A Monetary (Asset) Approach to Exchange Rate Determination: The Evidence since 1973

By Robert A. Baade, Lake Forest

I. Introduction

Explanations for the decline in the value of the dollar in the seventies are legion. Though economists do not agree on all the reasons for the dollar demise virtually all concede that monetary factors are at least co-conspirators in the dollar's undoing. Where monetary factors are concerned, then, the question is one of the primacy of their role in determining the value of the dollar. The purpose of this paper is to formulate an answer to this question through an analysis of the evidence generated from 1973, the year the world committed to a freer-floating exchange rate system, to the present. Data for that period support the position that money matters in currency valuation, and that U.S. monetary policy has played a particularly significant role. Furthermore, the evidence suggests that monetary phenomena exerted more influence on exchange rate determination in the 1977 - 79 period than was true for the 1973 - 76 period.

The paper is organized as follows. Section 1 introduced the topic. the model is developed and its empirical implementation is explained in Section 2. Section 3 presents and analyzes the empirical findings. The results are summarized in Section 4.

II. Theoretical Development

At one end of the spectrum on exchange-rate determinations is the purchasing-power parity theory, which asserts that the equilibrium exchange rate equals the ratio of domestic to foreign prices. Operationally there is extensive debate on what constitutes the appropriate price measures. To some experts the price of traded goods only should be employed, while to others the broadest measure of prices should be used. In both cases, money exercises an effect on the exchange rate

only through its impact on prices. The more narrowly conceived the price measure, the less likely it would seem exchange rates can be explained as a monetary phenomenon, and the more likely they reflect commodity arbitrage.[1]

An alternative interpretation of exchange rate determination is the monetary or asset view. This perspective accepts as trivial the notion that commodity arbitrage equates the prices of traded goods, but asserts that the exchange rate is determined through the interplay of demand and supply forces for national moneys.

"Being a relative price of two assets (moneys), the equilibrium exchange rate is attained when the existing stocks of the two moneys are willing held. It is reasonable, therefore, that a theory of the determination of the relative price of two moneys could be stated conveniently in terms of the supply and the demand for these moneys."[2]

Thus the asset approach construes the exchange rate as an exclusively monetary phenomenon, so that the exchange value of a country's currency reflects the supply of and demand for a country's money.

Since the purpose of this paper is to analyze the appropriateness of an asset or monetary perspective on the determination of selected foreign currency prices of the dollar, an asset model needs to be developed. Therefore, equations for dollar supply and demand are specified below.

Generally the real demand for money (m^d) is determined by the real rate of interest (r), real income (Y), and price expectations (p^e), or in defining real dollar demand:

$$(1) \qquad\qquad m^d = f\,(r, Y, p^e)$$

Given the magnitude of inflation in the U.S. during the 1970's, ascribing a dominant role to price expectations in dollar demand may prove a useful simplification. Thus

$$(2) \qquad\qquad m^d = f\,(p^e);\; \frac{dm^d}{dp^e} < 0$$

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[1] See for example, *Lawrence H. Officer* (1976), "The Purchasing-Power-Parity Theory of Exchange Rates: A Review Article." International Monetary Fund Staff Papers, 1, XXIII, March, 1976.

[2] *Jacob A. Frenkel* (1976), "A Monetary Approach to the Exchange Rate: Doctrinal Aspects and Empirical Evidence", Scandinavian Journal of Economics (May 1976), 78, 2, 200.

Stock equilibrium in the money market requires that the real money supply $\frac{M}{P}$ must equal money demand, i.e.,

(3)
$$\frac{M}{P} = m^d, \text{ where } P = \text{"the" price level}$$

Equation (3) can be used to determine the price level so that,

(4)
$$P = \frac{M}{m^d} \text{ or } P = \frac{M}{f(p^e)}; \frac{dP}{dM} > 0, \frac{dP}{dp^e} > 0$$

Using the purchasing-power parity condition,

(5)
$$P = SP^*, \text{ where } P^* = \text{"the" foreign price level}$$
and S = the dollar price of currency n,

and the rest of the equational structure, the dollar price of the currency in question is:

(6)
$$S = \frac{M}{f(p^e)} \Big/ P^*$$

If we assume that price expectations have similarly dominated money demand functions in other countries, then

