The Existence of a World Demand for Money Function: Preliminary Results

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I. Introduction

By using simple and basic relationships, in the context of a pooling technique, this study reveals on the one hand a significant interest elasticity in the world demand for money, and on the other, a high degree of instability in this function, especially during the flexible exchange rate period since the latter part of 1971. In this period, as expected a distinct deterioration of the function is observed.

Among recent empirical studies on the demand for money, one can distinguish two[1] which have examined the subject at a world level under fixed exchange rates. Both studies select a group of advanced countries (ten and fifteen respectively), aggregate the relevant macro-variables and fit a world demand-for-money function. Such an approach derives from using time-series data which have also been the source of numerous demand-for-money functions at the national level.

The main aim of this paper is twofold. Firstly, by using a different methodological approach, to allow for possible heterogeneities between countries which are totally neglected upon aggregation[2]. Secondly, to investigate the stability of the world demand-for-money function under both fixed and flexible exchange rates.

An interesting by-product of our study is a test of one of the basic assumptions in monetary theory: i. e. whether the demand for nominal cash balances is homogeneous to degree one in the price level. It also provides investigation of an opportunity cost variable in the demand function and questions whether this is of an international or domestic

[1] *Gray, Ward* and *Zis* (1976), and *Swoboda* and *Genberg* (1976).

[2] The necessity of distinguishing heterogeneities between countries and avoiding over-aggregation has also been emphasised by Marcus H. *Miller,* the discussant of the study by *Gray, Ward* and *Zis* (1976).

character; and an examination of the usefulness of distributed lag mechanisms (partial adjustment hypothesis) in explaining the demand-for-money function more fully.

II. Methodology — Pooling Cross-Section and Time-series Data

Many of the inadequacies arising from the application of models to time-series data (the usual econometric "snags" are multicollinearity and small samples) can be overcome if we have access to time series data from many similar cross-section units, which are treated as if they belong to the same population.

The inception of pooling can be found in studies such as *Marshack* (1943), *Staehle* (1945), *Tobin* (1950), *Wold* and *Jureen* (1951) and *Stone* (1954). This methodology was subsequently tackled from the sampling theory point of view by *Durbin* (1953), generalised by *Theil* and *Goldberger* (1961) and *Theil* (1963). Broadly speaking, the central idea has been to introduce some kind of extraneous information into a model which is finally estimated from time series. The main criticism of this methodology is that the economic structure underlying the model might well have changed between the period which generated the extraneous information and that which generated the time-series sample. As a result research has been directed to a different method where time series of several cross-sections are pooled in order to obtain one set of homogeneous parameters.

When pooling of several time-series "blocks" occurs, there are two extra sources of variation that arise. One is between the cross-section units involved and the other is across time. The treatment of this problem, (which, if ignored, results in the error term having three components), has been approached from two different angles. There is one school of thought which treats these sources of variation as random (*Balestra and Nerlove* [1966] und *Kmenta* [1971]), and the traditional covariance model which treats them as fixed (see, for example, *Johnston* [1972] and *Scheffe* [1959] Chap. 6.). The debate between the two approaches as to which yields better results can be traced in the papers by *Amemiya* (1967), *Wallace* and *Hussain* (1969), *Maddala* (1971) and *Nerlove* (1971). In our analysis we have decided to use the traditional covariance model due to its simplicity and consistency in results. Besides when the regions which are pooled consist of countries, then this methodology is expected to produce more plausible results (see *Kouris* [1976] chap. 3).

Our fundamental assumption, in the context of this approach, is that our "world" consists of ten countries, each having its own demand function. From these ten demand functions we derive an average income and price elasticity. In order to allow for differences between countries, an intercept term is introduced in each case. This last term tends to absorb primarily the heterogeneities that exist in the structure of financial markets between countries. The use of this methodology enables aggregation to remain at the national level. Therefore the size of our sample increases to several hundreds which is crucial when lagged dependent variables are used as regressors. Although our observations refer to national aggregates, the hypothesis tested in this study is at the world and not at the national level. This is because inevitably the results of our regressions refer to an average country and not specifically to any one of the ten countries. The same hypothesis can be tested if we aggregate all ten countries and express figures on a per capita basis. While it is correct that in the latter case we also measure the average of the ten countries, this methodology allows neither for differences between countries nor enables the use of very big samples[3].

