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Currency Substitution in Egypt and the Yemen Arab Republic: A Comparative Quantitative Analysis

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Abstract

The paper provides an empirical analysis of the determinants of currency substitution in Egypt and the Yemen Arab Republic over the period 1980-86. During this period, residents have exhibited a marked preference to substitute foreign money balances for domestic balances, as indicated by their holdings of foreign currency deposits. This preference reflects changes in the expected relative returns to, and liquidity of, holdings of foreign balances. Such changes, in turn, are shown to result from intensified financial and economic imbalances, increased political uncertainties, and changes in institutional factors which affect domestic channels for acquiring and using foreign exchange resources.

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Contents

Summary

A number of developing countries have experienced a marked increase in the extent to which residents seek to substitute foreign exchange for their domestic money holdings. This phenomenon, known as currency substitution, has implications for the design, execution, and effectiveness of various economic and financial policies--particularly monetary, fiscal, financial intermediation, and exchange rate policies. Accordingly, several studies have been undertaken that attempt to identify the determinants of currency substitution. The quantitative application of these studies has focused mainly on industrial countries and a few Latin American developing countries. This paper extends the quantitative analysis to Egypt and the Yemen Arab Republic, two Middle Eastern countries that have experienced a high level of currency substitution and for which data are available on residents' holdings of foreign currency deposits for the period 1980-86.

Given the time span of the paper's quantitative analysis, the framework used to investigate the determinants of currency substitution abstracts from longer-term trends (such as the level of monetization and the development of banking habits), focusing instead on factors that influence agents' expectations of the relative return to, and liquidity of, holdings of foreign balances. The results suggest that the growth in residents' foreign currency portfolios was strongly influenced by expectations of increased financial yields on foreign balances relative to those on domestic money holdings, as well as by political uncertainty and institutional changes that reduced the foreign exchange available through the banking system. Accordingly, for a given political and institutional environment, an intensification of inflationary pressures and further deterioration in the external accounts would be reflected in an increased tendency by residents to substitute foreign balances for domestic currency balances in meeting their demand for money holdings. The findings also suggest that the implementation of measures designed to arrest and reverse such a tendency would need to be sustained over a significant period of time, given the importance of the stock adjustment mechanism in the process of adaptation of agents' portfolios to changes in the underlying conditions affecting the relative attractiveness of foreign currency holdings.

I. Introduction

The process of currency substitution, whereby foreign currency denominated money balances increasingly substitute for domestic money as a store of value, unit of account, and medium of exchange, has gained importance in a number of countries over the past few years. This process, reflecting a shift in preferences among residents toward foreign money often arising from large and growing economic and financial imbalances in the domestic economy, has induced a corresponding increase in professional interest in the subject. Accordingly, a number of studies have been undertaken on the growth in currency substitution and its implications for major macroeconomic relations, as well as traditional statistical concepts. The quantitative application of the resulting framework of analysis has focused primarily on the experience of industrial countries, 1/ with the relatively few studies on developing economies being restricted almost

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1/ Industrial country studies include Batten, D.S. and R.W. Hafer (1984), "Currency Substitution: A Test of its Importance," Federal Reserve Bank of Minneapolis, Quarterly Review, August/September; Baten, D.S. and R.W. Hafer (1985), "Money, Income and Currency Substitution; Evidence from Three Countries," Federal Reserve Bank of St. Louis, Review, May; Batten, D.S. and R.W. Hafer (1986), "Impact of International Factors on U.S. inflation: An Empirical Test of the Currency Substitution Hypothesis," Southern Economic Journal, October; Bordo, M.D. and E.U. Chaudhri (1982), "Currency Substitution and the Demand for Money: Some Evidence for Canada," Journal of Money, Credit and Banking, Vol. 14, No. 1; Brillembourg, A. and S.M. Shadler (1979), "A Model of Currency Substitution in Exchange Rate Determination, 1973-78," International Monetary Fund Staff Papers, Vol. No. 26, No. 2; Daniel, B.C. and H.O. Fried (1983), "Currency Substitution, Postal Strikes, and Canadian Money Demand," Canadian Journal of Economics, Vol. 16, No. 4; Marquez, J. (1985), "Currency Substitution and Economic Monetary Aggregates: The U.S. Case," Economics Letters, Vol. 19, No. 4; and Melvin, M. (1985), "Currency Substitution and Western European Monetary Unification," Economica, February.