(7)
$$P^* = \frac{M^*}{f(p^{e*})},$$

then

(8)
$$S = \frac{M}{M^*} \cdot \frac{f(p^{e*})}{f(p^e)}$$

Converting equation (8) to logarithms yields

(9)
$$\log S = \log M - \log M^* + \log f(p^{e*}) - \log f(p^e) .$$

Equation (9) will be used in assessing the merit of an asset approach in determining the dollar price of various currencies since 1973. Formulating price expectations is a problem in this equational structure. Past literature suggests a number of possibilities. For example, *P. Cagan* (1956) used a time series of actual rates of inflation to construct a time series of expected rates of inflation.[3] This approach has been criticized by *Frenkel* (1976) and others since the selection of any past time series

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[3] *P. Cagan* (1956), "The Monetary Dynamics of Hyperinflation", In: *M. Friedman*, (ed.), Studies in the Quantity Theory of Money, Chicago: University of Chicago Press.

is necessarily arbitrary and accounts for only past events. *Frenkel* suggested as an alternative measure of inflationary expectations, the forward premium or discount. This figure, *Frenkel* argues, measures the anticipated differences between the rates of inflation between the countries.[4] Since the data *Frenkel* suggests is available on expected rates of inflation does not fit the functional form of equation (9), past data were used in describing inflationary expectations. Specifically since the empirical work is based on monthly statistics, price expectations were assumed to depend on the inflationary experience of the most recent past. For example the spot rate at the end of November, 1979 was determined partially by the inflationary experiences of both countries in October, 1979.[5] In addition, a broad measure of prices, consumer prices indices, were used as opposed to a narrow measure such as the price of traded goods only.

III. Empirical Results and Analysis

The empirical results are presented and analyzed in two parts. First, the importance of monetary factors in influencing the values of the Belgian, British, Canadian, Dutch, French, Italian, Japanese, Swiss, and West German currencies is measured over the entire 1973 - 1979 period. Second, conclusions are drawn on whether monetary factors are exerting more or less influence on currency values as the 1970's draw to a close. In Table 1 statistics are recorded on the coefficients, standard errors, and correlation coefficients for the 1973 - 79, 1973 - 76, and 1977 - 79 periods. In addition, tests were conducted to determine whether coefficients for the U.S. money supply, the variable that seemed to be the most important monetary factor in determining exchange rates over the entire 1973 - 79 period, differed significantly between the 1973 - 76 and 1977 - 79 periods. These results were recorded in the last column in Table 1.

From an analysis of the results recorded in Table 1 the following conclusions emerged:

(1) Even a simplified version of the asset model that assumed price expectations play the key role in determining the demand for money,

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[4] Op. cit., p. 211.

[5] Given recent reactions in foreign exchange markets to inflationary performance announcements in the most recent month, e. g., Japan, suggests expectations, however, formulated should weigh the most recent experience most heavily.

generally explained a substantial amount of the exchange rate variation during the 1973 - 79 period. Further, in every case with the exception of Italy, the model accounted for exchange rate fluctuations more completely during the 1977 - 79 period than was true during the 1973 - 76 period. The increase in explanatory power may be indicative of the fact that the monetary role in exchange rate determination was superseded temporarily as the international monetary system absorbed the shocks of the quadrupling of oil prices in 1973 - 74 and the commitment to floating in 1973.

Table 1

Statistical Summary of Coefficients and Standard Errors Relevant to an Asset View of Exchange Rate Determination During the 1973 - 79 Period for Nine Industrial Countries

Statistic → Country ↓	1973 - 1979					
	Constant	Log m [a]	Log m^* [a]	Log p^{e*} [c]	Log p^e [c]	R^2
Belgium	3.54[b] (.16)	− .27[b] (.14)	[d]	1.74[b] (.217)	− 2.36[b] (.287)	.748
Canada	− .77[b] (.31)	.32[b] (.14)	.14 (.09)	1.05 (.71)	− 1.15 (.81)	.60
France	3.63[b] (.42)	− .43[b] (.15)	[d]	3.78[b] (.53)	− 4.73[b] (.71)	.43
Germany	1.93[b] (.46)	− .52[b] (.23)	.10 (.22)	.69[b] (.32)	− .90[b] (.30)	.71
Italy	4.85[b] (.539)	− .57[b] (.17)	[d]	1.71[b] (.21)	− 2.06 (.428)	.88
Japan	6.18[b] (.35)	− .18 (.20)	− .52[b] (.22)	2.42[b] (.19)	− 2.95 (.37)	.84
Netherlands	2.13[b] (.26)	− .33[b] (.14)	− .08 (.11)	1.50[b] (.33)	− 2.02 (.30)	.81
Switzerland	4.00[b] (.26)	− .19 (.27)	− .83[b] (.20)	− .01 (.07)	− .73 (.19)	.87
United Kingdom	− 1.72[b] (.36)	.42[b] (.16)	[d]	− 1.58[b] (.14)	2.15[b] (.31)	.85