III. The Model

The approach followed here is both static and dynamic. At the national level the importance of distributed lag mechanisms in relation to demand-for-money functions has been stressed and applied to the U. S. by *Feige* (1967); it has also been used by *Laidler* and *Parkin* (1970) in an investigation into demand for money in the U. K., by *Frowen* and *Arestis* (1976) for the Federal Republic of Germany and, at an international level, by *Gray, Ward* and *Zis* (1976).

Our static formulation is as follows:

$$m_t = a y_t^b r_t^c u_t \tag{3.1}$$

where m_t = per capita real cash balances
y_t = per capita real income
r_t = rate of interest (opportunity cost variable)
u_t = error term satisfying the usual stochastic assumptions
a, b, c = constants to be estimated from the regression analysis

[3] We are indebted to George *Zis* and Michael *Parkin* for their comments which helped to clarify our exposition of this point.

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Our dynamic formulation is generated by the following mechanism

$$\frac{m_t}{m_{t-1}} = \left(\frac{m_t^d}{m_{t-1}}\right)^k v_t \qquad 0 < k < 1 \tag{3.2}$$

where m_t^d = desired per capita real cash balances
v_t = error term

Hence we assume that actual changes in real cash balances are adjusted gradually as a result of the discrepancy between desired and actual cash balances. Equation (3.2) in conjunction with (3.1) yields the following reduced form model

$$m_t = d_o \, y_t^{\,d_1} r_t^{\,d_2} m_{t-1}^{\,d_3} u_t \tag{3.3}$$

where $d_0 = ak$
$d_1 = bk$
$d_2 = ck$
$d_3 = 1 - k$

Specification (3.3), as is well known, gives rise to both short and long-run parameters. We have linearised the two models (3.1) and (3.3) by applying a double logarithmic transformation in which case all parameter estimates refer to elasticities.

IV. Application of the Models to a Pooled Time-Series and Cross-Section Sample[4]

The data period used covers two distinct periods. Firstly, the period of fixed exchange rates from 1957 (2) to 1971 (2) and secondly the period of flexible exchange rates from 1971 (3) to 1974 (4).

The models have been applied using two different opportunity cost variables, (a) domestic interest rates and (b) the euro-dollar rate, the first reflecting the influence of domestic money and capital markets,

[4] Our data has been derived mainly from O.E.C.D. Main Economic Indicators and IMF International Financial Statistics. The money-stock variable refers to M_1 (currency and sight deposits); the income variable refers to G.N.P.; and deflation has been performed via the retail price index. The Euro-dollar rate refers to the 3-month rate on Euro-dollar deposits in London, while the domestic rates refer to the governments' 3-month Treasury bills. All figures are mid-quarter estimates. For more details see data appendix in the paper by *Gray*, *Ward* and *Zis* (1976) to whom we are grateful for providing us with their data.

and the second the integration and uniformity of the international capital market. The use of the latter yields better results confirming our contention that the demand for money on a world basis is more appropriately explained by a world interest rate than a domestic rate.

Applying the static model to the fixed exchange rate period (1957[2] - 1971[2]) — which, considering that we have a pooled sample, provides us with 570 observations — we find the following results:

(4.4) $$ln\hat{m}_t = \underset{(32.9)}{1.0974}\, lny_t - \underset{(7.58)}{0.1332}\, lnr_{d_t} \quad R^2 = 0.9470$$ [5]

(4.5) $$ln\hat{m}_t = \underset{(31.1)}{1.2698}\, lny_t - \underset{(11.3)}{0.2339}\, lnr_{e_t} \quad R^2 = 0.9524$$

where lnr_{d_t} = natural logarithm of the domestic interest rate

lnr_{e_t} = natural logarithm of the euro-dollar rate

All other variables are as defined before. Figures in parenthesis represent 't' ratios.

As can be seen from these results, the simple static model works well. All variables are highly significant and the interest rate variable not only assumes the right sign, but in contrast to most other studies, it has a small standard error. Moreover, when we replace the domestic by the euro-dollar rate, the overall performance of the equation improves and the interest elasticity becomes bigger and more significant.

At this point it is interesting to observe the statistical significance of the dummies, which reflect differences between countries, something which is overlooked if figures are simply aggregated over countries. For reasons of simplicity we quote only the dummies of Equation (4.4).