exclusively to countries in Latin America. 1/ This paper seeks to extend the quantitative analysis of currency substitution to two Middle Eastern countries--viz., Egypt and the Yemen Arab Republic (Y.A.R.). 2/

Both Egypt and the Y.A.R. have experienced a high level of currency substitution as measured by residents' holdings of foreign currency deposits. This preference of individuals to substitute domestic money by foreign money, and the prospects for a continuation of this phenomenon, raises a number of economic issues, particularly regarding the implications of currency substitution for the design, execution, and effectiveness of monetary, fiscal, and exchange rate policies. In order to provide a satisfactory framework for further analysis of such issues, this paper attempts a preliminary empirical investigation, based on available partial data, of the magnitude and determinants of private sector currency substitution in these countries over the period 1980-86. To this end, Section II provides the background for the statistical analysis by outlining the theoretical determinants of currency substitution focussing on transaction, risk and return considerations, as well as on institutional factors. On the basis of this discussion, a reduced form money demand model, explicitly incorporating foreign currency denominated nominal money holdings and the associated impact on the portfolio balance decisions of asset holders, is specified. This model is estimated using quarterly data for Egypt and the Y.A.R.--two countries which are shown in Section III to have widespread and growing currency substitution, as measured by residents' relative holdings of foreign currency deposits in domestically located banks. The results of the estimation, presented in Section IV, provide an indication of the absolute and relative importance of various determinants of private sector currency substitution during the period under consideration.

1/ Analyses of the experience of developing countries are contained in Canto, V.A. (1985), "Monetary Policy, 'Dollarization', and Parallel Market Exchange Rates: The Case of the Dominican Republic," Journal of International Money and Finance, Vol. 4, No. 4; Gruden, W.C. and P.J. Lawler (1983), "Currency Substitution: The Use of Dollar Coin and Currency in the Texas Border Area of Mexico," Federal Reserve Bank of Dallas, Economic Review, July; Fasano-Filho, U. (1986), Currency Substitution and Liberalization: The Case of Argentina; Marquez, J. (1985), "Money Demand in Open Economies: A Currency Substitution Model for Venezuela," Federal Reserve Board, International Finance Discussion Paper No. 265; Ortiz, G. (1983), "Currency Substitution in Mexico: The Dollarization Problem," Journal of Money Credit and Banking, Vol. 15, No. 2; and Ramirez-Rojas, C.L. (1985), "Currency Substitution in Argentina, Mexico, and Uruguay," International Monetary Fund Staff Papers, Vol. 32, No. 4.

2/ The paper draws upon background work undertaken in the context of the preparation of an earlier working paper on foreign currency deposits in developing countries (Dodsworth, J., M.A. El-Erian, and D. Hammann (1987), "Foreign Currency Deposits in Developing Countries--Origins and Economic Implications", International Monetary Fund Working Paper, WP/87/12).

II. Determinants and Implications of Currency Substitution: A Brief Outline

Currency substitution may be defined as a situation in which foreign-denominated money has replaced, either wholly or in part, domestic money in performing the roles of store of value, medium of exchange, and unit of account. 1/ This phenomenon, which reflects basically individuals' attempts to protect or increase the value of their wealth and income, usually has taken place in the context of deteriorating economic and financial conditions that adversely affect the return on holdings of domestic money relative to those on foreign currency denominated money balances, as well as in the context of changes in the political and institutional environments that influence expectations regarding their absolute and relative liquidity.

The growth in currency substitution in a number of countries has been associated with increasing awareness of the resulting implications for economic and financial policy management. More specifically, the numerous articles in this area have demonstrated that large and growing currency substitution is likely to be associated with significant changes in the effectiveness of fiscal, monetary, and exchange rate policies. In particular, it has been shown that currency substitution, inter alia, (i) adversely affects fiscal policy by widening the possibilities for tax avoidance and reducing the yield of the inflationary tax; 2/ (ii) reduces the authorities' control over domestic liquidity by enlarging the component over which the authorities have little direct influence and reducing the stability of money demand; 3/ and (iii) weakens the effectiveness of exchange rate policy by reducing the disabsorption effect of a given devaluation. 4/ In addition, the

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1/ The type of currency substitution under consideration has been referred to in the literature as "non-symmetrical" since residents demand for a "stronger" currency is not accompanied by a demand for the "weaker" currency by agents abroad.

