THE DEMAND FOR FOREIGN CURRENCY HOLDINGS BY EUROPEAN BANKS

Commercial banks in Western Europe maintain balances in foreign currencies, a large share of which are denominated in U.S. dollars. For the most part these balances are held for transaction purposes. They are designed to finance international trade in goods and services as well as inter-country capital flows, and therefore reflect a transaction demand for foreign currencies. From the United States' point of view the transaction demand for dollars by foreign countries indicates this country's ability to run deficits with relative impunity.[1] Unfortunately, countries do not report their commercial banks' holdings of dollars; instead they lump all foreign currency holdings together. It is the determinants of the demand for these holdings that the present paper investigates.

I. CONCEPTUAL FRAMEWORK

Two alternative formulations of the dependent variable were used in the analysis: the absolute level of foreign exchange holdings of commercial banks (E), and foreign exchange holdings as a proportion of the banks' total assets (E/TA). The second formulation follows from the portfolio approach which postulates that holders of financial assets adjust their portfolio's composition in response to variations in interest rate differentials and other variables.

It is postulated that the transaction demand for foreign currencies is directly related to the "needs of trade" and inversely related to the opportunity cost of maintaining such holdings. The cost, R, of holding foreign exchange can be approximated as the foregone interest on domestic assets minus the interest earnings on the foreign currencies. For most countries the empirical measure of R was the short-term government bond yield minus the Euro-dollar rates. Call money rates were used when the government bond yields was not available.[2]

Empirically, the "needs of the trade" was represented first by the level of transactions;[2] namely the value of the country's exports plus its imports ($X + M$). We also experimented with an alternative formulation of the variable, viewing it as a synchronization problem; its empirical counterpart was represented by exports minus imports ($X - M$). It might, however, be argued that the synchronization view is more appropriate for a single bank than the entire banking system of a country. Indeed this variable was not statistically significant in any of the regressions.

II. THE EMPIRICAL RESULTS

We start by reporting the results for Germany (41 observations) in some detail. Following are the estimates of two linear regression equations, employing the notations mentioned in the previous section:

$$E = \underset{(376.2)}{-896.3} - \underset{(92.1)}{286.8}\,R + \underset{(0.01)}{0.06}\,(X + M) \qquad (1)$$

$$\frac{R^2}{0.70} \quad \frac{D.W.}{0.46}$$

[1] In addition there are speculative motives for foreign currency holdings by private institutions, as well as reserve demand by central banks. Thus the transaction demand accounts for only a part of the total.

[2] *Sources of data:* The domestic interest rates were taken from the *International Financial Statistics*. Euro-dollar rates were supplied (privately) by the Federal Reserve Board for the years 1968–70. Since these rates were not collected prior to 1968, the series was extended backwards to earlier dates by linking the Euro-dollar rates to the yield on three months U.S. government bills. Foreign currency holdings of banks were obtained from various issues of the *International Financial Statistics* (IMF). Total banks' assets—originally denominated in each country's currency—were converted into dollars through the official exchange rates. International transaction figures for the West-European countries were taken from various issues of *International Financial Statistics*. All calculations were made on a quarterly basis yielding for most countries between 30 and 40 observations.

TABLE I

DEMAND FOR FOREIGN CURRENCY HOLDINGS BY BANKS IN SIX EUROPEAN COUNTRIES

Country	Independent Variable and its mean Value	Estimated Parameter of: (after Cochrane-Orcutt transformation) R	X+M	X-M	Original R^2	Original D.W. Statistic	Trans-formed D.W. Statistic	No. of Observations
Italy	E($2200 m.)	-128.5 (92.4)	+0.2 (0.03)	+0.15 (0.08)	0.93	0.5	1.7	36
	E/TA(5.5%)	-0.2 (0.2)	+0.00015 (0.00008)	+0.00016 (0.00016)	0.79	0.6	1.6	36
Netherlands	E($855 m.)	-12.8 (58.4)	+0.07 (0.02)	+0.07 (0.06)	0.87	0.8	2.2	29
	E/TA(14.3%)	-0.5 (0.7)	+0.0006 (0.0002)	+0.0013 (0.0008)	0.72	0.7	2.0	29
Norway	E($195 m.)	-16.4 (8.6)	+0.04 (0.01)	+0.12 (0.03)	0.92	1.4	2.1	40
	E/TA(6.4%)	-0.18 (0.24)	+0.0002 (0.0004)	+0.0025 (0.0008)	0.67	0.8	2.1	40
Denmark	E($175 m.)	-1.5 (11.2)	+0.04 (0.01)	-0.01 (0.04)	0.76	0.5	1.3	41
	E/TA (3.6%)	-0.07 (0.18)	+0.0003 (0.0002)	-0.00005 (0.0006)	0.42	0.5	1.4	41
Austria	E($209 m.)	-37.1 (18.1)	+0.04 (0.03)	+0.02 (0.08)	0.89	1.3	2.2	32
	E/TA(3.8%)	-0.3 (0.3)	-0.0002 (0.0006)	+0.0007 (0.001)	0.71	1.1	2.3	32
Belgium	E($1300 m.)	+59 (70)	+0.11 (0.03)	+0.08 (0.2)	0.88	1.2	1.5	29

$$E/TA = 1.39 - \underset{(0.37)}{0.37}\,R + \underset{(0.00001)}{0.00002}\,(X+M) \qquad (2)$$
$$(0.09)$$
$$0.46 \quad 0.64$$

Since the net payments (or receipts) on service and capital accounts, as well as the $(X - M)$ variable were not statistically significant, they are not reported here.

