \beta s + \gamma y + n_x X$$

In addition, the stock of past real saving (s) is assumed to depreciate at a constant rate, δ, per year.

Thus, the change in the stock of real saving ($\dot{s}$) over a given time (t) can be represented by:

$$(2) \qquad \dot{s}(t) = q(t) - \delta s(t)$$

and used to transform the structural equation into one containing only flow variables. In its reduced form, Wachtel's estimated equation was:

$$(3) \quad q_t = A_0 + A_1 q_{t-1} + A_2 \Delta y + A_3 y_{t-1} + A_4 \Delta X + A_5 X_{t-1}$$

Because the structural parameters β and δ are overidentified, n_x (the inflation uncertainty coefficient) is not readily obtainable from the reduced-form equation.[4] Nevertheless, the long-run effect of inflation uncertainty can be calculated from the coefficient on the lagged variable X_{t-1}, where the long-run effect of uncertainty (ϕ_x) equals $A_5/(1-A_1)$.

Wachtel estimated equation (3) using both National Income and Product Accounts (NIA) and flow of funds (FOF) accounts saving per household, deflated by the personal consumption expenditures deflator. Disposable personal income, similarly deflated, was used as the income variable. Inflation uncertainty was measured by the average variance in households' assessment of future price increases as obtained from Survey Research Center surveys.

The Saving Data

NIA saving is basically the residual after deducting current outlays for goods, services, and interest payments from current disposable personal income (Table 2). Disposable personal income consists of the after-tax receipts of households from wages and salaries, interest income, rent, dividends, and net transfer payments. Capital gains are not included. The rental value of owner-occupied housing is imputed and added to both personal disposable income and personal consumption expenditures. Since purchases of new housing are excluded from personal consumption expenditures, net investment in housing by households is included as a component of personal saving. Nonconsumed income, held in the form of currency, demand deposits, bonds, stocks, or pension funds, is incorporated into net financial investment. Thus, the major assets into which NIA saving flows are net housing investment and net financial investment.

The measure of household saving in the FOF accounts is also a residual, in this case, from the measured transactions among all other sectors of the economy (Table 3). In addition to net financial investment and net housing investment, FOF household saving includes capital gains dividends, additions to government pension funds, and net durable goods investment.

[3]H. S. Houthakker and Lester D. Taylor, *Consumer Demand in the United States, 1929-1970: Analysis and Projections*, (Cambridge, Mass., Harvard University Press, 1966).

[4]Two distinct values for β and δ are generated from the reduced-form coefficients. For a technique to deal with this problem, see Ibid., pp. 21-25.

FOF saving during the post-war period has been consistently higher than NIA saving even after adjustments for these compositional differences. Measurement errors in both series account for some portion of the discrepancy. In addition, capital gains from the sale of real estate and other durable assets (art and antiques, for example) to the business sector may add to the observed difference in the two measures. These transactions would amplify the discrepancy during periods of rising inflation.

Table 3

Derivation of Flow of Funds Accounts Saving
(Year end, total flows)

	1978 (Billions of Dollars)	
(1) INCREASE IN FINANCIAL ASSETS		$245.9
Demand Deposits & Currency	$ 18.2	
Time and Savings Accounts	105.3	
Credit Market Instruments (Government Securities, Corporate & Foreign Bonds, Mortgages, Commercial Paper, Money Market Funds)	64.9	
Investment Company Shares	−1.0	
Other Corporate Equities	−5.2	
Life Insurance and Pension Fund Reserves	77.8	
Net Investment in Noncorporate Business	−23.1	
Security Credit & Miscellaneous Assets	9.0	
GROSS INVESTMENT IN TANGIBLE ASSETS		$298.2
Nonfarm Homes (includes mobile homes)	92.0	
Consumer Durables	200.3	
Nonprofit Plant & Equipment	5.9	
less CAPITAL CONSUMPTION ALLOWANCES		181.0
Nonfarm Homes (includes mobile homes)	32.8	
Consumer Durables	142.8	
Nonprofit Plant & Equipment	5.4	
(2) NET INVESTMENT IN TANGIBLE ASSETS		117.2
(3) NET INCREASE IN LIABILITIES		166.4
Mortgages	104.7	
Consumer Credit	50.6	
Bank Loans & Other Loans	7.2	
Security Credit, Trade Debt, & Miscellaneous	3.9	
NET SAVING (1+2−3)		196.7

SOURCE: Board of Governors of the Federal Reserve System.

Wachtel's Results

Wachtel obtained a significant positive response to inflation uncertainty for real NIA saving per household over the sample period, I/1955-III/1974. He found that a 1 percent rise (fall) in inflation uncertainty resulted in a $69 increase (decrease) per household in real NIA saving. The inflation uncertainty coefficients in the reduced-form equation, however, were statistically insignificant using the similarly-deflated FOF saving data.

When FOF saving was disaggregated into its components — net increases in financial assets, net increases in liabilities, and net increases in tangible assets (mainly housing and durable goods) — Wachtel discovered that increased uncertainty about inflation reduced net increases in liabilities and tangible assets. The reduced-form coefficients on inflation uncertainty for net increases in financial assets were negative, but statistically insignificant. Inflation uncertainty had a positive and significant effect, however, on net financial investment (net increases in financial assets less net increases in liabilities).

When Wachtel used actual price changes as the inflation variable, he found that inflation exerted a positive and statistically significant influence on both NIA and FOF saving. He concluded that inflation and the uncertainty it creates made households reluctant to acquire additional debt in order to purchase tangible assets. As a result, real saving per household rose.