2/ Discussion of this issue is contained in Khan, M.S. and C.L. Ramires Rojas (1984), "Currency Substitution and Government Revenue from Inflation," (Unpublished: International Monetary Fund); and Tanzi, V. and M.I. Blejer (1982), "Inflation, Interest Rate Policy, and Currency Substitution in Developing Economics: A Discussion of Some Major Issues," World Development, Vol. 10, No.9. The analysis in Fischer, S. (1982), "Seigniorage and the Case for a National Money," Journal of Political Economy, Vol. 90, No. 2, indicates that the seignorage rate in the Y.A.R. was among the highest in the world.

3/ Analysis of the various aspects of this problem can be found in Batten, D.S. and R.W. Hafer (1985), op. cit.; Brillembourg A. and S.M. Shadler (1979), op. cit.; and Fasano-Filhi, U. (1986), op. cit.

4/ This, and related issues, are discussed in Girton, L. and D. Roper (1981), op. cit.; Husted, S.L. (1980), "The Theory and Empirical Estimation of Currency Substitution," Ph.D. Thesis, Michigan State University; and Miles, M.A. (1978), op. cit.

formalization of the process of currency substitution through the introduction and promotion of foreign currency deposits has been shown to require a corresponding adjustment in credit policies and regulatory practices to ensure that the financial integrity of the banking system is not adversely affected by a growth in uncovered foreign liabilites. Such policies must address the maturity and currency coverage, as well as the ability to generate sufficient foreign exchange resources in order to meet the interest obligations to depositors. 1/

In view of the adverse policy implications of widespread currency substitution, investigations in this area have also sought to clearly identify the specific determinants of this phenomenon. This process has been undertaken in a number of theoretical frameworks, including those based on the marginal utility theory of money demand, 2/ on the portfolio balance approach, 3/ on the theory of the precautionary demand for cash balances, 4/ and on the money services production function approach. 5/ A consolidation of the various issues raised in these analyses suggests that the main determinants of currency substitution are actual or expected reductions in the value of domestic money holdings (in terms of the current and/or future command over goods and services) occasioned by increased domestic inflationary pressures, expectations of exchange rate depreciations, and lower interest rates on local currency holdings. By altering the relative yield to holdings of foreign currency denominated money balances, and therefore their attractiveness as a store of value, these factors induce a change in the pace of currency substitution. This process may be further affected by uncertainties regarding socio-political developments, as well as those relating to agents' expenditure patterns.

While the magnitude of currency substitution will be primarily influenced by shifts in relative returns to money balances at a time of domestic and external imbalances, its character will also be affected by the prevailing institutional environment. In particular, and for a given level of financial and economic disequilibria, the extent of currency substitution will be higher the narrower the range of competitive domestic assets, the lower the legal risk premia attached to

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1/ A discussion of these issues is contained in Dodsworth, J., M.A. El-Erian, and D. Hammann (1987), op. cit.

2/ In this approach, both domestic and foreign currency balances enter the agents' utility functions. Such an approach is used in Bordo, M.D. and E.U. Choudhri (1982), op. cit.

3/ E.g., Brillembourg A., and S.M. Shadler (1979), op cit., where the choice of assets in agents' portfolios decisions depends on the mean and variance of the returns.

4/ In this approach, explicit account is taken of expenditure uncertainty as a motive for holding money. Refer to Poloz, S.S.(1986), "Currency Substitution and the Precautionary Demand for Money," Journal of International Money and Finance, Vol. 5, No. 1.

5/ Miles, M.A. (1978), "Currency Substitution, Flexible Exchange Rates, and Monetary Independence," American Economic Review, June.

holdings of foreign currency balances, and the smaller the transaction costs involved in acquiring such balances. Thus, currency substitution is likely to grow faster in countries with limited capital markets and other domestic investment outlets. In such environments, foreign currency balances increasingly become a more remunerative form of savings as they avoid the losses associated with the deterioration in domestic purchasing power occasioned by worsening economic and financial conditions. This factor will be supplemented in agents' formulation of portfolio decisions by considerations relating to the acquisition, maintenance, and use of foreign currency balances. Clearly, the wider the possibilities for obtaining these balances, the larger the potential for rendering effective a given level of notional demand for foreign currency holdings. Similarly, the greater the channels for the legal maintenance and use of such balances, the wider the possibilities for translating agents' desired holdings of foreign currency balances into actual holdings. Accordingly, the extent of currency substitution will be more widespread, ceteris paribus, in an environment in which, for example, there is an absence of total surrender requirements for foreign exchange receipts, there exist formalized and secure channels for holdings of foreign currency (e.g., through appropriately maintained foreign currency bank deposits), and there are relatively few restrictive regulations on the type of transactions that can legitimately be financed.

