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CURRENCY SUBSTITUTION, CAPITAL MOBILITY
AND MONEY DEMAND

by

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I Introduction

A number of papers has recently examined the problems that currency substitution -- the possibility that domestic residents hold foreign as well as domestic money balances -- might cause for the conduct of domestic monetary policy. Marc Miles (1978), for example, has argued that although a flexible exchange rate system allegedly insures a degree of monetary autonomy that is impossible under fixed exchange rates, this autonomy is lost in the presence of currency substitution (CS). In a similar vein, Girton and Roper (1981) show that exchange rate volatility increases with the degree of CS in the face of exogenous changes in the expected rate of depreciation. In the limiting case of perfect CS, the exchange rate becomes indeterminate. Helpman and Razin (1979) and Kareken and Wallace (1981) also note this indeterminacy of the level of the exchange rate when two fiat monies are perfect substitutes.

Taking a slightly different tack, Bruce Brittain (1981) claims that international currency substitution can explain the apparent instability of velocity in a number of industrial countries. McKinnon (1982) addresses the related question of defining meaningful monetary aggregates, proposing that CS makes an appropriately defined "world money supply" rather than national money supplies relevant for studying worldwide inflation.

While currency substitution is a potentially important phenomenon, its implications for open-economy macro modelling and policy analysis have not yet been thoroughly investigated. In particular, it is unclear which of the above-mentioned

implications of CS are, in fact, consequences of CS per se and which are implications of high international capital mobility in general. Existing papers obscure this distinction by treating CS in isolation from the complete specification of financial market equilibrium. Girton-Roper (1981) and McKinnon (1982), for example, both assume interest rates are exogenous in their CS models. Implicitly Calvo-Rodriguez (1977) also fix both domestic and foreign interest rates, because they lump all domestic assets and all foreign assets together. This, of course, makes it impossible to distinguish asset substitution in general from currency substitution, i.e., substitution among national monies.

One important issue, therefore, in integrating the CS literature into open-economy money and macro theory is: To what extent does CS yield conclusions or implications that are different than those obtained in standard portfolio balance (PB) models. These models, as described by Branson (1979) , Girton-Henderson (1976), and Isard (1978) among others, permit varying degrees of substitutability between domestic and foreign nonmonetary assets. It would seem natural to analyze the potential importance of CS for open-economy macro modelling and monetary theory by adding foreign monetary assets to the available menu of assets in these PB models. That way, the one-currency-per-country assumption, which the CS literature condemns, is relaxed.

A second issue concerns the appropriate specification of the money demand function in an open economy and how it is affected by international capital mobility on one hand and CS on the other. It is these two issues that the model in this paper tries to resolve.

II. Financial Equilibrium with Currency Substitution

Domestic investors are allowed to hold their wealth in the form of four different assets: (1) domestic money M (2) domestic-currency-denominated nonmonetary assets which are referred to, for convenience, as domestic "bonds", B (3) foreign "bonds" F and (4) foreign money N . Following usual PB specification, these demands depend on the assets' respective returns, income, and wealth (as well as the predetermined variance-covariance structure of asset returns). Thus domestic residents' asset demands equal:

$$(1) \quad M^d = M^d(\bar{r}, \bar{r}^* + x, \bar{x}, \bar{Y}, \bar{W})$$

$$(2) \quad B^d = B^d(\bar{r}, \bar{r}^* + x, \bar{x}, \bar{Y}, \bar{W})$$

$$(3) \quad F^d = F^d(\bar{r}, \bar{r}^* + x, \bar{x}, \bar{Y}, \bar{W})$$

$$(4) \quad N^d = N^d(\bar{r}, \bar{r}^* + x, \bar{x}, \bar{Y}, \bar{W}).$$

These demands satisfy the usual wealth constraint where total domestic financial assets equal:

$$(5) \quad W(e) \equiv M + B + eF + eN, \quad W'(e) = F + N \geq 0$$

where e is the domestic currency price of foreign currency, r is the domestic interest rate on bonds, r^* is the interest rate on foreign-pay bonds, and x is the expected rate of depreciation of the domestic currency.¹ Hence $r^* + x$ is the expected return, including expected exchange rate changes, on foreign bonds held by domestic investors. The terms r , $r^* + x$, and x , therefore represent the nominal returns on domestic bonds, foreign bonds, and foreign money, respectively, from domestic investors' point of view. The nominal return

1. x may be a function of the level of the exchange rate rather than being taken as exogenous as we do here. It is typical to assume static or regressive expectations so that $x'(e) < 0$ but this is not crucial here.

on domestic money is exogenously set at zero, as is conventional in such models.¹ All asset demand functions also depend on domestic income Y , in a way to be specified below, and on domestic wealth W .