INFLATION AND SAVING: 1955-1978

In an inflationary economy, uncertainty about future prices and real income results from the unexpected variation of prices around the generally anticipated rate of inflation. Thus, in this analysis, the uncertainty variable is approximated by using an estimate of unanticipated changes in the rate of inflation. Wachtel's equation was respecified to include measures of unanticipated (X) and anticipated (Z) inflation. The reduced-form equation in this analysis is:

$$(4) \qquad q_t = A_0 + A_1 q_{t-1} + A_2 \Delta y + A_3 y_{t-1} + A_4 \Delta X + A_5 X_{t-1} + A_6 \Delta Z + A_7 Z_{t-1}$$

The coefficients on anticipated inflation (Z) and on the estimated long-run effect (ϕ_z) are not expected to be statistically different from zero. This result is

Table 4

Regression Results for NIA Saving*

I/1955 - III/1974

$$q_t = \underset{(.88)}{-107.18} + \underset{(12.60)}{.85q_{-1}} + \underset{(7.02)}{.55\Delta y} + \underset{(1.19)}{.02y_{-1}} + \underset{(1.76)}{23.88\Delta X} + \underset{(2.30)}{11.23X_{-1}} - \underset{(1.12)}{54.80\Delta Z} + \underset{(.04)}{.41Z_{-1}}$$

$\bar{R}^2 = .91$ D.W. = 2.28 $\phi_x = \underset{(1.45)}{75.17}$ $\phi_z = \underset{(.04)}{2.76}$

I/1955 - IV/1978

$$q_t = \underset{(.63)}{76.45} + \underset{(15.50)}{.93q_{-1}} + \underset{(9.84)}{.65\Delta y} - \underset{(.44)}{.01y_{-1}} + \underset{(3.36)}{40.09\Delta X} + \underset{(3.48)}{13.76X_{-1}} + \underset{(.02)}{.82\Delta Z} + \underset{(.43)}{4.39Z_{-1}}$$

$\bar{R}^2 = .87$ D.W. = 2.24 $\phi_x = \underset{(1.10)}{190.58}$ $\phi_z = \underset{(.39)}{60.80}$

*t-statistics are reported in parentheses.

consistent with the explanation that only unanticipated inflation produces the uncertainty effect obtained by Wachtel. Furthermore, economic theory suggests that fully anticipated inflation has no lasting effect on saving behavior.[5] Thus, unanticipated inflation (X) is expected to be the only source of a positive long-run relationship between household saving and inflation.[6]

Since empirical evidence has shown that there is a direct relationship between lagged money growth and the fundamental rate of inflation, a 20-quarter rate of change in the narrowly-defined money supply, M1, was initially used as a proxy for anticipated inflation.[7] The difference between a four-quarter rate of change in the Consumer Price Index (CPI), a well-publicized indicator of price change, and the money supply variable above was used to measure unanticipated inflation. All other data used to estimate equation (4) are the same as those previously used in Wachtel's study.

The equation was estimated over two sample periods: I/1955-III/1974 (the period used by Wachtel) and I/1955-IV/1978. A significantly different effect of unanticipated inflation on saving behavior before and after III/1974 would suggest that the household saving response to inflation had, in fact, changed.

Inflation and NIA Saving

Consistent with the analysis above, anticipated inflation (Z) and its long-run effect (ϕ_z) were found to have no significant impact on saving as measured in the NIA in either sample period (Table 4). Furthermore, the lagged variable of unanticipated inflation had significant positive effects on NIA saving in both periods.

When the long-run effect of unanticipated inflation (ϕ_x) is examined for the 1955-74 period, a 1 percent rise (fall) in the rate of unanticipated inflation produced a $75 rise (fall) in real saving per household. Over the longer sample period, this effect becomes more than twice as great: A 1 percent rise (fall) in the rate of unanticipated inflation resulted in about a $192 rise (fall) in real saving per household. *In neither sample period, however, was the long-run effect significantly different from zero at the 95 percent level of confidence.*

To determine whether these findings depend upon the disaggregation of inflation into anticipated and unanticipated price changes, the saving relationship was reestimated using lagged and first differences of the actual rate of inflation, measured by a four-quarter rate of change in the CPI. The initial results prevailed: The reduced-form coefficients showed a sig-

[5]A wealth loss could result even with fully anticipated inflation because of the increased costs of using money as a medium of exchange and a store of value. This effect on real wealth could have an impact on saving and consumption. For a discussion of the costs of anticipated inflation, see John A. Tatom, "The Welfare Costs of Inflation," this *Review* (November 1976), pp. 9-22.

[6]The positive relationship between unanticipated inflation and saving is supported by the results of several studies. See, for example, F. Thomas Juster and Paul Wachtel, "Inflation and the Consumer," *Brookings Papers on Economic Activity* (1:1972), pp. 71-121 and Joseph Bisignano, "The Effect of Inflation on Savings Behavior," Federal Reserve Bank of San Francisco *Economic Review* (December 1975), pp. 22-26.

[7]See Denis S. Karnosky, "The Link Between Money and Prices — 1971-76," this *Review* (June 1978), pp. 17-23.

Table 5

Regression Results for FOF Saving*

I/1955 - III/1974

$$q_t = \underset{(1.77)}{-548.24} + \underset{(3.99)}{.41q_{-1}} + \underset{(3.90)}{.68\Delta y} + \underset{(2.82)}{.12y_{-1}} + \underset{(.71)}{22.76\Delta X} - \underset{(1.38)}{15.95X_{-1}} - \underset{(.14)}{16.08\Delta Z} + \underset{(.23)}{5.46Z_{-1}}$$

$\bar{R}^2 = .85$ D.W. = 2.41 $\phi_x = \underset{(1.26)}{-27.06}$ $\phi_z = \underset{(.23)}{9.26}$

I/1955 - IV/1978

$$q_t = \underset{(.98)}{-286.62} + \underset{(4.00)}{.38q_{-1}} + \underset{(4.44)}{.62\Delta y} + \underset{(2.38)}{.09y_{-1}} + \underset{(.82)}{21.70\Delta X} - \underset{(.91)}{8.42X_{-1}} + \underset{(.70)}{74.51\Delta Z} + \underset{(1.06)}{23.86Z_{-1}}$$

$\bar{R}^2 = .81$ D.W. = 2.36 $\phi_x = \underset{(.94)}{-13.53}$ $\phi_z = \underset{(1.05)}{38.44}$

*t-statistics are reported in parentheses.

nificant positive relationship between saving and inflation, but this relationship was statistically insignificant in the long run. In summary, the existence of a significant long-run positive effect of inflation on NIA saving is not supported by the results whether a measure of inflation uncertainty or the actual inflation rate is used.