Table 1 (continued)

Country	1973 – 1976					
Statistic →	Constant	Log m a)	Log m^* a)	Log p^{e*} c)	Log p^e c)	R^2
Belgium	2.89b) (.54)	− .11 (.18)	d)	1.35b) (.66)	− 1.84b) (.87)	.13
Canada	− .23 (.41)	.14 (.18)	.08 (.15)	.40 (1.32)	− .40 (1.51)	.09
France	2.95b) (.66)	− .23 (.20)	d)	3.42b) (.86)	− 4.28b) (1.13)	.29
Germany	1.63b) (.43)	− .24 (.21)	.53b) (.20)	− .08 (.30)	− .73b) (.27)	.30
Italy	4.26b) (.68)	− .27 (.20)	d)	1.92b) (.29)	− 2.34b) (.57)	.86
Japan	3.02b) (.37)	.15 (.10)	− .47b) (.11)	.68b) (.25)	− .17 (.41)	.70
Netherlands	1.66b) (.33)	− .15 (.18)	.29b) (.15)	.34 (.64)	− .95 (.60)	.37
Switzerland	2.25b) (.63)	− .09 (.20)	.15 (.30)	.55 (.65)	− 1.38b) (.51)	.80
United Kingdom	.19 (.67)	.08 (.22)	d)	− 1.15b) (.22)	1.20b) (.46)	.84

a) Money supply figures are unadjusted m_1 figures as recorded on line 34 of the *IMF*, International Financial Statistics for the individual countries.

b) Significant at the 95 % level.

c) Price statistics are taken directly from the consumer price indices that are recorded on line 64 of the *IMF*, International Financial Statistics for the individual countries.

d) Data not available.

(2) When data over the entire period is considered, the U.S. money supply and foreign price expectations emerged as the most prominent variables. Both variables were significant in seven of the nine cases examined over 1973 - 79. In addition, it was noteworthy that Japan and Switzerland, two countries that have consistently recorded balance of payments surpluses during the 1973 - 79 period, showed no significant correlation between the dollar prices of the currencies and the U.S.

Table 1 (continued)

Statistic → Country ↓	1977 - 1979						Is the Log m coefficient significantly different during the 73 - 76 and 77 - 79 periods (at the 95 % level) Yes Or No
	Constant	Log m a)	Log $m*$ a)	Log p^{e*} c)	Log p^e c)	R^2	
Belgium	6.84 (1.38)	− .04 (.256)	d)	− 1.49 (1.27)	− .73 (.59)	.87	No
Canada	− 1.81 (.24)	.10 (.13)	.08 (.15)	.42 (.46)	.22 (.45)	.93	Yes
France	3.52 (.34)	− .19 (.185)	d)	.30 (.92)	− 1.34 (.97)	.88	Yes
Germany	3.25 (1.92)	− .22 (.32)	− .10 (.36)	− 1.66b) (.66)	.76 (1.29)	.90	Yes e)
Italy	4.01 (.423)	− .02 (.138)	d)	.005 (.34)	− .45 (.47)	.65	Yes
Japan	3.25 (1.92)	− .22 (.32)	− .10 (.36)	.76 (1.29)	− 1.66b) (.66)	.90	Yes e)
Netherlands	4.44 (.85)	− .25b) (.15)	.30b) (.11)	− .503b) (.74)	− 1.19b) (.34)	.94	Yes e)
Switzerland	9.53 (1.27)	− .66 (.62)	.79 (.61)	− .004 (.09)	− 3.89b) (1.15)	.84	Yes e)
United Kingdom	− 2.45 (.30)	.23 (.19)	d)	− .24 (.86)	1.20 (.86)	.83	Yes e)

e) Exchange-rate, U.S. money supply elasticity is greater during than the 1977 - 79 period than was true for the 1973 - 76 period.

money supply. Perhaps this is an indication that Japan and Switzerland negated U.S. monetary policy through a manipulation of the domestic component of their monetary bases in an effort to maintain their balance of payment surpluses. This view is supported by the fact that the only two countries that recorded significant correlations between their money supplies and the dollar prices of their currencies were Japan and Switzerland.