The discussion of the factors determining the level and character of currency substitution can be partially summarized in a simplified composite reduced form demand for money function. This function, which provides the basis for the subsequent quantitative analysis of currency substitution in Egypt and the Y.A.R., is derived on the basis of two separate underlying money demand equations for local and foreign currency denominated balances, each of which incorporates relevant transaction demand variables as well as those measuring the opportunity cost of holding money. Manipulation of these equations, taking account of the qualifications discussed below, yields a reduced form function which specifies the demand for foreign balances relative to domestic balances as dependent on the differential returns to the two holdings. In the context of a rapidly deteriorating economic and financial situation in which structural and institutional rigidities preclude the satisfaction of interest rate parity conditions, this differential will be reflected primarily in expectations of exchange rate changes. In addition, the specification incorporates a partial adjustment mechanism to reflect possible lags in the adjustment of desired holdings, and a term to capture major changes in the institutional and political environments.

The general function, including the a priori signs of the first order partial derivatives, can therefore be written as:

$$\frac{e_t M_t^f}{M_t^d + e_t M_t^f} = f\left[\underset{+}{e^*_t} ; \underset{+}{\frac{1 + i_t^f}{1 + i_t^d}} ; \underset{+}{\frac{e_{t-1} M_{t-1}^f}{M_{t-1}^d + e_{t-1} M_{t-1}^f}} ; \underset{\ldots 1/}{\emptyset} \right]$$

where M: nominal holdings of money balances;
i: nominal interest rate;
e: nominal exchange rate;
e*: expected nominal exchange rate;
Ø: term capturing political and institutional changes;
and the superscript d and f refer to the domestic and foreign components, respectively.

In considering the specification and application of the model, two important qualifications should be noted. First, the specification of the model is based on a number of simplifying assumptions. In particular, it is assumed that the scale variables in the two underlying money demand functions are similar and therefore play no role in determining the demand for local balances relative to that for foreign balances. In addition, it is assumed that both the transaction costs involved in maintaining and switching between local and foreign balances and the overall level of monetization remain broadly unchanged throughout the estimation period. An indication of the effects of such simplifying assumptions on the ability of the model to account for changes in currency substitution, in the period under consideration, will be provided by the value of the various statistical goodness-of-fit measures.

The second qualification relates to the specification of the dependent variable in the model. In particular, while the concept of currency substitution is relatively easy to define, its measurement poses considerable difficulties. Most attempts to quantify the level and changes in currency substitution, including the present one, focus on residents' relative holdings of foreign currency deposits in domestically-located banks. In using such an indicator, it is important to recognize that no account is taken of deposits in banks abroad and of

1/ A priori sign depends on the exact specification of institutional and political factors. For example, a positive relationship would be expected in the case where the variable is specified in such a way that an increase denotes more political uncertainties.

non-bank transactions; accordingly, this measure will underestimate the magnitude of currency substitution in cases where residents hold significant foreign currency deposits in banks abroad as well as in cases where a significant portion of financial intermediation in foreign currency takes place outside the formal banking system.

Available data on residents' holdings of foreign currency deposits in banks abroad, reported in International Financial Statistics, indicate that such holdings were not insignificant in the case of Egypt and the Y.A.R. 1/ The impact on the estimation of the model of the exclusion of these deposits, however, will be small as, in the period under consideration, both types of deposits experienced similar variations. 2/ As regards non-bank transactions--particularly those relating to cash holdings of foreign exchange--casual empiricism suggest that such transactions are quite widespread, especially in the Y.A.R. where banking habits are relatively underdeveloped. 3/ Notwithstanding this, however, a statistical analysis of currency substitution based on recorded domestic bank holdings will continue to provide meaningful insights if it is carried out within a framework that recognizes the impact of financial and economic disequilibria. Specifically, one would expect these disequilibria to be associated both with a growth in overall currency substitution, as mentioned earlier, and with a shift in the composition of agents' holdings away from deposits in domestically-located banks. Accordingly, if the estimation exercise, incorporating the latter holdings as a dependent variable, points to a positive and significant relationship between these holdings and the financial and economic disequilibria explanatory variables, the model would provide support for the more general currency substitution hypothesis encompassing alternative forms of foreign exchange holdings. 4/