Inflation and FOF Saving

When using FOF saving, Wachtel obtained a positive effect of inflation on saving only when the actual inflation rate was substituted for his measure of inflation uncertainty. The analysis of FOF data in this study, however, reveals no such relationship. Furthermore, neither unanticipated inflation nor anticipated inflation have a significant impact on FOF saving in either sample period (Table 5). Wachtel's results showing a positive effect of actual inflation on FOF saving may be due to the estimates of depreciation of tangible assets used in his study. When Wachtel published his results, the revised estimates that are incorporated in the FOF data used in this update were not available.

Although FOF saving is not significantly affected by either inflation or inflation uncertainty, its components could be altered by adjustments across various household asset categories. Adjustments that reduce purchases of durable goods relative to other assets would appear as increased NIA saving with rising inflation. This occurs because durable goods purchases are classified as consumption expenditures in the NIA.

To investigate this aspect of the impact of inflation, the saving model was estimated using, as dependent variables, the three components of FOF saving: net acquisitions of financial assets, net increases in financial liabilities, and net investment in tangible assets. Tangible asset acquisitions were disaggregated into net housing and net durable goods investment.

As indicated in Table 6, the reduced-form coefficient on the lagged variable for unanticipated inflation is statistically significant and negative in the net durable goods investment equation over both sample periods. The long-run effect, which is not statistically significant from 1955-74, is significant in the longer sample period. The estimate of the long-run effect suggests that an increase (decrease) of 1 percent in the rate of unanticipated inflation induced a reduction (expansion) in real net durable goods investment of $45 per household in the 1955-78 sample period. This result is consistent with a rise in NIA saving in response to a rise in unanticipated inflation.

Net housing investment appears to be strongly affected by both anticipated and unanticipated inflation in the reduced-form equation. The long-run effects of anticipated and unanticipated inflation on housing investment, however, are not statistically significant in either sample period.

When net durable goods and housing investment are aggregated into net increases in tangible assets, a significant long-run relationship with both anticipated and unanticipated inflation is obtained for the 1955-74 sample period. A 1 percent increase (decrease) in the rate of unanticipated inflation produces a $63 per household decrease (increase) in real tangible asset acquisitions. At the same time, the effect of anticipated inflation on saving is almost twice as strong, but positive: A 1 percent rise (decline) in the

rate of anticipated inflation produces a $107 per household rise (decline) in real net tangible asset investments.

Over the longer sample period, the positive effect of anticipated inflation on household investment in tangible assets dissipates.[8] Only unanticipated inflation continues to exert an influence on net tangible asset investment that is statistically significant in the long run. In the period, I/1955 to IV/1978, a decline (increase) in the rate of unanticipated inflation by 1 percent induced a rise (decrease) in net purchases of tangible assets of $102 per household, nearly double the impact of the I/1955 to III/1974 period.

As separate components, net increases in financial assets and liabilities generally are not affected by anticipated or unanticipated inflation (Table 7). Neither the reduced-form results nor the long-run relationship between the inflation variables and the financial asset and liability components of FOF saving is statistically significant in either sample period. When net increases in financial assets and liabilities are combined (called net financial investment), however, a statistically significant positive long-run response to unanticipated inflation results, but only over the 1955-78 sample period.

Assuming an anticipated rate of inflation of about 6 percent from 1974 to 1976, these findings suggest that the decline in the rate of inflation from 11 percent in 1974 to 5.6 percent in 1976 resulted in a reduction in real net financial investment of approximately $280 per household, or $20 billion, and a net increase in real durable goods investment of about $243 per household, or $17 billion from 1975 to 1977. Therefore, the effects of this reduction in unanticipated inflation would have contributed to the observed decline in NIA saving in that period.

Table 6

Tangible Asset Component of FOF Saving*

	Net Increase in Housing Investment		Net Increase in Durable Goods		Net Increase in Tangible Assets	
	1955-74	1955-78	1955-74	1955-78	1955-74	1955-78
Constant	224.51	−8.67	−52.07	−205.71	349.58	57.29
	(3.04)	(.16)	(.52)	(2.27)	(2.97)	(.49)
Lagged Dependent Variable	.87	1.01	.69	.61	.73	.81
	(17.54)	(31.17)	(8.80)	(7.86)	(10.57)	(12.74)
Δy	−.002	.01	.19	.12	.17	.12
	(.07)	(.48)	(3.30)	(2.84)	(2.43)	(2.06)
y_{t-1}	−.02	−.002	.01	.03	−.03	.002
	(3.13)	(.31)	(.81)	(2.60)	(1.92)	(.16)
ΔX	−7.05	−15.41	0.56	−1.68	−4.99	−18.43
	(1.25)	(3.30)	(.05)	(.18)	(.35)	(1.37)
X_{t-1}	−4.56	−4.36	−10.90	−17.72	−17.10	−19.12
	(2.32)	(2.93)	(2.56)	(5.20)	(3.17)	(4.27)
ΔZ	40.01	21.53	55.41	20.17	83.50	25.95
	(2.10)	(1.22)	(1.53)	(.64)	(1.85)	(.58)
Z_{t-1}	15.17	5.86	10.65	3.18	29.15	13.11
	(3.37)	(1.50)	(1.41)	(.47)	(3.03)	(1.36)
$\bar{R}^2$	.95	.95	.91	.90	.89	.88
D.W.	1.33	1.36	1.98	2.02	1.53	1.63
ϕ_x	35.08	322.96	−34.60	−44.89	−63.33	−102.36
	(1.50)	(1.03)	(1.77)	(2.86)	(1.98)	(1.96)
ϕ_z	118.52	434.07	33.81	8.06	107.96	70.18
	(1.72)	(.15)	(1.34)	(.48)	(2.17)	(1.16)

*t-statistics are reported in parentheses.

ALTERNATIVE SPECIFICATIONS

Several alternative measures of anticipated and unanticipated inflation were used in reestimating equation (4). First, an anticipated inflation series was generated using forecasts of future price changes from the Livingston survey.[9] These semiannual forecasts were interpolated to create a quarterly data series and the difference between the expected rate of price change generated by these forecasts and the actual inflation rate was used as the measure of unanticipated inflation. Under this specification, both unanticipated and anticipated inflation showed a positive long-run effect on NIA saving in the 1955-74 sample period, which contradicts the hypothesis that anticipated inflation has no long-run effect on saving.

[8]The trend growth of money — anticipated inflation — tended to stabilize around a 6 percent annual rate after 1972, providing no further positive impetus to tangible asset acquisition. This is consistent with a one-time shift from money to goods resulting from the transition to a higher expected rate of inflation.