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[5] In three of the countries included in our study — Italy, France and Japan — no domestic short-term interest rates corresponding to those used in the case of the other countries were available. Thus, for those three countries the euro-dollar rate was used instead. If we exclude these three countries and apply the same models to the remaining seven, we obtain the following results:

Static model $$ln\hat{m}_t = \underset{(21.6)}{0.7344}\, lny_t - \underset{(7.51)}{0.1073}\, lnr_{d_t} \quad R^2 = 0.9650$$

Dynamic model $$ln\hat{m}_t = \underset{(6.78)}{0.1026}\, lny_t - \underset{(6.40)}{0.0300}\, lnr_{d_t} + \underset{(59.3)}{0.9116}\, lnm_{t-1} \quad R^2 = 0.9965$$

As these results indicate, using purely domestic interest rates does not invalidate our previous finding that the interest elasticity is a highly significant variable in our demand-for-money function.

(General constant)	U.S.A.	−5.9125 (185.6)	W. Germany	−0.5103 (17.7)
	Canada	−0.6282 (26.2)	Italy	0.4474 (9.28)
	Japan	0.1385 (2.48)	Belgium	0.4190 (12.5)
	U. K.	−0.0718 (1.88)	Netherlands	0.0051 (0.14)
	France	0.2865 (9.25)	Sweden	−0.7785 (32.1)

As is evident from the simple 't' test on each dummy, differences are very significant in all cases except the Netherlands.

Switching the analysis to the dynamic model, the following results are obtained:

$$ln\hat{m}_t = \underset{(6.79)}{0.0878}\, lny_t - \underset{(6.31)}{0.0268}\, lnr_{d_t} + \underset{(98.1)}{0.9508}\, lnm_{t-1} \qquad R^2 = 0.9971 \tag{4.6}$$

$$ln\hat{m}_t = \underset{(7.50)}{0.1168}\, lny_t - \underset{(6.71)}{0.0371}\, lnr_{e_t} + \underset{(93.1)}{0.9405}\, lnm_{t-1} \qquad R^2 = 0.9971 \tag{4.7}$$

The implied long-run elasticities are:

	Interest Rates	
Income	Domestic	Euro-dollar
1.7838	−0.5453	
1.9622		−0.6231

All the short-run elasticities are statistically significant, while the size of the long-run elasticities turn out to be larger than is generally believed. The elasticity of the lagged money stock reveals a speed of adjustment of approximately 5 to 6 percent per quarter.

For the dynamic model (Equation 4.6) the country dummies are given below:

(General constant)	U.S.A.	−0.3055 (5.30)	W. Germany	0.0102 (1.19)
	Canada	−0.0156 (1.86)	Italy	0.0909 (7.67)
	Japan	0.0858 (6.56)	Belgium	0.0548 (6.32)
	U. K.	0.0274 (3.05)	Netherlands	0.0374 (4.50)
	France	0.0396 (5.17)	Sweden	−0.0203 (2.12)

As in the case of the static model, differences between countries are quite significant (except in the case of W. Germany). It is worth noting that for both the static and the dynamic models the dummies are even more significant when using the euro-dollar rate.

We can now test the basic assumption in monetary theory that nominal balances are homogeneous of degree one in the price level. This can easily be performed by specifying an equation where per capita cash balances are expressed in nominal terms and the price level is also included as an independent variable. The results are as follows:

$$\text{(4.8)} \qquad ln\hat{m}_t^* = \underset{(5.34)}{0.1076}\, lny_t - \underset{(5.62)}{0.0232}\, lnr_{d_t} + \underset{(1.96)}{0.0374}\, lnp_t + \underset{(99.5)}{0.9498}\, lnm_{t-1}^* \qquad R^2 = 0.9498$$

$$\text{(4.9)} \qquad ln\hat{m}_t^* = \underset{(6.15)}{0.1199}\, lny_t - \underset{(6.24)}{0.0342}\, lnr_{e_t} + \underset{(2.89)}{0.0580}\, lnp_t + \underset{(96.9)}{0.9419}\, lnm_{t-1}^* \qquad R_2 = 0.9981$$

where m_t^* = nominal cash balances
p_t = the price level

The implied long-run elasticities are:

	Interest Rates		
Income	Domestic	Euro-dollar	Price
2.1423	−0.4617		0.7442
2.0651		−0.5881	0.9985

Mere inspection of the long-run price elasticity shows that for the model where the euro-dollar rate is used, the homogeneity assumption is fulfilled, while in the case of the domestic rate equation the same cannot be maintained[6].