The study of CS within the PB framework requires careful consideration of the signs and magnitudes of the various partial derivatives in (1)-(4). As a starting point we make the usual assumption of gross substitutability to sign the rate of return effects. It is important to emphasize that these are all partial derivatives. In particular, the partials with respect to x denote only the direct effect of exchange rate depreciation and not the indirect effect via the net return on foreign bonds r^*+x . Hence the specification that $\partial F^d/\partial x$ is negative, indicating a fall in the domestic demand for foreign bonds when the domestic currency is expected to depreciate, is not as peculiar as it initially appears. Given gross substitutability, the direct effect of an increase in the rate of return on foreign money (x) is to reduce the demands for all other assets. The increase in the expected rate of depreciation, however, also affects the net return on foreign bonds r^*+x . Both the direct effect and this indirect effect (through r^*+x) of expected depreciation must be taken into account. When this is done, the asset demand functions can be rewritten as:

$$(6) \quad M^d = m(\bar{r}, \bar{r}^*, \bar{x}, \bar{Y}, \bar{W})$$

$$(7) \quad B^d = b(\bar{r}, \bar{r}^*, \bar{x}, \bar{Y}, \bar{W})$$

$$(8) \quad F^d = f(\bar{r}, \bar{r}^*, \bar{x}, \bar{Y}, \bar{W})$$

$$(9) \quad N^d = n(\bar{r}, \bar{r}^*, \bar{x}, \bar{Y}, \bar{W})$$

1) By expressing the asset demand functions in terms of nominal rather than real returns, I ignore direct substitution between financial assets and goods as part of the portfolio choice. While this seems reasonable for the industrial countries considered here, it is inappropriate in many LDCs.

where the signs of the partial derivatives with respect to r , r^* and x follow from gross substitutability in the original specification (1)-(4). Thus the net effect of an increase in the expected rate of depreciation is to increase the demands for both foreign money and foreign bonds:

$$(10) \quad \frac{\partial f}{\partial x} = \frac{\partial F^d}{\partial r^*} \frac{\partial (r^*+x)}{\partial x} + \frac{\partial F^d}{\partial x} > 0$$

$$(11) \quad \frac{\partial n}{\partial x} = \frac{\partial N^d}{\partial r^*} \frac{\partial (r^*+x)}{\partial x} + \frac{\partial N^d}{\partial x} > 0 ,$$

as intuition would have suggested in the first place.

One additional aspect of the asset demand specification should be mentioned. Portfolio balance models typically assume that the income elasticity is positive for money demand and nonpositive for all other assets. In CS models, however, this assumption is modified: the domestic demands for both domestic and foreign monies rise with an increase in domestic income. This presumably reflects the transactions motive for holding real balances in several currencies although the differing degree to which various currencies satisfy this transactions role has not yet been based on any explicit microtheoretic framework. Nevertheless, CS does have the straightforward, testable implication: domestic/foreign demand for foreign/domestic money balances should depend positively (rather than negatively or not at all) on domestic/foreign income or some other transactions variable(s).

What has been gained by adding CS to the standard PB framework? Returning to the asset demand specification in (6)-(9), one

of its revealing characteristics is that the signs of the rate-of-return effects in the domestic money, domestic bond, and foreign bond demand functions are exactly the same as they would be in the model without CS! Thus one might suspect that none of the model's qualitative conclusions will be altered by the introduction of currency substitution.

The effects of a change in the foreign interest rate on domestic demands for foreign bonds and foreign money, it might be noted, do differ: $\partial f / \partial r^* > 0$ and $\partial n / \partial r^* < 0$. But, of course, any model that fixes r^* exogenously as many CS models do -- either by making the small country assumption or implicitly assuming that the foreign central banks pegs r^* -- obscures this distinction. From Hicks' composite commodity theorem we know that foreign bonds and foreign money can be lumped together in this case.

Suppose r^* does change over time. What is lost by aggregating domestic holdings of both foreign monetary and nonmonetary assets? After all, open-economy macro models seldom distinguish liquid from nonliquid assets in their treatment of international capital flows even though balance of payments accounts have long made this distinction.

If we aggregate foreign money and bond demand by defining the total domestic demand for foreign assets as:

$$(12) \quad A^d \equiv F^d + N^d = a(r, r^*, x, Y, W),$$

the gross substitutability assumption in (1)-(4) implies that:

$$(13) \quad \frac{\partial a}{\partial r} < 0, \quad \frac{\partial a}{\partial r^*} > 0, \quad \frac{\partial a}{\partial x} > 0.$$

Consequently, all rate-of-return effects in the domestic demand functions for domestic money (6), domestic bonds (7), and total (monetary and nonmonetary) foreign assets (12) are qualitatively the same as they are in the standard PB model that ignores CS. The sizes of various elasticities may, of course, be affected but this has no effect on the applicability of the standard open-economy macro models that ignore the CS possibility.

One thing that might be noted about the specification of the aggregated foreign-asset demand function in (12) is the ambiguity of the income effect:

$$(14) \quad \frac{\partial a}{\partial Y} = \frac{\partial f}{\partial Y} + \frac{\partial n}{\partial Y} > 0 .$$

Currency substitution implies that $\partial n / \partial Y > 0$, while the standard PB specification assumes (albeit without any deep justification) that $\partial f / \partial Y$ is negative. The presumption is that $|\partial f / \partial Y|$ is quite small so that an increased transactions demand for money is satisfied primarily by attempting to sell domestic assets rather than foreign assets: $|\partial b / \partial Y| > |\partial f / \partial Y|$.