[9]J. A. Livingston, "Business Outlook," *The Philadelphia Record*, June 1954-December 1978.

Table 7

Financial Asset and Liability Components of FOF Saving*

	Net Increase in Financial Assets		Net Increase in Liabilities		Net Financial Investment	
	1955-74	1955-78	1955-74	1955-78	1955-74	1955-78
Constant	−964.49	−929.06	137.57	−55.51	−1296.01	−338.36
	(2.30)	(2.27)	(.63)	(.26)	(3.67)	(1.02)
Lagged Dependent Variable	.47	.46	.77	.93	.29	.50
	(4.01)	(4.93)	(9.47)	(17.35)	(2.63)	(5.21)
Δy	.60	.68	.11	.07	.51	.49
	(2.73)	(3.95)	(.77)	(.65)	(2.87)	(3.14)
y_{t-1}	.16	.15	−.01	.01	.18	.06
	(2.81)	(2.76)	(.27)	(.24)	(3.95)	(1.41)
ΔX	−9.49	−20.40	−41.88	−73.98	−2.77	.98
	(.23)	(.63)	(1.62)	(3.50)	(.09)	(.03)
X_{t-1}	−20.43	−8.02	−16.14	−13.80	16.34	26.06
	(1.38)	(.71)	(1.64)	(1.93)	(1.46)	(2.67)
ΔZ	64.41	61.43	128.95	39.89	−76.00	66.24
	(.46)	(.47)	(1.47)	(.50)	(.67)	(.57)
Z_{t-1}	−7.48	10.92	21.32	10.49	−42.51	3.91
	(.25)	(.39)	(1.17)	(.61)	(1.7)	(.16)
$\bar{R}^2$	.84	.86	.80	.86	.78	.71
D.W.	2.28	2.30	2.60	2.49	2.17	2.26
ϕ_x	−36.29	−14.89	−69.33	−206.59	23.15	51.81
	(1.48)	(.69)	(1.84)	(1.03)	(1.41)	(2.27)
ϕ_z	−13.28	20.28	91.58	157.03	−60.22	7.76
	(.25)	(.39)	(1.05)	(.55)	(1.54)	(.16)

*t-statistics are reported in parentheses.

A second measure of anticipated inflation was obtained using a series developed in a recent study by Scadding.[10] His series takes into account the way in which people revise their estimates of the underlying inflation rate when actual prices turn out differently from expected. The Scadding data produced a positive and significant relationship between NIA saving and unanticipated inflation in the reduced-form equation. In addition, the positive long-run effect of unanticipated inflation on NIA saving was statistically significant at the 90 percent level over both sample periods.

Although these alternative measures of inflation anticipations yield positive long-run relationships between inflation and NIA saving, they show no effect of inflation on FOF saving. Wachtel encountered this same dichotomy in his analysis — the results are sensitive to the saving measure used.

Conclusions

As an update to previous work on the relationship between inflation and saving, this study finds no conclusive evidence that inflation has a positive long-run effect on saving. FOF saving, which represents net additions to household wealth, is not affected by any measure of inflation or inflationary anticipations used in the analysis. NIA saving, a narrower measure, is not affected by actual inflation nor by unanticipated inflation derived from the difference between actual prices and lagged money growth. The use of Livingston survey and Scadding data, however, produce a positive relationship between unanticipated inflation and NIA saving. Both Livingston and Scadding data are sensitive to the saving measure used.

Unanticipated inflation had a significant long-run effect on the components of saving over the 1955-78 sample period. Rising rates of unanticipated inflation reduced durable goods investment and increased net financial investment. The observed positive relationship between inflation and NIA saving is due, in large part, to the negative effect of unanticipated inflation on durable goods purchases, which are classified as consumption expenditures in the NIA.

[10]John L. Scadding, "Estimating the Underlying Inflation Rate," Federal Reserve Bank of San Francisco *Economic Review* (Spring 1979), pp. 7-18.

Does Eurodollar Borrowing Improve the Dollar's Exchange Value?

DAVID H. RESLER

"In a further move to improve the international position of the dollar, the Board of Governors on August 28, 1978, announced a change in reserve requirements to make it more attractive for member banks to borrow funds in the Eurodollar market. . . . The new action involves a reduction from 4 percent to zero in the reserve requirement on foreign borrowings of member banks, primarily Eurodollars, from their foreign branches and other foreign banks."[1]

Federal Reserve BULLETIN, *September 1978.*

EARLY in 1978, the dollar began to decline sharply in value in the foreign exchange markets. This dramatic decline, shown in Chart 1, precipitated several Federal Reserve policy actions, culminating in last November's comprehensive dollar rescue effort undertaken in cooperation with the Treasury. This action consisted of a combination of dollar-supporting efforts including an expansion of both direct foreign exchange intervention and swap arrangements, and an announced increase in the discount rate. While these actions seem to have successfully abated the dollar's decline, the desired *improvement* in the dollar's international position has been modest.

The action taken last November was the most dramatic of several actions taken to support the dollar.[2] The quotation above identifies another such dollar-supporting move. By removing the reserve requirements against Eurodollar borrowing, the Fed intended to encourage the use of this source of funds in order to generate a net increase in the demand for the dollar and thereby increase its foreign exchange value. This paper examines analytically the conditions under which removal of these reserve requirements would improve the dollar's foreign exchange value. Available data relating to Eurodollar borrowing offer little evidence that this policy initiative has fulfilled its intentions.