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IV. Conclusion

This paper was an attempt to evaluate the merits of a monetary or asset approach to exchange rate determination. Using data from 1973 to the present, the empirical evidence offered some support for the asset approach during this period. Furthermore, the data suggested that after the OPEC and free-floating shocks to the international economic order in 1973 were absorbed, money assumed a stronger role in exchange rate determination than indicated by the data for the entire 1973 - 79 period. Turning to policy implications, since U.S. monetary policy played a significant role in determining most of the dollar prices for currencies, a more moderate U.S. monetary policy could induce considerably greater stability in foreign exchange markets.

Bibliography

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Zusammenfassung

Ein monetaristischer, vermögenstheoretischer Ansatz zur Bestimmung des Wechselkurses: Empirische Ergebnisse seit 1973

Fast jeder Ökonom bestätigt, daß monetäre Faktoren den Dollarpreis der Weltwährungen beeinflussen. Weniger einmütig ist man sich jedoch, wenn es um die Frage geht, wie stark dieser Einfluß ist. Mit dem Übergang zu einem System flexibler Wechselkurse im Jahre 1973 ergab sich jedoch die Chance festzustellen, inwieweit monetäre Faktoren die Dollar-Währungskurse beeinflussen. Wenn auch das für den Zeitraum von 1973 bis 1979 zusammengestellte Beweismaterial nicht eindeutig bestätigt, daß ein vermögenstheoretischer Einfluß der Wechselkurs-Bestimmung besteht, deutet doch alles darauf hin, daß ihm dennoch eine wichtige monetäre Rolle zukommt. In der folgenden Zeit von 1977 bis 1979 ergibt sich jedoch noch mehr Evidenz als

während der Jahre 1973 - 1976. Dies mag die Tatsache widerspiegeln, daß das Weltwährungssystem nach dem durch die Ölpreisexplosion von 1973/74 verursachten Zerfall und nach dem Übergang zu einem flexibleren Wechselkurssystem im Jahre 1973 zu neuen Ablaufmustern zurückgefunden hatte.

Summary

A Monetary (Asset) Approach to Exchange Rate Determination: The Evidence Since 1973

Virtually every economist agrees that monetary factors affect the dollar price of world currencies. No such unanimity of opinion exists, however, when the question of degree is entertained. The adoption of a freer-floating exchange rate regime in 1973, however, provides an opportunity to analyze the degree to which monetary events influence dollar currency prices. While evidence gathered for the 1973 - 79 period does not confirm unequivocally a monetary or asset approach to exchange rate determination, it does suggest an important monetary role. Furthermore, the 1977 - 79 period offers more support for the asset approach than the 1973 - 76 period. This may reflect the fact that the world monetary system has settled back into a pattern after disruptions due to the significant oil price hikes in 1973 - 74 and after the commitment was made to a freer-floating exchange rate system in 1973.

Résumé

Une hypothèse monétariste, de théorie patrimoniale pour définir le taux de change: Résultats empiriques depuis 1973

Chaque économiste ou peu s'en faut confirme que les facteurs monétaires influencent le cours en dollars des monnaies mondiales. Mais l'accord est moins unanime lorsqu'il s'agit de définir l'importance de cette influence. Le passage en 1973 à un système de taux de change flexibles avait pourtant fourni l'occasion d'établir dans quelle mesure des facteurs monétaires intervenaient dans le cours-dollar des monnaies. Même si les preuves réunies pour la période de 1973 à 1979 ne confirment pas sans équivoque l'existence d'une influence patrimoniale théorique sur la fixation des taux de change, tout concourt à lui donner cependant un rôle monétaire primordial. Et l'évidence est plus éclatante pour les années 1977 - 1979 que pour les années 1973 - 1976. Ceci tient peut-être au fait que le système monétaire mondial, à la suite de sa désagrégation provoquée par l'explosion des prix du pétrole des années 1973 - 1974 et après l'introduction en 1973 des cours flexibles, ait retrouvé de nouveaux modèles de fonctionnement.