In any event, one can argue that the presence of CS introduces a new possibility into the standard PB framework, which implicitly lumps all foreign assets (monetary and nonmonetary) together. Namely, the total domestic demand for foreign assets may (but need not) depend positively on income, contrary to the usual presumption, once CS is introduced.

The foregoing conclusion may or may not be useful empirically because the presence of CS can not be ruled out when $\partial a / \partial Y$ is found to be negative. Furthermore this ambiguity can be avoided by

directly testing to see if $\partial n/\partial Y > 0$. On the other hand, however, the possibility that $\partial a/\partial Y > 0$ may have important theoretical implications (by reversing certain comparative static results) for the analysis of stabilization policy in open economies. This has not yet been demonstrated.

In light of the foregoing analysis, it is concluded that the financial asset demand specification in a portfolio balance model with currency substitution is virtually indistinguishable from the standard PB model, which rules out CS or implicitly lumps together foreign monetary and nonmonetary assets. The sole exception lies in the effect of an increase in domestic income on total domestic demand for foreign assets, which may be positive if CS is strong whereas it is presumed to be negative or zero in the conventional PB model. Surprisingly perhaps, given the emphasis in the CS literature on the effects of shifts in the expected rate of currency depreciation, the rate-of-return effects on demands for domestic money, bonds, and total foreign assets are qualitatively the same with and without CS.¹

1. In the limiting case of perfect CS, however, the exchange rate becomes indeterminate [c.f. Boyer (1978), Helpman-Razin (1979), Girton-Roper (1981), Kareken-Wallace (1981)].

III. The Sequential Portfolio Choice Set-Up

The CS literature to date, it should be emphasized, has not been based on a general portfolio selection model of the type described in Section II. Rather than discussing CS within the context of the financial equilibrium determination of interest rates and exchange rates, the papers tend to focus more narrowly on its implications for money demand and the exchange rate. In quite a number of cases, in fact, authors explicitly assume a sort of sequential portfolio choice process which even divorces CS from the determination of interest rates.

The 1978 paper by Miles, for example, assumes that investors ~~first decide how to divide total wealth between monetary and non-~~monetary assets. Next, the optimum currency composition of money balances is chosen based on the opportunity cost of holding each.

As Miles puts it:

The overall portfolio ... is assumed to consist of holdings of all types of assets, only one of which is money. In constructing that portfolio, desired amounts of each of these assets are determined. Once the demand for each individual asset has been determined, asset constraints for each asset can be constructed. ... the private sector decides to hold M_o real cash balances. These cash balances are then divided between M_d/p_d domestic currency-denominated real balances and M_f/P_f foreign currency-denominated real balances on the basis of the relative cost of holding these different types of balances (reflected in the asset constraint)... (Miles, 1978, p. 433).

Girton and Roper (1981, p.14) make a similar assumption by making relative demands for domestic and foreign monies (and hence the value of the exchange rate) invariant to the yield on the non-monetary asset. This is surely an extreme assumption in light of the considerable effort in international macroeconomics to develop financial equilibrium models which simultaneously determine interest rates and exchange rates so as to explain the observed high correlation between these variables. King, Putnam, and Wilford (1978) and McKinnon

(1982) also adopt the sequential portfolio selection process.

While the foregoing studies differ slightly in the rate of return variables and alternative assets they consider, they all presume the same basic set-up. First, the desired level of total (domestic plus foreign) money balances is chosen based on the return(s) on nonmonetary assets, r and/or r^*+x , and domestic income or some other scale variable. Second, the optimum currency composition is chosen solely on the basis of the expected rate of depreciation x . Thus the asset demands in (1)-(4) (n.b. not (6)-(9)) take on the added restrictions:

$$(15) \quad \frac{\partial M^d}{\partial r} = e \frac{\partial N^d}{\partial r}$$

$$(16) \quad \frac{\partial M^d}{\partial r^*} = e \frac{\partial N^d}{\partial r^*}$$

$$(17) \quad \frac{\partial B^d}{\partial x} = e \frac{\partial F^d}{\partial x} = 0$$

$$(18) \quad - \frac{\partial M^d}{\partial x} = e \frac{\partial N^d}{\partial x}$$

$$(19) \quad \frac{\partial \log M^d}{\partial \log Y} = \frac{\partial \log N^d}{\partial \log Y} .$$

Whether these additional restrictions are consistent with the data, of course, remains to be seen. This issue will be returned to below when the empirical evidence on CS is reviewed.

IV. Empirical Evidence: The Elasticity of CS

What empirical evidence is there regarding the importance of CS? Furthermore, do the existing studies enable us to distinguish CS per se from the more general phenomenon of high international capital mobility? These are the questions to which we now turn.