III. Currency Substitution in Egypt and the Y.A.R.

The extent of private sector currency substitution in Egypt and the Y.A.R., as measured by a partial indicator based on the levels of foreign currency bank deposits, has expanded significantly in recent years, and is now similar to that prevailing in a number of Latin American countries. The introduction and growth of these deposits took place against a background of a higher availability of private sector foreign exchange transfers in the 1970's, mainly resulting from increased employment of nationals in neighbouring oil-producing

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1/ As of June 1986, these holdings amounted to US$3.0 billion for Egypt and US$360 million for the Y.A.R.

2/ More specifically, the coefficients of correlation between developments in these two types of deposits were estimated at 0.91 and 0.90 for Egypt and the Y.A.R. respectively.

3/ Around three-quarters of the recorded money stock in the Y.A.R., for example, is held outside the banking system in the form of currency in the hands of the non-banking public.

4/ This argument is also valid for the other explanatory variables; viz., those capturing changes in institutional and political factors.

countries. The introduction and promotion of foreign currency bank deposits provided the private sector with a legal means of holding the higher foreign currency balances within the banking system. At the same time, it appears that these deposits were viewed by the authorities as a way of increasing the supply of foreign exchange resources to their respective economies, as well as a method for directing these resources to formal banking channels, thereby providing the authorities with increased potential control over the process of financial intermediation of domestically-located foreign currency balances. This section considers the magnitude and growth of this measure of currency substitution, thereby setting the stage for the statistical analysis of this process presented in the following section.

The introduction of foreign currency deposits in Egypt in 1974 was part of a broader effort aimed at the liberalization of the economy. While comprehensive data are not available for the early years, it appears that these deposits quickly became a significant component of residents' holdings of money. By the early 1980s, they were well established in the banking system and continued to grow in a context of a deteriorating economic and financial situation characterized by increasing inflationary pressures and a weakening external position. In the six-year period that ended June 1986, foreign currency deposits in domestically-located banks grew at an annual rate of 22 percent in dollar terms. 1/ While this growth was reflected in both demand as well as time and savings deposits, the latter increased at a more rapid rate, registering an annual growth rate of 24 percent during this period. 2/ By the end of the period, residents' holdings of foreign currency in domestically-located banks, amounting to some US$7.3 billion, were far in excess of the country's gross official reserves. If account is also taken of the recorded foreign currency accounts in banks located abroad, Egyptian residents' total holdings were equivalent to US$10.3 billion in June 1986.

The growth in residents' holdings of foreign currency deposits has had a significant impact on the level and composition of Egypt's money supply. The rapid expansion of these deposits, compounded by stock adjustments arising from exchange rate-induced valuation effects, have been reflected in the substantial growth of the recorded domesic liquidity. Moreover, since these deposits grew at a faster rate than other components of money, their relative importance increased from some 25 percent of broad money in June 1980 to around 40 percent in June 1986.

1/ In local currency terms, the deposits grew at an annual rate of 42 percent during this period (converted at the free market rate).

2/ The two types of deposits grew by annual rates of 30 percent and 44 percent respectively, when measured in local currency terms.

The Y.A.R. also experienced a significant growth in currency substitution, as measured by the limited available data on private sector foreign currency time and savings deposits in domestically-located banks. In the fourteen year period ended June 1986, these deposits grew at an annual rate of 36 percent in dollar terms increasing to some US$270 million by the end of this period. 1/ The increase in the earlier portion of this period was part of a more generalized movement toward higher monetization and formal financial intermediation in the Yemeni economy which, as noted above, occured against a background of increased foreign exchange inflows. Foreign currency deposits continued to grow in the 1980's in an environment of deteriorating economic and financial conditions and changing institutional factors. For example, there was a substantial rise in the size of these deposits in 1983/84 which coincided with changes in banking regulations governing selected commercial bank foreign exchange activities. These changes had the effect of reducing agents access to the banking sector for acquiring and using foreign exchange to finance imports. The resulting higher demand for "own financed transactions" is likely to have led to an increased demand for foreign exchange holding by traders--a hypothesis which is investigated below.