THE EURODOLLAR MARKET: AN OVERVIEW

Eurodollars are simply dollar-denominated deposits placed in a bank outside the United States. Anyone may own Eurodollars and these owners may reside in a foreign country or in the United States. They may

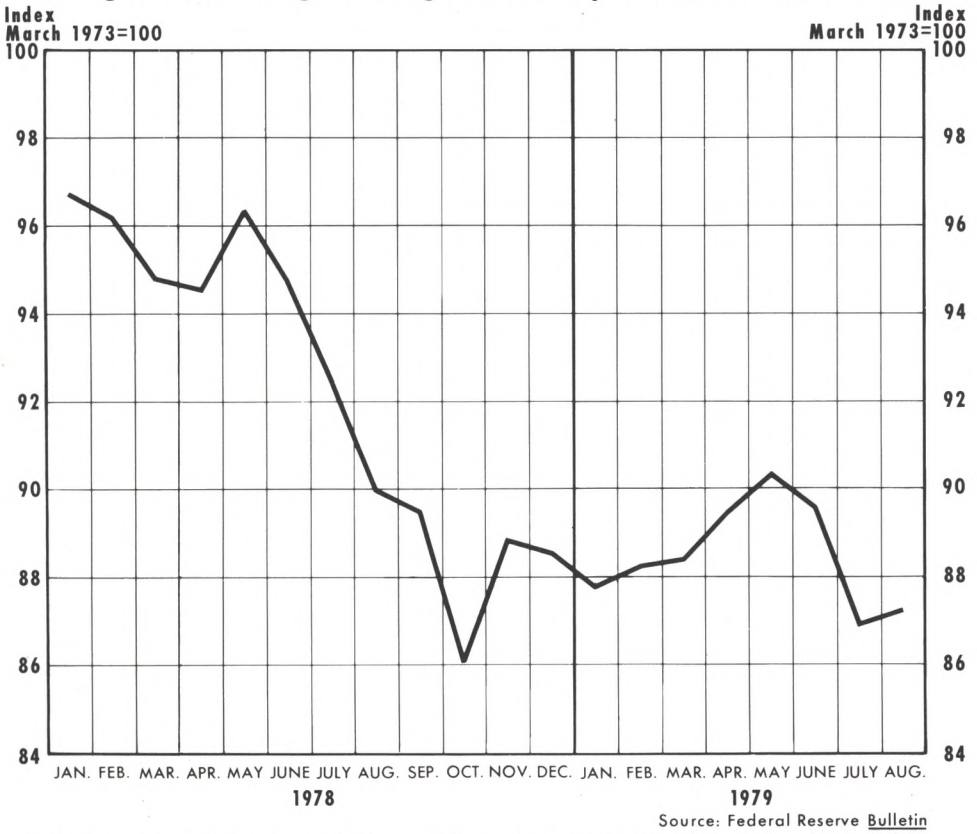
As this article was published, the Federal Reserve announced a comprehensive change in policy that includes Eurodollar borrowing. Eurodollar borrowing will be included in the calculation of "managed liabilities." Increases in the total of these managed liabilities above a base level will be subject to an 8 percent marginal reserve requirement. This action, however, does not remove the differential reserve requirement between large CDs and Eurodollar borrowing. In fact, the new policy action may further stimulate the substitution of Eurodollars for large CDs that this paper examines.

[1] Federal Reserve *Bulletin* (September 1978), p. 777. The regulations affected by this policy action are Regulations D and M. Regulation D specifies the reserve requirements member banks must meet for various liability classifications. Regulation M governs the Federal Reserve's treatment of foreign branch banks. It is important to note that the computation of the reserve requirement against "Eurodollar borrowings" was actually on *net balances* due to foreign branches.

[2] In addition to the action indicated in the quotation, the Federal Reserve has increased the discount rate several times during the past year. For an assessment of the effect of these discount rate changes on the exchange rate, see Douglas R. Mudd, "Did Discount Rate Changes Affect the Foreign Exchange Value of the Dollar During 1978?" this *Review* (April 1979), pp. 20-26.

Chart 1

Weighted Average Foreign Currency Value of the Dollar[1]



Source: Federal Reserve Bulletin

[1] The countries included in the weighted-average foreign interest rate and exchange rate series are Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, and the United Kingdom. The weights and formula used in constructing these series are from "Index of the Weighted-Average Exchange Value of the U.S. Dollar: Revision," Federal Reserve Bulletin (August 1978).

be private citizens, nonfinancial corporations, other banks or financial intermediaries, or official institutions of foreign governments.

Motives for holding Eurodollars are equally diverse. The primary motive, however, is that Eurodollars are short-term dollar-denominated assets which pay an attractive yield. Those extensively engaged in international trade view the market as especially convenient. With a large volume of trade ultimately conducted in dollars, the Eurodollar market provides a relatively high yielding outlet for dollar balances that obviates much of the risk and transactions costs associated with converting them into a foreign asset or with investing them directly in U.S. capital markets.

Despite the "Eurodollar" designation, the market is not exclusively located in Europe. Though the largest part of the market's activity takes place in London, the rest of Europe and such diverse locations as Singapore, the Bahamas, and the Cayman Islands account for a substantial volume of Eurodollar activity.

Regardless of their location, Eurodollar banks (Eurobanks) perform an intermediary function similar to that of other banks. They issue liabilities (that is, they accept deposits) which they use to acquire earning assets, primarily loans to customers and financial investments such as bonds, commercial paper, and so on. As with other intermediaries, Eurobanks' profits are the differential between earnings received on their assets and the costs of their liabilities.

Eurodollar deposits differ from domestic U.S. bank deposits in one often overlooked but very important respect: Generally, liabilities of Eurobanks are not "checkable deposits." Eurodollar depositors cannot write drafts on their deposits. In other words, Eurodollars are not "money" in the same sense that demand deposits and U.S. currency are money. Eurodollars are, instead, most comparable to various "near-monies" like large denomination certificates of deposit (CDs).[3]

THE RELATIONSHIP BETWEEN THE U.S. BANKING SYSTEM AND EURODOLLARS

There are two important links between the Eurodollar market and the U.S. banking system. First, and most important to this discussion, many Eurodollar banks are branches or subsidiaries of U.S. commercial banks. This means that U.S. parent banks have an aux-

[3] The degree of liquidity of Eurodollars varies with the term to maturity of the deposit. The maturity of Eurodollar deposits ranges from overnight to, more typically, 30 days or more. The extent to which Eurodollars add to the world's liquid balances and thereby represent a source of world inflation is perhaps the most controversial aspect of the market. For a recent discussion of this problem, see Adrian W. Throop, "Eurobanking and World Inflation," *Voice of the Federal Reserve Bank of Dallas* (August 1979), pp. 8-23.