The 1978 paper by Marc Miles provides one of the first theoretical models of CS as well as the first empirical assessment of its importance. His theoretical framework is based on Chetty's (1969) CES production function for money services (ms) and assumes that domestic and foreign real balances (each deflated using the local price index) are inputs into the production process:

$$(20) \quad ms = \left[\alpha_1 \left(\frac{M_d}{P_d} \right)^{-\rho} + \alpha_2 \left(\frac{M_f}{P_f} \right)^{-\rho} \right]^{-1/\rho}.$$

The elasticity of substitution between the two currencies in generating money services equals $\sigma \equiv 1/(1 + \rho)$. Equation (20) is maximized subject to a so-called "asset constraint" that takes the following form:

$$(21) \quad \frac{M_o}{P_d} = \frac{M_d}{P_d} (1 + r) + \frac{M_f}{P_f} (1 + r^*)$$

where M_o/P_d is the total demand for monetary assets (in all currencies) chosen in stage one of the portfolio selection process described above. r and r^* are the yields on domestic and foreign T-bills. In light of the general portfolio model described in Section II it is unclear exactly how these uncovered interest rates capture the opportunity costs of holding monies and why these costs differ between currencies. The PB model avoids this ambiguity by defining all asset demand functions in terms of the expected

rates of return on all available assets rather than pointing to a particular asset's return as an indicator of the opportunity cost of holding some other asset.

Setting this difficulty aside for the moment, the resulting first-order conditions yield:

$$(22) \quad \log \left(\frac{M_d/P_d}{M_f/P_f} \right) = \sigma \log (\alpha_1/\alpha_2) + \sigma \log \left(\frac{1+r^*}{1+r} \right).$$

Rather than using the logarithm of the ratio of domestic to foreign real money balances, Miles invokes the assumption of continuous purchasing power parity (PPP) and estimates:

$$(23) \quad \log \left(\frac{M_d}{eM_f} \right) = \sigma \log (\alpha_1/\alpha_2) + \sigma \log \left(\frac{1+r^*}{1+r} \right),$$

Using Canadian data on residents' holdings of Canadian and U.S. money balances, he comes up with a statistically significant elasticity of CS equal to 5.4.

Several comments should be made about Miles' procedure. Given the well-known failure of PPP in the short run, it would seem preferable to estimate (22) rather than (23). Nonetheless much of the CS literature assumes continuous PPP. Second, if interest rate parity holds for the interest rates which are being used, the independent variable $\log (1+r^*)/(1+r)$ would equal the forward premium in the foreign exchange market and hence would be a proxy for the expected rate of currency depreciation. Third, in light of the PB framework, we expect the demands for both domestic and foreign monies to depend on some transactions variable like income

as well as the domestic interest r , the foreign interest rate r^* , and the expected rate of depreciation x (as in (6) - (9) above). In the limiting case where domestic and foreign bonds are perfect substitutes and asset market adjustment is instantaneous (i.e. the "perfect capital mobility" case), the interest differential will equal the expected depreciation rate as measured by the forward premium: $r - r^* = x$. Hence one of the variables r , r^* , or x would have to be dropped from the estimated asset demand equations to avoid perfect multicollinearity. The variables to be retained can be chosen on econometric grounds. For

example, if the country under consideration is small so that it faces an exogenous foreign interest rate r^* , it would make sense to retain r^* . Simultaneous equation bias is a potential problem whenever endogenous rate of return variables are used. To date, the theoretical CS literature has not presented a complete model of financial market equilibrium and, correspondingly, the empirical literature has not addressed the issue of simultaneous equation bias.

Bordo and Choudhri (1982) have recently provided a useful critique of Miles' empirical specification. They begin by specifying domestic demand functions for domestic and foreign money balances as follows:

$$(24) \quad \log \left(\frac{M_d}{P_d} \right) = \beta_0 + \beta_1 \log y + \beta_2 r + \beta_3 r^*$$

$$(25) \quad \log \left(\frac{M_f}{P_f} \right) = \gamma_0 + \gamma_1 \log y + \gamma_2 r + \gamma_3 r^* .$$

The PB specification in Section II suggests that, in general, x should also enter these regression equations. As B-C note, however,

the correlation between r and $r^* + x$ is .99 using their Canadian data. Hence the omission of x may not be inappropriate.¹⁾

B-C combine (24) and (25) using PPP in order to obtain a regression equation with the same dependent variable as Miles uses:

$$(26) \quad \log \left(\frac{M_d}{eM_f} \right) = \delta_0 + \delta_1 \log y + \delta_2 r + \delta_3 (r^* - r)$$

where:

$$(27) \quad \delta_1 = \beta_1 - \gamma_1$$

$$(28) \quad \delta_2 = \beta_2 + \beta_3 - \gamma_2 - \gamma_3$$

$$(29) \quad \delta_3 = \beta_3 - \gamma_3 .$$

They note that the interest differential $(r^* - r)$, which is approximately equal to Miles' $\log (1 + r^*)/(1 + r)$, equals the expected rate of depreciation when the interest rate parity condition (33) is satisfied. The coefficient $\delta_3 = \beta_3 - \gamma_3$, however, does not bear any obvious relationship to the CS parameter σ that Miles wishes to estimate. Furthermore they point out that the omission of y and r from Miles' regression may bias the estimated coefficients.