To understand the meaning of these results, consider equation 1. It states that a one percentage point reduction in the cost of holding foreign exchange (R—defined as the difference between the German call money rate and the Euro-dollar rate) raises foreign currency holdings by $286.8 millions. Likewise, a $1 million increase in the value of merchandise trade $(X + M)$ raises the foreign currency holdings of banks by $60,000. From equation 2 we gather that one percentage point reduction in cost raises by 0.37% the percent of the banks' total assets held in foreign currencies, while a $1 million increase in the value of exports plus imports raises that percentage by 0.00002. All variables have the theoretically expected signs and are statistically significant. For the sake of comparison, the mean E for Germany was $1,300 million and mean E/TA is 1.7 percent.

Since the $D.W.$ Statistic suggests the existence of significant auto-correlation in the residuals, we re-estimated the equations using the first order Cochrane-Orcutt transformation.[3] The results are as follows:

$$E = \underset{(179.9)}{-171.0} - \underset{(94.3)}{196.8}\,R + \underset{(0.02)}{0.06}\,(X+M) \qquad (1a)$$

$D.W.$ Stat.
1.63

$$E/TA = \underset{(0.26)}{-1.16} - \underset{(0.08)}{0.38}R - \underset{(0.00002)}{0.00004}(X+M) \qquad (2a)$$

2.15

Clearly, the results were sharpened by this

[3] The method for transforming the variables and computational procedure are discussed in [1, 236–244]. The estimates of the autocorrelation coefficient (ρ) were computed by the following formula: $\hat{\rho} = 1 - DW/2$ where $D.W.$ is the conventionally calculated Durbin-Watson statistic.

transformation. The interest differential variable (R) has the expected negative sign, and is statistically significant. But the parameter of the transaction variable assumes a negative sign in equation 2a, where the independent variable is the ratio of foreign exchange holdings to total assets, although it remains positive in 1a. This may suggest economies of scale in the use of foreign currencies for transactions purposes.

We now turn to six other countries[4] for which estimates were made. In nearly every case we had significant positive autocorrelation; over half of the estimated values of ρ were between 0.5 and 1, where a significant difference from zero indicates autocorrelation in the residuals. Consequently we used the Cochrane-Orcutt transformation, and Table I reports the estimates of the three parameters for the six countries after the transformation. The partial derivatives can be viewed as marginal propensities to hold foreign currencies; they can be converted to elasticities by dividing by the respective "average propensity."

The cost of holding balances always has the expected negative sign, but it is not always statistically significant. The transactions variable ($X + M$) is significant in all countries except Denmark, while the synchronization variable ($X - M$) is rarely significant.

III. CONCLUSIONS

What are the general implications of these results? On a theoretical plane the regressions do not support the alleged superiority of the portfolio approach to asset adjustment; the dependent variable E(foreign currency holdings) is explained better than E/TA by the independent variables representing "cost" and the "need of trade." However more sophisticated models may yield a different conclusion. Moreover, the results pertaining to the dependent variables can complement each other. In the case of Germany for example the portfolio approach suggests the possible existence of economies of scale in the use of foreign currencies.

On a policy plane, it appears that banks are sensitive to interest cost in determining the level of their foreign currency holdings or of the proportion of these holdings in total assets. A one percentage point increase in the Euro-dollar interest rate—a rate which can be indirectly susceptible to American economic policy—would induce foreign banks to hold more foreign currencies, mainly dollars, to the tune of $287 million in Germany, $129 million in Italy, and lesser amounts in the smaller European countries. If Germany can be regarded as representative of the three large European countries, then a one percent increase in the Euro-dollar rate may raise transaction holdings of foreign currencies by European banks by as much as $\$^{3}/_{4}$—1 billion; consequently this rate can be considered an important U. S. policy instrument for attaining external balance in the short run. On the other hand any U. S. action can be offset by the foreign central bankers increasing domestic interest rates.

In the long run the transaction demand for foreign currencies depends more on the need of the trade as reflected in the ($X + M$) variable. Using an approximate weighted average of the parameters of the seven reported countries, a 1 billion dollar expansion in trade volume would raise foreign currency holdings of European banks by $60 million. Since total European trade has been expanding annually by $6–10 billion, transaction demand for foreign currencies may be expected to rise at an annual rate of $0.6—1 billion. Much of this would be in dollars. But because of the possible existence

[4] The results for Finland and Sweden appear rather erratic, and consequently are not reported here. For Finland R is significant with a parameter of −8.2 when R and ($X + M$) are run against E, while in the case of Sweden the ($X + M$) is significant in a similar regression, with a parameter of 0.06.

of economies of scale in the use of foreign currencies, these figures should be regarded as upper bounds.

This discussion suggests that even if the role of the dollar as a reserve currency were substantially reduced, there would still remain a large transaction demand for dollars. The goal of the U. S. balance of payments policy should not be to attain equilibrium. Rather it should aim at reducing the annual deficit to the half a billion dollar mark needed for transaction purposes, plus whatever is required for incremental reserves (and other) holdings.

MORDECHAI E. KREININ
Michigan State University
AND
ROY F. GILBERT
Texas A & M University

REFERENCE

1. Goldberger, A. S. *Econometric Theory*. New York: Wiley, 1964.