Table 1

Effective Cost of Bank Liabilities*

		(1) Eurodollar Borrowing	(2) Certificates of Deposit	(3) Difference
1977	August	6.56%	6.29%	.27%
	September	6.83	6.57	.26
	October	7.44	6.64	.80
	November	7.39	7.11	.28
	December	7.42	7.15	.27
1978	January	7.63	7.37	.26
	February	7.58	7.33	.25
	March	7.57	7.29	.28
	April	7.69	7.48	.21
	May	8.15	7.89	.26
	June	8.68	8.32	.36
	July	8.88	8.63	.25
	August	8.83	8.56	.27
	September	9.12	9.16	−.04
	October	10.12	10.02	.10
	November	11.51	11.65	−.14
	December	11.62	11.63	−.01
1979	January	11.16	11.41	−.25
	February	10.79	11.07	−.28
	March	10.64	11.01	−.37
	April	10.60	10.92	−.32
	May	10.75	11.03	−.28
	June	10.52	10.82	−.30
	July	10.87	10.99	−.12
	August	11.53	11.62	−.09

*Calculations are based on the reported daily average yield for each type of liability and the applicable reserve requirements.

SOURCE: Federal Reserve *Bulletin* and the Federal Reserve Bank of St. Louis.

iliary source of funds for their domestic operations. Specifically, a U.S. parent bank may use the special relationship with its branch to obtain liabilities (that is, to borrow from its branch) when domestic sources of funds become constrained. This occurred, for example, in 1968-69 when restrictive monetary policy, coupled with Regulation Q deposit ceilings, dried up domestic sources of funds, thereby encouraging U.S. banks to utilize credit lines with their foreign branches. At other times, this relationship between parent and branch has resulted in a net flow of funds from the parent to the branch. This was, in fact, typical of the market from 1975 until early this year.

The second important link between the U.S. and Eurodollar banking systems centers on the Eurobanks' demand for reserve funds. As with any financial intermediary, a Eurobank maintains a stock of readily accessible funds (reserves) to meet day-to-day transactions and clearing requirements. One of the most striking and controversial features of the Eurodollar system is that, unlike domestic banks, the level of reserves held by Eurobanks is not regulated. This does not mean, however, that Eurobanks hold no reserves. Profit-maximizing considerations determine the optimal level of precautionary reserves for Eurobanks. The special characteristics of this market result in very low levels of reserves relative to total deposit volume.[4] Generally, Eurobanks' deposits with U.S. banks serve as precautionary reserves for the Eurodollar market.

THE EFFECT OF EURODOLLARS ON THE DOLLAR'S FOREIGN EXCHANGE VALUE

As previously noted, U.S. banks often obtain liabilities from the Eurodollar market by borrowing from their own branches or from other Eurobanks. Like other forms of foreign borrowing, this practice increases U.S. liabilities to foreigners and lowers (raises) the short-term international capital account deficit (surplus).

Falling deficits or rising surpluses generally indicate an increasing demand for dollars which in turn implies a rising value of the dollar in foreign exchange markets.[5] This is the connection between Eurodollar borrowing and the foreign exchange rate that the August 28, 1978 policy action attempted to exploit.

The connection between the net liquidity deficit and the foreign exchange rate, however, is more complicated when Eurodollars are borrowed because such borrowing need not result in a currency conversion. To see this point more clearly, consider the following example: When a U.S. resident borrows from a foreigner, he usually issues a dollar-denominated IOU.

[4]For both a theoretical and empirical discussion of optimal Eurodollar reserves, see John H. Makin, "Identifying a Reserve Base for the Euro-Dollar System," *Journal of Finance* (June 1973), pp. 609-17 and David H. Resler, *A Study of the Euro-Dollar Market: Its Origin and Interaction with U.S. Monetary Policy*, unpublished Ph.D. dissertation (The Ohio State University, 1977).

[5]It is important to note that increased borrowing by U.S. banks tends to improve (lower) the U.S. balance-of-payments deficit as measured on a net liquidity basis. It need not and probably does not, however, exert any impact on the "official settlements" balance. This balance is based only on official governmental settlements. In the case above, no intergovernmental transactions are involved. For a detailed discussion of this distinction, see Donald S. Kemp, "Balance of Payments Concepts — What Do They Really Mean?" this *Review* (July 1975), pp. 14-23.

To purchase this debt instrument, the foreigner first acquires dollars through the foreign exchange market, thereby increasing the demand for dollars. If, however, the foreigner already possesses dollar-denominated assets such as Eurodollars, the transaction does not involve the foreign exchange market even though the U.S. net liquidity deficit falls. Thus, Eurodollar borrowing need not increase the demand for dollars in the foreign exchange markets.

But, *can* Eurodollar borrowing produce a net increase in the demand for dollars? The answer is a qualified yes. Elimination of the reserve requirements against Eurodollar borrowing effectively reduces the cost of this source of funds. This tends to increase the total demand for Eurodollar borrowings, thereby bidding up the Eurodollar loan (and deposit) rate. If the higher relative yield on Eurodollars produces an increase in the general level of U.S. interest rates, it may induce a substitution of dollars for other currencies. When this occurs, the demand for dollars and the dollar exchange rate will increase. On the other hand, the higher yield on Eurodollars may induce only a substitution *among* dollar assets. Owners of domestic dollar CDs or U.S. Treasury bills, for instance, may switch to Eurodollars. The extent to which Eurodollars are substituted for other dollar-denominated assets, then, is the key factor in evaluating the effect this policy action has on the foreign exchange value of the dollar.

EVALUATING THE CHANGE IN RESERVE REQUIREMENTS

When a bank meets a reserve requirement, the cost of its funds includes both the interest expense and the earnings foregone on the idle balances (reserves) it must hold. The elimination of reserve requirements against Eurodollar borrowing lowers the effective cost of these funds to U.S. banks.[6] When making portfolio decisions about their liability structure, banks compare the effective cost of funds for alternative liabilities. Thus, in assessing the relative attractiveness of Eurodollar borrowings, the effective cost of these funds must be compared with alternative liabilities.

Eurodollar borrowings can be considered a substitute for large denomination ($100,000 or more) CDs issued by U.S. banks. The effective cost of funds for these two liabilities and the differences between them over the last two years are reported in Table 1.[7] While a modest cost advantage in favor of Eurodollar borrowing emerged temporarily in September 1978, a persistent cost advantage in favor of Eurodollar borrowing has prevailed only since November 1978 when the Federal Reserve increased the reserve requirement against large CDs from 6 percent to 8 percent. The cost differential fell dramatically following this action.[8]

Data presented in Table 1 show that the elimination of reserve requirements against Eurodollar borrowing did little *by itself* to encourage a preferential shift by U.S. banks toward borrowing Eurodollars. The Fed's action of November 1, raising reserve requirements on CDs, however, appears to have eventually encouraged Eurodollar borrowing.