Implicitly Miles imposes the restrictions that $\delta_1 = \delta_2 = 0$ in his regressions. Interestingly, these restrictions are implied by his sequential portfolio selection process described in Section III, namely $\beta_1 = \gamma_1$ and $\beta_2 + \beta_3 = \gamma_2 + \gamma_3$. Hence an econometric test of the hypothesis that $\delta_1 = \delta_2 = 0$ is, in fact, a test of the sequential portfolio selection process that is widely employed in the CS literature.

1) Both domestic and foreign interest rates and x should be included to check.

B-C's estimation of (26) is reproduced in Table 1 below. It yields two interesting conclusions. First, the domestic income and/or interest rate variables are statistically significant when added to Miles' regression equation. The restrictions implied by the widely assumed sequential portfolio selection procedure are, therefore, rejected by the data in the Canadian case at least. Second, the coefficient on the interest differential δ_3 becomes statistically insignificant and has the wrong sign, in contrast to Miles' conclusion.

One must be careful in drawing conclusions about CS from the (in)significance of δ_3 however. It would be preferable to estimate β_3 directly using the domestic demand functions for domestic money balances. Unfortunately no one has yet estimated equations like (24) and (25) using only domestic holdings of domestic and foreign money balances as the dependent variables. Instead the total domestic and foreign money supplies are used as the dependent variables. Thus the right-hand side of these equations represent the combined effects of both domestic and foreign demands for the asset indicated by the dependent variable.

Table 1

MILES'S ESTIMATES OF ELASTICITY OF SUBSTITUTION REEXAMINED

Period	Const.	$i_e - i_r$	i_r	$\log y$	R^2	D-W	Rho	SEE
1. 1960.IV-1975.IV (Miles's total data period, includes fixed as well as flexible rates)	2.56 (18.34)*	4.98 (2.40)*			0.78	1.47	0.88	0.1323
	-5.72 (-1.13)	-1.39 (0.59)	-11.40 (-4.35)*	0.78 (1.74)**	0.83	1.70	0.85	0.1164
2. 1960.IV-1962.II plus 1970.III-1975.IV (combines the two flexible exchange rate subperiods)	2.75 (21.15)*	6.67 (2.45)*			0.76	1.45	0.78	0.1476
	-2.83 (-0.54)	-0.11 (-0.03)	-10.52 (-2.71)*	0.54 (1.15)	0.82	1.84	0.78	0.1340

NOTES: The dependent variable is $\log (M_e/EM_e)$. All estimates are based on the Cochrane-Orcutt procedure. t -values are shown in brackets. For the definition of terms and sources, see Appendix.

*Indicates significance at the 5 percent level. **Indicates significance at the 10 percent level.

Source: Bordo-Choudhri (1982).

V. Estimating Money Demand in Open Economies:

More Evidence on CS

As the foregoing discussion suggests, the PB model of an open economy has important implications for the estimation of money demand functions. This is true whenever domestic residents can elect to hold foreign (as well as domestic) currency denominated bonds, regardless of whether or not currency substitution-- i.e. domestic holding of foreign monies-- is present. Surprisingly, however, the presence of international capital mobility has received little emphasis in studies of money demand. In fact the important papers by Goldfeld (1976) and Enzler, Johnson and Paulus (1976) don't even mention open-economy variables as possible determinants of money demand or as explanations of the "mystery of the missing money" after the mid-1970s.

According to the PB framework where domestic residents allocate their wealth among domestic money, domestic bonds and foreign bonds (but not foreign money), the domestic money demand function should depend on the net return on foreign assets, r^*+x , in addition to the usual domestic interest rate and income variables. Even if CS is precluded by assumption, the general PB framework predicts negative effects of both r^* and x on domestic money demand. The omission of these variables from money demand functions, as usually estimated, is one possible explanation for the increased "instability" of those functions after 1973. Empirical work is needed to test this hypothesis.

It should be emphasized that the statistical significance of the expected depreciation in the money demand equation is, in general, not a valid test of the presence of currency substitution. To distinguish the effect of changes in the net return of foreign bonds $r^* + x$ (which reflect the presence of "capital mobility") from changes in the return on foreign money (i.e. currency substitution per se) requires more information. In effect we must ask whether x affects money demand directly, rather than just through $r^* + x$. The most straightforward way of doing this is to estimate:

$$(30) \quad \log \left(\frac{M_d}{P_d} \right) = \beta_0 + \beta_1 \log y + \beta_2 r + \beta_3 (r^* + x) + \beta_4 x.$$

Currency substitution not important under the null hypothesis that β_4 is zero. In the presence of CS, we should expect to find in (30) a significantly negative β_4 coefficient.