V. The Stability of the Demand Function Under Fixed Exchange Rates

Apart from the pertinence to monetary theory of the interest elasticity of the demand for money, one of the most discussed issues is the stability of the demand-for-money function. In the context of our analysis, the least worrying factor is a lack of degrees of freedom.

[6] This assumption can be tested more stringently if the asymptotic standard errors corresponding to each elasticity are computed. However, our computer programme did not have the relevant subroutine.

Hence we can divide the entire period into two sub-periods and apply the same models to both. Differences in the calculated parameters would indicate the extent to which the function has changed between the periods. Thus, we apply the static and dynamic models to two-sub-periods — 1957 (2) - 1964 (2) with $n = 290$, and 1964 (3) - 1971 (2) with $n = 280$. In the case of the dynamic model we also apply a test for homogeneity.

A comparison between the two sub-periods shows that in the latter period both the static and dynamic model reveal a drop in the income elasticity. In the case of the interest elasticities a diverse movement is observed. In the static case both interest elasticities increase, while in the dynamic case the interest elasticity of the domestic rate rises, whereas the elasticity of the euro-dollar rate declines. However, the long-run elasticities for both income and the two interest rates depict a considerable increase in the second of the two sub-periods. The homogeneity test shows that only in the first sub-period is there evidence of the absence of money illusion (since the price elasticities approach one).

If we confine ourselves to the most representative specification of our model, which is the dynamic one using the euro-dollar rate, our main observations are, that both income and interest elasticities decline in importance, while the lagged money stock elasticity shows a significant improvement. Since lags "carry over" expectations, which in our case are chiefly related to prices, incomes and interest rates, it may be argued that changes in expectations have been the main factor influencing the demand for money in the second part of our fixed exchange rate period. The increase in the lagged money stock elasticity also implies that adjustment between desired and actual cash balances has slowed down from 18 percent per quarter to 2 percent per quarter.

1957 (2) - 1964 (2)

Static model

$$\ln \hat{m}_t = \underset{(30.17)}{1.0746} \ln y_t - \underset{(3.41)}{0.0510} \ln r_{d_t} \qquad R^2 = 0.9835 \tag{5.10}$$

$$\ln \hat{m}_t = \underset{(27.85)}{1.11770} \ln y_t - \underset{(3.13)}{0.08228} \ln r_{e_t} \qquad R^2 = 0.9834 \tag{5.11}$$

Dynamic model

$$\ln \hat{m}_t = \underset{(8.40)}{0.2273} \ln y_t - \underset{(4.28)}{0.0263} \ln r_{d_t} + \underset{(37.14)}{0.8217} \ln m_{t-1} \qquad R^2 = 0.9972 \tag{5.12}$$

$$\ln \hat{m}_t = \underset{(8.88)}{0.2517} \ln y_t - \underset{(4.47)}{0.0480} \ln r_{e_t} + \underset{(37.41)}{0.8234} \ln m_{t-1} \qquad R^2 = 0.9973 \tag{5.13}$$

The implied long-run elasticities are:

	Interest rates	
Income	Domestic	Euro-dollar
1.2748	−0.1477	
1.4260		−0.2719

Homogeneity test

(5.14)
$$ln\hat{m}^*_t = \underset{(5.87)}{0.1926}\, lny_t - \underset{(4.13)}{0.0237}\, lnr_{d_t} + \underset{(3.28)}{0.1344}\, lnp_t + \underset{(39.92)}{0.8636}\, ln\hat{m}^*_{t-1}$$
$$R^2 = 0.9979$$

(5.15)
$$lnm^*_t = \underset{(6.52)}{0.2189}\, lny_t - \underset{(4.52)}{0.0450}\, lnr_{e_t} + \underset{(3.14)}{0.1275}\, lnp_t + \underset{(40.28)}{0.8647}\, lnm^*_{t-1}$$
$$R^2 = 0.9979$$

The implied long-run elasticities are:

	Interest rates		
Income	Domestic	Euro-dollar	Prices
1.4117	−0.1735		0.9850
1.6173		−0.3326	0.9419

1964 (3) - 1971 (2)

Static model

(5.16)
$$ln\hat{m}_t = \underset{(13.39)}{0.8363}\, lny_t - \underset{(2.76)}{0.0730}\, lnr_{d_t} \qquad R^2 = 0.9612$$

(5.17)
$$ln\hat{m}_t = \underset{(14.65)}{0.9205}\, lny_t - \underset{(4.64)}{0.1127}\, lnr_{e_t} \qquad R^2 = 0.9631$$