A persistent effective cost differential in favor of Eurodollar borrowing began to emerge in November 1978. Since U.S. banks' cost of funds had become higher in the domestic CD market than in the Eurodollar market, it is reasonable to expect that U.S. banks would have attempted to reduce their CD holdings relative to borrowing in the Eurodollar market.

One way for banks to replace CDs with Eurodollars without endangering well-established customer relationships is to encourage their depositors to place CDs directly with the banks' foreign branches. U.S. banks could then borrow from these branches at a lower effective cost. This transaction produces offsetting short-term dollar flows with no net change in the demand for dollars. The Federal Reserve recognized this potential in its August 28 announcement when it ". . . reemphasized the importance of compliance by U.S. banks with its previous requests not to solicit or to

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[6]Specifically, the effective cost (C_j) of any liability (j) can be written as:

$$C_j = i_j/(1 - r_j),$$

where i_j and r_j are the interest rate and required reserve ratio for the liability.

[7]Data in column 1 of Table 1 tend to overstate the effective cost of Eurodollar borrowings. The reason is that, as noted in footnote 1, the relevant reserve requirement applies to *net* balances due to foreign branches. Since the aggregate net position of the banking system was negative preceding the policy revision, only a small number of banks could have been net borrowers from the market. It is only for these banks that the calculated effective cost of Eurodollar funds is appropriate.

[8]A brief digression on the characteristics of this cost differential should prove illuminating. In constructing Table 1, the Eurodollar borrowing rate is the three-month interbank loan rate as published by the Federal Reserve. This reported rate represents the Eurobank's opportunity cost of lending to a U.S. (i.e., its parent) bank. A U.S. bank may be willing to borrow from its Eurobank branch even when the cost differential favors the CD market. This may occur if earnings and costs of the parent and branch are differentially treated under the relevant tax laws for the two banks. Thus, even a small positive cost differential may be consistent with a domestic bank's preference for Eurodollar borrowing.

Table 2

Large CDs and Eurodollar Deposits of U.S. Residents

(Billions of Dollars, Not Seasonally Adjusted)

		Large Denomination CDs	U.S. Nonbanks' Eurodollar Deposits at Foreign Branches of U.S. Banks
1978	January	$76.4	N.A.
	February	76.9	N.A.
	March	80.2	N.A.
	April	81.4	N.A.
	May	84.6	$20.1
	June	86.3	21.6
	July	87.3	23.0
	August	88.0	24.3
	September	90.3	21.8
	October	90.8	24.7
	November	96.4	25.9
	December	99.5	25.0
1979	January	101.1	30.5
	February	99.6	31.5
	March	97.5	33.0
	April	92.6	33.5
	May	88.9	34.8
	June	84.4	35.3
	July	84.0	N.A.
	August	86.4	N.A.
	September	89.8	N.A.

SOURCE: Federal Reserve *Bulletin* and Board of Governors of the Federal Reserve System.

encourage deposits by U.S. residents at their foreign branches . . ."[9]

Data suggest that very little of this direct transfer has occurred (Table 2, column 2). Eurodollar deposits of U.S. nonbank residents have increased steadily since May 1978 but have shown no dramatically sharper rise when large CDs have fallen. These data, however, probably understate the value of CDs that U.S. residents have replaced with Eurodollar deposits. Instead of transferring deposits to branches of U.S. banks, U.S. residents may have established Eurodollar accounts with foreign banks. These banks could then sell Eurodollar CDs in a secondary market to U.S. foreign branches. The net effect of these transactions is the same as when U.S. residents deposit funds directly with the branches. The important difference, however, is that the transactions outlined here would not produce any changes in the foreign branches' liabilities to U.S. nonbanks.

Any empirical assessment of Eurodollar borrowing by U.S. banks must begin with a word of caution: Since Eurodollar borrowings are not directly reported by U.S. banks, available data provide only approximations of the actual borrowing volume.

In October of this year, the Federal Reserve Board initiated reporting of new data that provide useful approximations for Eurodollar borrowing.[10] These data record net balances due to directly related foreign institutions. The data measure the net direction of the flow of funds between the U.S. banking system and the Eurodollar market. Eurodollar borrowing by U.S. banks represents only part of the net flow of funds and may be offset by loans from U.S. banks to Eurobanks. Nevertheless, *changes* in net balances due to directly related foreign institutions represent a reasonable proxy for changes in Eurodollar borrowing. For instance, an increase of $1 billion in the "net balances" is interpreted as an increase in Eurodollar borrowing of $1 billion. Data for this measure of Eurodollar borrowing are given in Table 3.

Data reported in Table 3 reveal that Eurodollar borrowing by U.S. banks changed very little in the four months immediately following the change in reserve requirements. At the same time, the data indicate that Eurodollar borrowing has increased sharply since January 1979. Column 1 shows that, in January 1979, the net flow of dollars from U.S. banks to their own branches began to reverse itself. The net outflow fell substantially each month and finally became a net inflow from Eurobanks in May 1979. This flow reversal is attributable to the extensive Eurodollar borrowing by U.S. banks. The data reveal that U.S. banks have increased their Eurodollar borrowing from their own branches by $19 billion since the beginning of the year. Over the same period, total net balances due to related foreign institutions increased by more than $26 billion. Both data are essentially consistent with the incentive pattern reported in Table 1. The data suggest that the increase in Eurodollar borrowing this year can be attributed less to the Fed's elimination of reserve requirements against Eurodollar borrowing than to the Fed's increase in reserve requirements against large CDs.

[9]Federal Reserve *Bulletin* (September 1978), p. 778.

[10]In the past, most researchers measured borrowing with *gross* claims (in dollars) of foreign branch banks on their parent U.S. bank. This measured only Eurodollar borrowings from their own branches but did not record borrowing from other Eurobanks nor did it account for borrowing by nonmember U.S. banks. Nevertheless, these data were the only useful proxies for Eurodollar borrowing.