We conclude that the effects on money demand of capital mobility in general as opposed to CS in particular can be distinguished: The former would be reflected in $\beta_3 < 0$ and the latter by $\beta_4 < 0$ in (30). Either effect would cause x to enter with a significant negative effect in a money demand equation in terms of $\log y$, r , r^* and x .

Unfortunately the existing empirical evidence on CS is not based on (30) but instead regressions that include only two of the three rate-of-return variables: $(r, r^* + x, x)$ or equivalently¹⁾ (r, r^*, x) . As mentioned above, this is appropriate in the case where domestic and foreign bonds are perfect substitutes so that the Fisher open condition holds exactly. This restriction should

1) Compare specifications (1) - (4) and (6) - (9).

be tested, rather than assumed a priori, by initially including all three of the variables in the regression. Omitted variable bias is thereby guarded against. This was not done in the empirical studies by Bordo and Choudhri (1982) and Brittain (1981) reported below, although B-C do calculate the correlation coefficient between r and r^*+x . High correlation among two variables, of course, does not necessarily preclude them both being significant in regression equations.

After finding a correlation coefficient of .99 between r and r^*+x in their study using Canadian and U.S. interest rates, Bordo-Choudhri in effect estimate (30) with the implicit restriction that $\beta_3 = 0$. If domestic and foreign bonds are, in fact, perfect substitutes, then $\beta_4 < 0$ would indicate the presence of CS.

Their empirical results reported in Table 2 (see the column headed $\hat{E}$) indicate that the CS variable is statistically insignificant in the Canadian context. This concurs with their conclusion based on the estimation of (26) that Miles' result is based on a misspecified money demand function.

Given this new scepticism about the empirical importance of CS, it is particularly interesting to examine other countries to see how the results compare with the Canadian case.

A recent study by Brittain (1981) provides useful information in this regard for the United States, the United Kingdom and West Germany. Although Brittain estimates both velocity equations and money demand equations, the conclusions regarding CS are broadly similar. Hence only his money demand estimates in Tables 3, 4, and 5, thereby maintaining easy comparison with the already-mentioned studies.

Table 2

CURRENCY SUBSTITUTION IN THE CANADIAN DEMAND FOR MONEY: QUARTERLY DATA, 1970.IV-1979.IV

Coefficients of Independent Variables (<i>t</i> -values in brackets)														
Dependent Variable: Log (X_t/P_t)	Type of Regression	Const.	log y	i_s	i_l	i_o	$\dot{E}$	log (X_{t-1}/P_{t-1})	log (X_{t-2}/P_{t-2})	R^2	SEE	D-W	Durbin h	Rho
1. $X = M1$	OLSQ	-1.19 (-1.92)**	0.08 (1.86)**	-0.65 (-4.20)*				0.87 (12.84)*		0.926	0.0149	2.32	-1.07	
2. $X = M1$	OLSQ	-1.49 (-2.27)*	0.11 (2.21)*	-0.67 (-4.36)*			-0.21 (-1.26)	0.85 (12.30)*		0.930	0.0148	2.39	-1.31	
3. $X = M2$	CORC	-1.39 (-1.72)**	0.11 (1.75)**		-0.91 (-2.71)*	0.72 (4.07)*			0.88 (16.34)*	0.997	0.0064	1.71		0.224
4. $X = M2$	CORC	-1.58 (1.87)**	0.13 (1.89)**		-0.76 (2.05)*	0.65 (3.27)*	-0.08 (-0.89)		0.87 (15.47)*	0.997	0.0064	1.70		0.235
5. $X = M2-M1$	CORC	-2.33 (-2.79)*	0.19 (2.77)*		-1.01 (-2.24)*	1.11 (4.56)*			0.86 (20.98)*	0.998	0.0084	1.79		0.282
6. $X = M2-M1$	CORC	-2.38 (2.73)*	0.19 (2.70)*		-0.96 (1.93)**	1.08 (4.04)*	-0.03 (-0.23)		0.85 (20.20)*	0.998	0.0085	1.79		0.295

NOTES: M1 = narrowly defined money, M2 = broadly defined money, P = price level, y = real income, i_s = short interest rate, i_l = long interest rate, i_o = own rate, $\dot{E}$ = expected rate of change in the exchange rate; all rates represent annual rates expressed as fractions. For further explanation and sources, see Appendix.

*Indicates significance at the 5 percent level. **Indicates significance at the 10 percent level.