Dynamic model

(5.18)
$$ln\hat{m}_t = \underset{(3.59)}{0.0754}\, lny_t - \underset{(4.76)}{0.0337}\, lnr_{d_t} + \underset{(59.29)}{0.9873}\, lnm_{t-1} \qquad R^2 = 0.9973$$

(5.19)
$$ln\hat{m}_t = \underset{(3.34)}{0.0762}\, lny_t - \underset{(3.91)}{0.0270}\, lnr_{e_t} + \underset{(56.95)}{0.9800}\, lnm_{t-1} \qquad R^2 = 0.9972$$

The implied long-run elasticities are:

	Interest rates	
Income	Domestic	Euro-dollar
5.9456	−2.6569	
3.8104		−1.3482

Homogeneity test

(5.20) $$ln\hat{m}^*_t = \underset{(2.28)}{0.0671}\, lny_t - \underset{(4.18)}{0.0294}\, lnr_{e_t} + \underset{(1.14)}{0.0339}\, lnp_t + \underset{(52.07)}{0.9770}\, ln\hat{m}^*_{t-1}$$

$R^2 = 0.9973$

(5.21) $$lnm^*_t = \underset{(1.92)}{0.0817}\, lny_t - \underset{(4.16)}{0.0297}\, lnr_{d_t} + \underset{(2.05)}{0.0644}\, lnp_t + \underset{(52.00)}{0.9764}\, lnm^*_{t-1}$$

$R^2 = 0.9973$

The implied long-run elasticities are:

	Interest rates		
Income	Domestic	Euro-dollar	Prices
3.5469	−1.2899		1.4727
2.8457		−1.2454	2.7304

VI. The World Demand for Money Under Flexible Exchange Rates

Although one can discuss the demand for money at world level in a meaningful way only, when exchange rates are fixed, we nevertheless extend our analysis to the flexible exchange-rate period to see to what extent fluctuations in exchange rates have eroded the world demand-for-money function.

Applying the previous methodology to the following two sub-periods — 1971 (2) - 1973 (1) with $n = 70$, and 1973 (1) - 1974 (4) with $n = 70$ — we arrive at the conclusions stated below.

During the first of the two sub-periods we notice a marked increase in both income and interest-rate elasticities, while the lagged money stock elasticity becomes weaker indicating an increase in the speed of adjustment; as a result the long-run elasticities become smaller. This last observation is a sign that, on average, expectations played a less important role in the determination of the world demand for money.

In the second sub-period both short and long-run elasticities computed in the two models decline in size. The overall impression is that the relationship we are trying to estimate becomes weaker and if we look at the homogeneity test one can say that it disintegrates.

1971 (2) - 1973 (1)

Static model

(6.22) $$ln\hat{m}_t = \underset{(27.01)}{1.5931}\, lny_t - \underset{(5.00)}{0.1279}\, lnr_{d_t} \qquad R^2 = 0.9827$$

(6.23) $$ln\hat{m}_t = \underset{(24.62)}{1.5402}\, lny_t - \underset{(3.58)}{0.1371}\, lnr_{e_t} \qquad R^2 = 0.9801$$

Dynamic model

(6.24) $$ln\hat{m}_t = \underset{(4.51)}{0.5386}\, lny_t - \underset{(3.89)}{0.0703}\, lnr_{d_t} + \underset{(9.36)}{0.6444}\, lnm_{t-1} \qquad R^2 = 0.9924$$

(6.25) $$ln\hat{m}_t = \underset{(3.80)}{0.4418}\, lny_t - \underset{(3.25)}{0.0816}\, lnr_{e_t} + \underset{(10.05)}{0.6863}\, lnm_{t-1} \qquad R^2 = 0.9920$$

The implied long-run elasticities are:

	Interest rates	
Income	Domestic	Euro-dollar
1.5145	−0.1978	
1.4083		−0.2601

Homogeneity test

(6.26) $$ln\hat{m}^*_t = \underset{(5.47)}{0.6716}\, lny_t - \underset{(3.73)}{0.0671}\, lnr_{d_t} + \underset{(5.14)}{0.8676}\, lnp_t + \underset{(6.77)}{0.5168}\, lnm^*_{t-1}$$
$$R^2 = 0.9923$$

(6.27) $$ln\hat{m}^*_t = \underset{(4.91)}{0.5896}\, lny_t - \underset{(3.34)}{0.0818}\, lnr_{e_t} + \underset{(5.05)}{0.8685}\, lnp_t + \underset{(7.17)}{0.5467}\, lnm^*_{t-1}$$
$$R^2 = 0.9920$$