In terms of broad money, the share of foreign currency deposits in the Y.A.R. rose from under 1 percent in June 1980 to over 10 percent in June 1986. Since the money supply is dominated by local currency in circulation, a better measure of the growing importance of these deposits is provided by their share in total financial sector deposits. This share increased from under 5 percent in June 1980 to around 25 percent in June 1986.

It is clear from the above that the phenomenon of currency substitution is important in both Egypt and the Y.A.R. The following section presents a preliminary statistical investigation of the determinants of this phenomenon during the period 1980-86. In doing so, an attempt is also made to identify additional data and analytical limitations, the further consideration of which could constitute a basis for supplementary empirical county work in this period, as well as for an extension of the analysis over a longer time period. 2/

1/ The growth rate of these deposits, in rial terms, amounted to 42 percent annually.

2/ Such an extension would require, inter alia, a shift of emphasis toward longer-term institutional factors (e.g., the pace of monetization and spread of banking habits) as well as toward more general issues relating to the level and structure of overall economic and financial development (e.g., changes in the "openess" of the economy).

IV. Quantitative Analysis of Currency Substitution in Egypt and the Y.A.R.

In order to obtain an indication of the absolute and relative importance of the determinants of currency substitution in Egypt and the Y.A.R., the reduced form function presented in Section II was estimated using quarterly data for the period 1980-86. The dependent variable (relative holdings of foreign currency deposits) was specified in two alternative ways which capture (i) narrow substitution between foreign currency bank deposits and domestic currency bank accounts, and (ii) broader substitution between foreign currency bank deposits and holdings of domestic balances encompassing both local currency bank deposits and cash holdings. The results of the various estimations are presented in Tables 1 and 2. The discussion in the text focuses on the specifications incorporating the concept of broader monetary substitution (i.e., Equations 1, 2, 5, and 6).

The results of the estimations suggest that agents' preferences for increased relative holdings of foreign currency balances, as measured by the growth in foreign currency time and savings bank deposits relative to total money holdings, reflected anticipations of higher yields on foreign currency balances due essentially to expectations of exchange rate induced capital gains. In addition, increased political uncertainties and changes in banking regulations provided an additional impetus to preferences for foreign money in lieu of domestic money. Finally, the results indicate that, given a change in these causal factors, actual holdings of foreign currency balances adjusted with a time lag to their unconstrained desired levels.

The detailed country results may be summarised as follows:

a. Egypt

All estimated coefficients had the expected signs and, with the exception of the term relating to interest rate differentials, 1/ were significant at the 95 percent confidence level; three of the coefficients were significant at the 99 percent confidence level (Equation 1 in Table 1). In addition, changes in the explanatory variables were found to account for the bulk of the variations in the extent of currency substitution. 2/

The results of the estimation indicate that increases in the importance of currency substitution in Egypt were associated, inter

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1/ Defined as the three month LIBOR dollar rate relative to the domestic rate of interest on three month local currency bank deposits. Movements in these rates were found to correspond closely to those in rates on other bank maturities.

2/ Based on the estimated correlation coefficient adjusted for degrees of freedom, which is reported in the table.

Table 1. Egypt: Estimates of the Determinants of Currency Substitution 1/

Variable	Constant	Exchange Rate Expectations	Interest Rate Differentials	Political Disruptions	Stock Adjustment	Coefficient of Determination	Durbin-Watson Statistic	Standard Error of Regression
Equation 1								
Co-efficient	-0.469	0.175	0.213	0.102	0.635			
Standard Error 2/	(0.126)**	(0.064)*	(0.359)	(0.031)**	(0.095)**	0.94	2.26	0.030
Equation 2								
Co-efficient	-0.459	0.153	...	0.104	0.635			
Standard Error 2/	(0.123)**	(0.051)**	...	(0.031)**	(0.093)**	0.94	2.21	0.029
Equation 3								
Co-efficient	-0.262	0.079	0.314	0.080	0.701			
Standard Error 2/	(0.093)*	(0.046)	(0.331)	(0.029)*	(0.105)**	0.81	1.98	0.027
Equation 4								
Co-efficient	-0.244	0.045	...	0.083	0.705			
Standard Error	(0.090)*	(0.030)	...	(0.028)**	(0.105)**	0.81	1.92	0.027