Source: Bordo-Choudhri(1982)

Table 3

THE UNITED KINGDOM (quarterly data, 1963.I to 1979.II)

	Constant	Lagged Dependent Variable	RY	RUK	RD	$\bar{R}^2$	D-W
RM3	-5.756 (-5.58)		0.805 (8.96)	0.032 (5.37)	-0.021 (-3.86)	0.82	0.266
RM3	-0.736 (-1.41)	0.959 (17.16)	0.080 (1.39)	-0.002 (-0.76)	-0.002 (-0.60)	0.97	1.315
RM1	9.66 (13.06)		0.014 (0.22)	-0.004 (-0.93)	-0.006 (-1.41)	0.19	0.330
RM1	0.599 (0.80)	0.837 (14.12)	0.093 (2.76)	-0.009 (-4.10)	0.002 (0.89)	0.81	2.530

Table 4

THE UNITED STATES (quarterly data, 1960.II to 1979.II)

	Constant	Lagged Dependent Variable	RY	RUS	RD	$\bar{R}^2$	D-W
RM1	-0.378 (-2.91)	1.076 (37.06)	-0.001 (-0.16)	-0.005 (-5.79)	-0.002 (-2.74)	0.98	1.45
RM1	4.145 (20.50)		0.181 (5.88)	-0.003 (-0.96)	0.129 (4.76)	0.63	0.17
RMB	0.013 (0.25)	0.869 (12.16)	0.082 (2.07)	-0.003 (-4.05)	-0.000 (-0.76)	0.99	1.69
RMB	0.466 (7.15)		0.560 (56.53)	-0.001 (-0.79)	0.003 (3.01)	0.99	0.54
RM2	-0.166 (-2.88)	0.937 (20.46)	0.084 (1.85)	-0.005 (-6.85)	-0.000 (-0.63)	0.99	1.33
RM2	-0.850 (-7.01)		1.001 (54.33)	-0.005 (-2.60)	0.004 (2.51)	0.99	0.41

Table 5

GERMANY (quarterly data, 1960.II to 1979.II)

	Constant	Lagged Dependent Variable	RY	RDE	RD	$\bar{R}^2$	D-W
RCBM	-0.026 (-0.391)	0.952 (39.02)	0.040 (1.61)	-0.004 (-4.12)	0.002 (2.20)	0.99	1.53
RCBM	-1.930 (-9.40)		0.959 (28.07)	0.001 (0.311)	0.003 (0.664)	0.97	0.18
RM1	-0.309 (-3.58)	0.784 (14.71)	0.233 (5.13)	-0.008 (-5.29)	0.004 (2.16)	0.99	2.29
RM1	-1.033 (-7.325)		0.878 (37.44)	-0.014 (-4.69)	0.017 (5.83)	0.98	0.80
RM3	-0.372 (-2.63)	0.845 (17.27)	0.180 (3.16)	-0.001 (0.47)	0.002 (1.26)	0.99	1.46
RM3	-2.345 (-12.48)		1.136 (36.36)	0.009 (2.35)	0.014 (3.495)	0.98	0.28

Source: Brittain(1981)

Brittain's money demand equations (including real M1, M2, M3 and the monetary base as alternative monetary aggregates) all include real income and the domestic interest rate as right-hand side variables. In addition, a "portfolio variable" - either the foreign interest rate or the difference between the foreign interest rates - is included to capture CS. (These "alternative" portfolio variables will always produce identical results, however, as long as the domestic interest rate is included.¹) Hence I will only discuss the regressions including the interest differential (RD in the tables) to facilitate comparison with B-C and Miles. If the open interest rate parity condition is always exactly satisfied, Brittain's specification would be the same as that of B-C.²

Brittain reports regression results for equations with and without a lagged value of the dependent variable. In every case, however, the lagged dependent variable (LDV) is highly significant. Its exclusion from the regression results in Durbin-Watson statistics less than unity in all cases. Thus there is every reason to suspect high serial correlation in the regression residuals in the equations with no lagged dependent variable. The associated standard errors and t-values on the estimated coefficients are, therefore, biased.

Given these econometric problems, it is valid only to consider the regressions that include a LDV. It would, of course, have been desirable to correct for serial correlation or, better still, to respecify the estimating equation. Note that inclusion

1) Brittain (1981) doesn't note this equivalence, which makes the results in his Tables 2.3, 2.5 and 2.7 redundant given Tables 2.2, 2.4 and 2.6.

2) His discussion of capital controls in the case of Britain, however, suggests that he would not expect IRP to hold for the interest rates he uses. (Brittain, 1981, pp. 144, 147.) In this case his money demand specification would be incorrect. Equation (30) should be used.

of a LDV has not "eliminated" the serial correlation problem: the DW statistic is still outside the desirable range.

A review of Brittain's regressions yields the following observations:

(1) For the U.K. (Table 3) the CS variable (RD) is insignificant once $(M/P)_{t-1}$ is included. This is true for either real M3 (RM3) or real M1 (RM1) as regressions 2 and 4 in Table 3 show.

(2) In the case of the U.S. (Table 4) the CS variable (which is the difference between the U.S. and German 90-day T-bill rates) is significant in the RM1 equation, even once the lagged dependent variable is included. The fact that the income elasticity of money demand is zero and the coefficient on the LDV is significantly greater than unity ($t = 2.6$) in this equation is, however, grounds for scepticism. When real M2 or the real monetary base is used as the dependent variable, CS is insignificant once the LDV is included.

(3) For Germany, (Table 5), Brittain's regressions indicate a statistically significant CS variable when either the real central bank money stock (RCBM) or real M1 (RM1) is the dependent variable, but the statistically significant coefficient has the wrong sign! With the broader aggregate RM3, the CS variable becomes insignificant once the LDV is included in the regression.