The implied long-run elasticities are:

	Interest rates		
Income	Domestic	Euro-dollar	Prices
1.3900	−0.1390		1.7956
1.3006		−0.1804	1.9159

1973 (1) - 1974 (4)

Static model

(6.29) $$ln\hat{m}_t = \underset{(11.20)}{0.8870}\, lny_t - \underset{(2.25)}{0.0619}\, lnr_{d_t} \qquad R^2 = 0.9697$$

(6.30) $$ln\hat{m}_t = \underset{(11.12)}{0.8435}\, lny_t - \underset{(1.83)}{0.0815}\, lnr_{e_t} \qquad R^2 = 0.9690$$

Dynamic model

(6.31) $$ln\hat{m}_t = \underset{(2.75)}{0.2887}\, lny_t - \underset{(2.26)}{0.0481}\, lnr_{d_t} + \underset{(6.99)}{0.6431}\, lnm_{t-1} \qquad R^2 = 0.9824$$

(6.32) $$ln\hat{m}_t = \underset{(2.41)}{0.2500}\, lny_t - \underset{(1.70)}{0.0589}\, lnr_{e_t} + \underset{(6.93)}{0.6474}\, lnm_{t-1} \qquad R^2 = 0.9819$$

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The implied long-run elasticities are:

	Interest rates	
Income	Domestic	Euro-dollar
0.8088	−0.1347	
0.7091		−0.1669

Homogeneity test

(6.33) $$ln\hat{m}_t^* = \underset{(3.91)}{0.3596} + \underset{(0.36)}{0.0078}\, lnr_{d_t} + \underset{(0.16)}{0.0163}\, lnp_t + \underset{(7.04)}{0.5901}\, lnm_{t-1}^* \qquad R^2 = 0.9870$$

(6.34) $$ln\hat{m}_t^* = \underset{(4.18)}{0.3793} + \underset{(1.64)}{0.0596}\, lnr_{e_t} - \underset{(0.50)}{0.0529}\, lnp_t + \underset{(6.98)}{0.5761}\, lnm_{t-1}^* \qquad R^2 = 0.9874$$

The implied long-run elasticities are:

	Interest rates		
Income	Domestic	Euro-dollar	Prices
0.8774	0.0190		0.0397
0.8947		0.1407	−0.1248

VII. Conclusions

The present article adopts a rather conventional procedure, i. e. a demand-for-money function which has been estimated using single-equation estimation techniques with the money stock as the dependent variable. This implies the assumption that the simultaneity bias is not significant enough to alter the main findings. In fact, the results reported in demand-for-money studies using simultaneous estimation techniques do not appear to differ more than marginally from those of single-equation studies. Furthermore, the present paper uses a narrow definition of money, real income on a *per capita* basis and a short-term interest rate, all variables which in past studies have proved to be of special significance.

This study provides strong evidence in favour of the Keynesian hypothesis of a significant interest-rate elasticity and instability of the demand-for-money function. In fact, we find a significant interest elasticity of the world demand for money even when using a simple static model which ignores any dynamic adjustment. When a dynamic mechanism is applied the interest elasticity is still well defined (− 0.03 in the short run and − 0.6 in the long run), the euro-dollar rate showing a consistent superiority over the domestic interest rate. Our demand-for-money function proves to be unstable under fixed exchange rates whilst, as expected, it almost breaks down under flexible exchange rates.

These empirical results appear to be in contrast to those in the paper by Gray, Ward and Zis (1976), which found the demand-for-money function to be stable and to show a low, insignificant interest elasticity. The differences in our results seem to be due entirely to our having used a pooling technique, instead of a simple time-series aggregation for all countries, the latter of which ignores heterogeneities that exist between countries.

Our policy implications are that it would be difficult to control world inflation simply by controlling the world money supply as Gray, Ward and Zis (1976) and Parkin (1976) appear to suggest,[7] because of the unpredictable effect of a change in the world money supply. In fact, as Keynesians would maintain, there are severe limits placed on the efficacy of monetary policy if the demand-for-money function is both unstable and interest-elastic.

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[7] This implication is based on Parkin's statement that the findings by Gray, Ward and Zis (1976) "point strongly towards there being a stable demand for money function and hence to the necessity and sufficiency of world money supply control for the control of world inflation" (Parkin (1976), p. 10). As the present authors find the world demand-for-money function to be unstable, the opposite must apply.