1/ Equation estimated in logarithmic form using ordinary least squares on quarterly data.
2/ * denotes significance of coefficient at the 95 percent confidence level;
** denotes significance at the 99 percent confidence level.

alia, with higher expectations of exchange rate devaluations, 1/ and greater political uncertainty. 2/ The elasticity of currency substitution with respect to exchange rate expectations during the period under consideration amounted to 0.2--i.e., a 1 percent increase in the expected command of foreign currency over local goods and services resulted, ceteris paribus, in a 0.2 percent increase in the share of foreign currency in broad money--an elasticity similar to that estimated in a recent study on currency substitution in Uruguay. 3/ The relative high value of the partial adjustment coefficient suggests that agents did not immediately and fully adjust their holdings to variations in relative yields of foreign balances.

While changes in the proxy for interest rate differentials were not found to be statistically significant in explaining variations in the extent of currency substitution, this result should be interpreted with considerable caution for a number of reasons. In particular, due to the repressed state of domestic financial markets, the "formal sector" domestic interest rate variable used in the estimation is a poor indicator of available alternative returns to holdings of domestic balances; moreover, no account is taken of the return on other domestic assets, including instruments associated with the advent of Islamic investment companies in Egypt. In view of these factors, as well as the associated rigidities in the formal sector of the economy which precluded the attainment of interest rate parity in the period under consideration, a relative demand for money function excluding an interest differential term was estimated (Equation 2 in Table 1). 4/ The signs of all estimated coefficients in this second specification met the a priori expectations; in addition, all coefficients were found to be significant at the 99 percent confidence level and their values were similar to those of the earlier estimation. These results provide further support for the above cited findings, as well as for the hypothesis regarding the limitations of the interest rate proxy.

1/ As measured by movements in the free market rate which is known to be highly flexible and the most responsive of the various exchange rates maintained in Egypt to changes in underlying demand and supply conditions.

2/ As proxied by a dummy variable specified to take into account the sudden increase in political uncertainty associated with the assasination of President Sadat in October 1981.

3/ Ramirez-Rojas, C.L. (1985), op. cit. The estimated elasticity for Egypt is also similar to that found for Mexico in the specification in which future prices for Mexican pesos were used as the indicator for exchange rate expectations. It should be noted, however, that in the case of Mexico, the calculations undertaken by Ramirez-Rojas yielded a wide range of estimates for the elasticity with respect to the exchange rate variable.

4/ In fact, a number of other country studies appear to have omitted, a priori, the interest rate term in estimating the determinants of currency substitution.

b. Y.A.R.

In the case of the Y.A.R., all estimated coefficients also met the a priori expectations regarding their signs and, with the exception of the relative interest rate term, were significant at the 95 percent confidence level (Equation 5 in Table 2). In addition, the coefficient of determination indicated that most of the variations in foreign currency deposits could be "explained" by changes in the explanatory variables. 1/ Estimation of the money demand function excluding the relative interest rate term, undertaken for reasons similar to those cited in the case of Egypt, also yielded highly significant results and satisfactory goodness of fit measures (Equation 6 in Table 2).

As compared to Egypt, changes in currency substitution in the Y.A.R. appear to have been more responsive to anticipations of increased yields on foreign currency arising from exchange rate depreciations. In particular, the elasticity with respect to exchange rate expectations 2/ was estimated to amount to about 2.0 for the period under consideration. 3/ The changes in the exchange and trade system in 1983/84 appeared to have resulted, as anticipated, in an upward shift in the level of currency substitution by the private sector in the Y.A.R., thereby providing support for the hypothesis that the limitation of access to foreign exchange resources through the banking system led traders to accumulate their own stock for transactionary purposes. As regards the speed of portfolio adjustment, the value of the estimate of the partial adjustment coefficient, while large and therefore indicating some sluggishness in agents' adaptation of actual balances to their desired levels, was smaller than that for Egypt. Accordingly, the results suggest that, for a given change in the other explanatory variables, agents in the Y.A.R. adjusted the composition of their money holdings to changes in these variables to a greater extent than did agents in Egypt in the same time period; or, put in another way, for a given change in the financial incentives, adjustment was achieved more

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1/ In the case of the Y.A.R., the specification of the "institutional term" is such as to take account of the major banking and exchange system changes of 1983/84. As noted earlier, these changes effectively reduced the foreign exchange resources for import purposes available through banking channels, thereby increasing the attractiveness of "own resource finance" for transactionary purposes. Details of the changes are contained in Leite, S.P., C. Sassanpour, and H. Snoek (1986) "Yemen Arab Republic: Issues in the Transition to a Modern Financial System," (Unpublished: International Monetary Fund).