The foregoing results are subject to one major qualification. To interpret the estimated coefficient on the uncovered interest differential as evidence of CS per se rather than high capital mobility in general requires the validity of open interest parity condition. Failure to include all three rate-of-return variables (r , r^*+x , x) in the regression equations may bias the regression results.

VI. Conclusions

It is fair to say that the review of the currency substitution question undertaken here yields rather negative conclusions about its importance both from the standpoint of macro model building and the estimation of money demand. The paper specifies a general portfolio balance model that permits domestic residents' demand for foreign money (i.e. currency substitution) to be distinguished from their demands for foreign nonmonetary assets (which are already much-discussed in the literature on international capital mobility). In that context it is concluded that the inclusion of foreign money in the usual menu of available assets introduces virtually no new insights. Rate of return effects in the asset demand functions remain qualitatively unchanged, although it is now possible (but not necessary) that the total domestic demand for foreign monetary and nonmonetary assets responds positively to an increase in domestic income, rather than negatively as the standard model presumes.

The CS literature has had the virtue of provoking a reconsideration of money demand specifications taking open-economy factors into account. The empirical work, however, has not been sufficiently precise in distinguishing high capital mobility from currency substitution. Even if we accept the implicit assumption of perfect capital mobility that these studies make, there appears to be little empirical evidence of CS. In Canada and the U.K. the CS coefficient was statistically insignificant. In Germany it was significant but had the "wrong" sign. Only in the case of the U.S., strangely enough, was the coefficient significant with the expected sign. The validity of this result obtained from a money demand equation

using the narrow monetary aggregate real M1, however, is brought into question by the fact that the income elasticity in that equation was found to be zero. Furthermore, the equation is dynamically unstable. The significant CS coefficient disappeared when either a narrower (i.e. real monetary base) or wider (i.e. real M2) monetary aggregate was employed.

References

- Bordo, M.D. and E.U. Choudhri, 1982, "Currency Substitution and the Demand for Money: Some Evidence for Canada", Journal of Money, Credit, and Banking 14, 1 (February), 48-57.
- Boyer, R.S., 1978, "Currency Mobility and Balance of Payments Adjustment", in Putnam and Wilford (1978).
- Branson, W.H., 1979, "Asset Markets and Relative Prices in Exchange Rate Determination", in A. Lindbeck (ed.) Inflation and Employment in Open Economies, Amsterdam: North-Holland.
- Brillembourg, A. and S.M. Schadler, 1979, "A Model of Currency Substitution in Exchange Rate Determination, 1973-78", IMF Staff Papers 26 (September), 513-41.
- Brittain, B., 1981, "International Currency Substitution and the Apparent Instability of Velocity in Some European Economies and in the United States", Journal of Money, Credit and Banking 13, 2 (May), 135-155.
- Calvo, G.A. and C.A. Rodriguez, 1977, "A Model of Exchange Rate Determination under Currency Substitution and Rational Expectations", Journal of Political Economy 85 (June), 617-25.
- Chetty, V.K., 1969, "On Measuring the Nearness of Near-Moneys", American Economic Review 59 (June), 270-81.
- Enzler, J., L. Johnson, and J. Paulus, 1976, "Some Problems of Money Demand", Brookings Papers on Economic Activity I, 261-80.
- Girton, L. and D. Henderson, 1976, "Central Bank Operations in Foreign and Domestic Assets under Fixed and Flexible Exchange Rates", Journal of Monetary Economics 2, 33-61.

Girton, L. and D. Roper, 1981, "Theory and Implications of Currency Substitution", Journal of Money, Credit, and Banking 13, 1 (February), 12-30.

Goldfeld, S.M., 1976, "The Case of the Missing Money", Brookings Papers on Economic Activity 3, 683-730.

Helpman, E. and A. Razin, 1979, "Towards a Consistent Comparison of Alternative Exchange Rate Systems", Canadian Journal of Economics 12, 3 (August), 394-409.

Isard P., 1978, "Exchange Rate Determination: A Survey of Popular Views and Recent Models", Princeton Studies in International Finance No. 42.

Kareken, J. and N. Wallace, 1981, "On the Indeterminacy of Equilibrium Exchange Rates", Quarterly Journal of Economics XCVI, 2 (May), 207-222.

King, D.T., B.H. Putnam, and D.S. Wilford, 1978, "A Currency Portfolio Approach to Exchange Rate Determination: Exchange Rate Stability and the Independence of Monetary Policy", in Putnam and Wilford (1978).

McKinnon, R.I., 1980. "Currency Substitution and Instability in the World Dollar Standard", CREG Memorandum No. 242, Stanford University.

Miles, M.A., 1978, "Currency Substitution, Flexible Exchange Rates, and Monetary Independence", American Economic Review 68, 3 (June), 428-36.

Putnam, B.H. and D.S. Wilford, 1978, (editors), The Monetary Approach to International Adjustment, New York: Praeger Publishers.

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