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Zusammenfassung

Das Vorhandensein einer Geldnachfragefunktion auf weltweiter Ebene unter festen und flexiblen Wechselkursen: Vorläufige Ergebnisse

Auf nationaler Ebene ist es möglich, die Geldnachfragefunktion als Richtlinie für die Wirksamkeit der Geldpolitik zu benutzen. Sobald ein quantitatives Verhältnis zwischen dem Geldvolumen, dem Einkommen und der Zinshöhe etabliert ist, kann die kontraktive Wirkung von Zinserhöhungen auf die Geldbestände, wie auch die notwendige Expansion des Geldvolumens für bestimmte Zunahmen des Bruttosozialproduktes beurteilt werden. Auf inter-

nationaler Basis ist eine solche Geldnachfragefunktion lediglich unter festen Wechselkursen relevant, denn nur in diesem Fall kann von einer praktisch gemeinsamen Währung gesprochen werden, die die Errechnung einer gemeinsamen Geldnachfragefunktion sinnvoll macht. Obgleich die Periode fester Wechselkurse inzwischen zur Vergangenheit gehört, ist die vorliegende Studie über eine solche Geldnachfragefunktion der Welt keineswegs von nur historischer Bedeutung, da eine spätere Rückkehr zu einem System fester Wechselkurse durchaus im Rahmen des Möglichen liegt. Abgesehen hiervon dürften die Ergebnisse dieser Studie, solange es Staatengruppen gibt, die, wie die EWG, auf längere Sicht hin gesehen nach einer Währungsunion streben, von einiger Bedeutung sein.

Im Gegensatz zu den bereits vorliegenden Studien über Geldnachfragefunktionen auf weltweiter Basis beruht diese Arbeit auf Zahlenaggregationen auf nationaler Basis durch Benutzung der 'Pooling Technique', obgleich sich die Anwendung des Modells selbst auf eine Gruppe von zehn führenden Industriestaaten bezieht. Die angewandte Spezifikation berücksichtigt spezifische Shift-Variable, die im wesentlichen die Heterogenitäten darstellen. Durch die angewandte Methode wird die Anzahl der Beobachtungen auf einen Stand von Hunderten von Beobachtungen erhöht, was ermöglicht, einen Anspruch auf asymptotische Eigenschaften der Parameterschätzungen zu erheben; weiterhin ist in diesem Fall ohne Schwierigkeiten eine Unterteilung der Stichproben möglich, um die Stabilität der Funktion zu prüfen.

Die Hauptergebnisse dieser Studie können wie folgt zusammengefaßt werden: Erstens spielen Zinsen in der Geldnachfragefunktion der Welt eine bedeutende Rolle, besonders im Falle des Eurodollarzinssatzes. Zweitens sind statische wie auch dynamische Formulierungen signifikant, mit besseren Ergebnissen für die dynamische Formulierung. Drittens besteht kein Grund für die Annahme, daß die Geldnachfragefunktion der Welt bei festen Wechselkursen stabil ist; für den Zeitraum flexibler Wechselkurse seit 1971 bricht sie fast zusammen. Dies bedeutet, daß es nicht leicht möglich sein wird, die weltweite Inflation durch eine Kontrolle des Geldvolumens in den in dieser Arbeit berücksichtigten Staaten in einer vorauszusehenden Weise zu beeinflussen. Diese Ergebnisse stehen in gewissem Gegensatz zu denjenigen ähnlicher Arbeiten über die Geldnachfragefunktion der Welt, die lediglich auf Zeitreihendaten und deren Aggregation beruhen. Die Bedeutung der Zinselastizität ist in jenen Studien unklar, besonders im Falle eines einfachen statischen Modells, während die Stabilität der Funktion selbst infolge eines Mangels an Freiheitsgraden nicht leicht geprüft werden kann.

Summary

The Existence of a World Demand-for-Money Function under Fixed and Flexible Exchange Rates: Preliminary Results

At a national level a demand-for-money function can be used as a guideline for the effectiveness of monetary policy. Once a quantitative relationship between money stock, income and the interest rate is established, then we

can assess the contractionary effect of interest rate increases on money cash balances as well as the necessary expansion of the money stock to given GNP increases. At an international level the pertinence of such a function is relevant only under fixed exchange rates because the currencies are freely convertible and one can virtually talk about a common currency. Although the fixed exchange rate period now belongs to the past, our study is still not of historical importance alone, since it is not unlikely that this practice might reappear in the future. Besides, so long as there are groups of countries, such as E.E.C., which aim at a monetary union at a future date the findings of this paper could be of some importance.