2/ In view of the relatively more rigid nature of the exchange system in the Y.A.R. in the period under consideration, expected exchange rate developments were derived on the basis of lagged actual changes.

3/ This higher elasticity for the Y.A.R. is similar to those estimated by Ramirez-Rojas for Argentina (which were in the range 1.5-2.1).

Table 2. Y.A.R.: Estimates of the Determinants of Currency Substitution 1/

Variable	Constant	Exchange Rate Expectations	Interest Rate Differential	Institutional Changes	Stock Adjustment	Coefficient of Determination	Durbin-Watson Statistic	Standard Error of Regression
Equation 5								
Co-efficient	-5.791	2.083	1.102	1.070	0.439			
Standard Error 2/	(2.083)*	(0.758)*	(1.920)	(0.183)**	(0.196)*	0.97	2.22	0.170
Equation 6								
Co-efficient	-5.216	1.859	...	1.068	0.480			
Standard Error 2/	(1.792)**	(0.638)**	...	(0.180)**	(0.179)*	0.97	2.33	0.167
Equation 7								
Co-efficient	-5.096	1.998	1.876	1.012	0.398			
Standard Error 2/	(1.730)**	(0.685)**	(1.935)	(0.183)**	(0.199)	0.96	2.27	0.164
Equation 8								
Co-efficient	-4.127	1.599	...	1.023	0.486			
Standard Error 2/	(1.410)**	(0.548)**	...	(0.182)**	(0.177)*	0.96	2.41	0.164

1/ Equation estimated in logarithmic form using ordinary least squares on quarterly data.
2/ * denotes significance of coefficient at the 95 percent confidence level;
** denotes significance at the 99 percent confidence level.

rapidly in the Y.A.R. As a result, actual holdings, at any one time, affected behavior in the next period to a lesser extent in the Y.A.R. than in Egypt. This result, as well as the differences in the exchange rate elasticity, reflected, in part, the relatively more liberal trade and payments system that prevailed in the Y.A.R., as well as the relatively more responsive character of its foreign exchange earnings which consist overwhelmingly of workers' remittances.

V. Concluding Remarks

Holdings of foreign-currency denominated bank balances by residents in Egypt and the Y.A.R. have grown substantially in recent years and now constitute an important component of domestic liquidity in these countries. The growth of these holdings, made possible by the increased access of the private sector to foreign exchange owing mainly to additional employment opportunities in neighboring oil producing economies, has recently reflected primarily attempts by agents to protect and increase the value of their wealth and income stream in the context of deteriorating financial and economic conditions. In particular, the results of quantitative analysis, based on partial indicators of currency substitution in the 1980s, suggest that the growth in agents' foreign currency portfolio preferences was strongly influenced by expectations of increased financial yields on holdings of foreign balances relative to those on domestic balances; in addition, the portfolio preferences during this period were found to be significantly affected by political and institutional changes.

The analysis suggests that, for a given political and institutional environment, an intensification of inflationary pressures and a further deterioration in the external accounts, to the extent that they adversely affect exchange rate expectations, will be reflected in an increased tendency by residents to substitute foreign balances for local balances in meeting their demands for a store of value, unit of account, and medium of exchange. At the same time, given the importance of the stock adjustment mechanism, the implementation of measures designed to reduce the pace of currency substitution would need to be sustained over a significant period of time if a meaningful reduction in individuals' preferences for foreign money holdings is to be achieved. Finally, as regards economic and financial policies, it is clear from the results of the analysis that the extent of currency substitution in Egypt and the Y.A.R. is such that its existence needs to be explicitly recognized in the formulation and implementation of such policies, particularly those in the monetary, fiscal, financial intermediation and exchange rate areas.

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