U.S. BANKS HAVE REDUCED CDs IN FAVOR OF EURODOLLARS

The overall success of the August policy action in terms of its effect on the dollar's exchange value depends on whether this Eurodollar borrowing is substituted for more conventional liabilities, such as large denomination CDs. If this has occurred, there is little reason to believe that the increased borrowing by U.S. banks has produced a net increase in the demand for dollars in foreign exchange markets. To evaluate the extent of this liability substitution ("round-tripping"), the behavior of large CDs over this period must be examined. Data on this liability (Table 2) reveal a substantial reduction in the total amount of CDs outstanding since the beginning of the year. From the January peak of $101.1 billion, CDs fell to $84.0 billion in July, a drop which accompanies the emergence of a relative cost disadvantage for CDs (reported in Table 1). It is interesting to note that, as CDs fell by about $17 billion from January to July, liabilities of U.S. banks to their foreign branches rose by $17.4 billion. The general pattern in this data suggests an apparent switching of Eurodollars and large CDs.[11]

In August and September, data on the volume of CDs and preliminary data on Eurodollar borrowing both show an increase in response to strong U.S. credit demands. This suggests that, since the cost advantage in favor of Eurodollar borrowing has now virtually disappeared, both liabilities will grow in response to overall credit demand.

Table 3

Net Balances Due to Directly Related Foreign Institutions

(Billions of Dollars)

		(1) Domestically Chartered Banks	(2) Foreign-Related Institutions	(3) Total	Changes in Eurodollar Borrowing*
1978	January	$–13.6	$11.5	$–2.1	
	February	–13.2	11.0	–2.2	$–0.1
	March	–14.7	11.2	–3.5	–1.3
	April	–11.1	10.8	–0.3	3.2
	May	–11.7	12.0	0.3	0.6
	June	–11.8	13.3	1.5	1.2
	July	– 9.5	12.6	3.1	1.6
	August	–10.5	12.9	2.4	–0.7
	September	–10.3	14.8	4.5	2.1
	October	– 9.9	17.0	7.1	2.6
	November	– 9.8	18.0	8.2	1.1
	December	–10.7	17.0	6.3	–1.9
1979	January	–10.1	16.4	6.3	0.0
	February	– 6.3	18.3	12.0	5.7
	March	– 4.5	20.8	16.3	4.3
	April	– 1.9	20.8	18.9	2.6
	May	2.5	20.6	23.2	4.3
	June	5.8	21.7	27.5	4.3
	July	6.3	22.8	29.1	1.6
	August	8.9	23.8	32.7	3.6

*Equals Changes in Column 3.

SOURCE: Federal Reserve *Bulletin* and the Board of Governors of the Federal Reserve System.

IMPLICATIONS OF "ROUND-TRIPPING" FOR MONETARY CONTROL

So far, the discussion has ignored any effect this substitution of Eurodollar borrowing for domestic CDs may have on the U.S. money supply. Since the primary advantage to U.S. banks from borrowing Eurodollars is that these liabilities are not subject to reserve requirements, the substitution of Eurodollar borrowing for CDs "liberates" reserves. For example, suppose a U.S. bank allows its CDs to decline by $1 million and offsets this outflow by borrowing $1 million from its foreign branch. The bank's total liability position is unchanged by the transaction. The bank's asset side, however, shows that the transaction has generated an additional $.08 million in excess reserves which it can then lend. Lending these newly generated excess reserves increases the U.S. money supply unless the increase in excess reserves is offset by Federal Reserve open market operations.

Of course, such an increase in the money supply could prove counterproductive to the Fed's objective of improving the dollar's foreign exchange value. If the faster growth of money leads to a higher expected rate of inflation in the United States and, hence, lowers the value of the dollar in the future, the dollar's current foreign exchange value will also fall as speculators attempt to minimize the anticipated exchange rate loss.

Unless Federal Reserve open market operations offset this increase in reserves, there will be a multiple expansion of the money supply equal to the money multiplier times the newly liberated reserves. Under this assumption, the reduction in CDs of $17 billion

[11]The data on Eurodollar borrowing is not sufficiently accurate to warrant the conclusion that this switchover has been complete, since it seems inappropriate to argue that only Eurodollars have replaced CDs. More extensive use by domestic money managers of other short-term financial instruments including repurchase agreements and commercial paper has probably also diminished their use of CDs.

from January to July (if offset by an equal increase in Eurodollar borrowing) would have resulted in about a $3.4 billion increase in M1.[12] This amounts to roughly 40 percent of the increase in M1 (not seasonally adjusted) that occurred from January to July 1979, and suggests that increases in Eurodollar borrowing have contributed to a more rapid expansion of the money supply. Since foreign exchange rates are sensitive to differential rates of anticipated inflation (and, hence, money growth), Eurodollar borrowing of this magnitude would indeed have affected the dollar's exchange value, but in a direction opposite to that intended by the Federal Reserve Board.

SUMMARY

By raising the reserve requirement on large CDs after eliminating the reserve requirement for Eurodollar borrowings, the Federal Reserve induced U.S. banks to borrow from their foreign branches. The combination of these two policy changes contributed to a rapid expansion in Eurodollar borrowing. These policies would have to be judged a success were their sole intent to increase Eurodollar borrowing. While the elimination of reserve requirements against Eurodollars should increase demand for Eurodollars, it need not increase the demand for dollars in the foreign exchange market. However, the stated objective was to encourage Eurodollar borrowing which, in turn, would increase the foreign exchange value of the dollar. The link between Eurodollar borrowing and the foreign exchange value of the dollar, however, is more tenuous than that implicit in the Fed's actions.

Though the data do not permit a definitive analysis, available evidence suggests that a by-product of these policy actions has been the substitution of Eurodollar borrowing for CDs. This kind of substitution does not involve foreign exchange transactions and therefore has little direct effect on the dollar's exchange value.

There may, however, be an indirect effect on the foreign exchange value of the dollar. Substitution of reserve-free Eurodollar borrowing for reservable CDs has the potential to increase the U.S. money supply. Unless Federal Reserve open-market operations offset the increase in reserves that this substitution produces, the more rapid growth of money that results may actually depress the dollar's foreign exchange value.

[12]This calculation assumes a constant money multiplier of 2.5.