Contrary to past studies on the same subject, aggregation remains at the national level although the application of our model relates to a group of ten countries. The specification adopted allows for specific shift variables which represent, in the main, heterogeneities that exist between countries. Also, the sample size is increased to several hundreds of observations which enable us to claim asymptotic properties for our parameter estimates and easy sub-division of the sample in order to test the stability of the function.

Our main findings are: firstly, interest rate plays an important role in the world demand-for-money function, especially when expressed by the euro-dollar rate. Secondly, both a static and a dynamic formulation are significant, with the latter performing better. Thirdly, the stability of the world demand-for-money function over time and under fixed exchange rates is not to be taken for granted, while under flexible exchange rates it almost breaks down. This implies that world inflation cannot easily be regulated by controlling the world money supply. These results are somewhat in contrast to those obtained by similar studies on the world demand-for-money using merely time-series data. The significance of the interest-rate elasticity is obscured in these studies, especially in the simple static model, while the stability of the function cannot readily be tested due to lack of degrees of freedom.

Résumé

L'existence d'une fonction de la demande monétaire au niveau mondial sous l'empire de taux de change fixes et flexibles: résultats provisoires

Au niveau national, l'on peut user de la fonction de la demande monétaire à titre de directive d'efficience de la politique monétaire. Dès que l'on a établi un rapport quantitatif entre le volume monétaire, le revenu national et le niveau des taux d'intérêt, l'on est en mesure d'apprécier l'effet contractif de hausses de taux d'intérêt, sur la masse monétaire comme aussi l'expansion du volume monétaire nécessaire à des accroissements déterminés du produit national brut. A l'échelon international, pareille fonction de la demande monétaire n'a de sens que sous l'empire de taux fixes de change, car ce n'est que dans cette situation que l'on peut parler d'une monnaie pratiquement commune qui valorise le calcul d'une fonction commune de demande monétaire. Bien que la période des taux fixes de change appartienne

anjourd'hui au passé, la présente étude présente plus qu'un intérêt historique, car un retour ultérieur aux taux fixes n'est nullement à exclure. Et au demandant tant qu'il existera des groupes d'Etats qui, comme la CEE, entendent développer à terme une union monétaire, les résultats de la présente analyse demeureront d'une réelle utilité.

Contrairement aux études existantes sur les fonctions de la demande monétaire à l'échelon planétaire, la présente analyse se fonde sur des agrégations chiffrées de données nationales grâce à l'usage de la technique de la mise en commun (« pooling »), encore que l'application du modèle se réfère à un groupe de dix principaux Etats industrialisés. La spécification utilisée tient compte de variables spécifiques (Shift), qui pour l'essentiel constatent les hétérogénéités existant entre ces Etats. En outre, la méthode exploitée hausse le nombre d'observations à plusieurs centaines, ce qui permet de prétendre déceler les caractéristiques asymptotiques des évaluations paramétriques; enfin, l'on peut sans peine décomposer les tests en vue de démontrer la stabilité de la fonction.

Les conclusions principales de la présente étude peuvent se résumer comme suit: Primo, les taux d'intérêt jouent un rôle d'importance dans la fonction de la demande monétaire mondiale, et en particulier le taux de l'eurodollar. Secundo, les formulations tant statiques que dynamiques sont signifiantes, les secondes offrant cepedant de meilleurs résultats. Tertio, l'hypothèse de la stabilité de la fonction de la demande monétaire mondiale sous l'empire de taux de change fixes n'apparaît pas fondée; et dans la phase de taux flexibles commençant en 1971, cette hypothèse s'est quasiment effondrée. Ceci signifie qu'il sera malaisé d'influencer avec une certitude prévisible l'inflation mondiale par un contrôle du volume monétaire dans les Etats retenus pour la présente analyse. Ces conclusions contredisent dans une certaine mesure celles de travaux similaires qui reposent exclusivement sur des données échelonnées dans le temps et sur leur agrégation. Dans ceux-ci, l'importance de l'élasticité des taux d'intérêt, demeure incertaine, en particulier dans les modèles statiques simple, et la stabilité de la fonction ne peut guère être testée en raison de l'absence de liberté de certains mouvements.