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# Foreign Currency Deposits: Implications for Macroeconomic Policies

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## Abstract

This paper discusses the relationship between foreign currency deposits and money, and it shows that the indexation of part of the nominal money supply to the exchange rate, as a result of the presence of foreign currency deposits, will increase the inflationary effects of monetary disequilibria under a floating exchange rate system and will reduce the effect of a devaluation of a usually fixed exchange rate. When a real exchange rate rule is followed, the presence of foreign currency deposits implies that there is less of a tradeoff between the rate of nominal depreciation/inflation and the level of the real exchange rate. The paper shows how certain aspects of financial programming may be affected by the presence of these deposits.

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Contents

Summary

This paper explores the macroeconomic policy implications of foreign currency deposits. A preference for the empirical definition of money implies that in principle it is not possible to decide on the appropriateness of the inclusion of foreign currency deposits in money before the necessary empirical work is carried out. In an inflationary environment, however, a measure of money which includes such deposits will probably satisfy the criterion of the empirical approach. Foreign currency deposits and foreign money in other forms may be held to protect the purchasing power of money holdings from inflation and to carry out transactions with foreigners, especially when there is foreign exchange risk or exchange restrictions.

With flexible exchange rates, the presence of foreign currency deposits, as money, increases the rate of change of prices and of the exchange rate in the face of any monetary disequilibrium. This is because the nominal money supply is endogenous when these deposits are present. When a normally fixed exchange rate system is in place, such deposits will diminish the effect of a devaluation on the real exchange rate and thus on the balance of payments, since the part of the money balances corresponding to these deposits is effectively indexed to the exchange rate. When a continuous depreciation of the currency (i.e., a real exchange rate rule) is followed in order to achieve a perpetual balance of payments surplus, the presence of these deposits implies that there is less of a trade-off between the rate of depreciation/inflation and the sustained balance of payments surplus/real exchange rate.

Larger amounts of these deposits, ceteris paribus, decrease the base over which the inflation tax can be levied, although the introduction of such deposits could raise government revenues. Although these deposits do not fundamentally alter the method of financial programming, they can affect certain aspects of it. If foreign and domestic currency deposits are perfect substitutes, programming should involve the projection of the demand of a broad monetary aggregate, which includes foreign currency deposits, and domestic credit expansion should be geared to cover the full projected growth in that broad aggregate (net of the revaluation effect of these deposits and the desired increase in net foreign assets). If, however, foreign and domestic currency deposits are imperfect substitutes, it would be necessary either to increase interest rates on domestic deposits or permit internal convertibility for the purpose of constituting foreign deposits. In case those options are not available, the programming exercise should involve the projection of the demand for only domestic money and should gear domestic credit growth to the projected growth of only that demand. In the presence of unanticipated movements in money demand or the real exchange rate, setting a ceiling on net domestic assets (excluding only the valuation effect of net foreign assets) would possibly call for unplanned contractions in domestic credit but would protect the program more than setting a ceiling on net domestic assets excluding the valuation effect of both net foreign assets and foreign currency deposits.

## I. Introduction

Recent years have seen large increases in the share of foreign currency deposits (FCDs) 1/ in broad money in many countries. These increases can come about due to growth in the foreign currency value of these deposits; often, however, the phenomenon arises because the rate of growth of domestic money holdings is smaller than the rate of depreciation of the domestic currency. Countries in which the share of FCDs in broad money showed rapid growth in recent years include, among others, Yugoslavia, Poland, Egypt, Turkey, Uruguay, Bolivia, and Argentina.

The purpose of this paper is to examine the implications of FCDs for macroeconomic policy. To this end, the paper begins with a discussion in section II of the relationship between FCDs and money. Section III discusses the incentives residents of a country might have for holding foreign money side by side with domestic money. The ways by which the public can acquire foreign money and thus accumulate FCDs are also examined. Having accepted that FCDs should be considered as part of money in the context of a macroeconomic framework that emphasizes the stability of the money-nominal GNP relationship, the paper proceeds in section IV to examine the macroeconomic effects of FCDs under three different exchange rate regimes: floating rates, fixed rates, and real exchange rate rules. A simple analytical framework is used to show the macroeconomic effects of monetary and exchange rate policies in the presence of FCDs. Section V examines the implications of FCDs for fiscal policy, and section VI examines certain issues that arise in the design of Fund-supported adjustment programs in the presence of FCDs. Section VII summarizes the main conclusions of the paper.

## II. FCDs and Money

This section examines the relationship between foreign money holdings, more specifically FCDs, and the concept of money. The key question is whether foreign and domestic money holdings of residents, taken together, comprise a bundle of financial assets which corresponds to the macroeconomic concept of "money". An answer to this question would determine the link between FCDs and a specific analytical framework and thus provide the basis for an investigation of the macroeconomic policy implications of FCDs.

The question of whether FCDs are money can be answered only in the context of a clear definition of money. However, the definition of money has not traditionally been a straightforward one. There exist definitions which a priori postulate essential characteristics that an asset must have in order to qualify as money; for example, an asset must serve as a medium of exchange or it must be "liquid." An alternative to

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1/ Deposits denominated in foreign currencies (typically U.S. dollars or other major foreign currencies) and held with the domestic banking system.

that is the empirical definition of money. This approach stresses the existence of a strong empirical regularity between a bundle of financial assets and certain other macroeconomic magnitudes (e.g. the price level or nominal GNP). The empirical definition of money does not require the rationalization of the empirical regularity.

Both the a priori definitions and the empirical definition aim at gathering various financial assets in a bundle in order to help describe and explain the behavior of the economy. This is why these definitions have been termed descriptive definitions of money. However, there also exists a prescriptive definition which defines money as an intermediate target variable of monetary policy. 1/ Specifically, money is defined as an aggregate which is not only causally connected with ultimate target variables but can also be controlled closely and easily by the monetary authority. These different definitions of money are likely to lead to different statistical counterparts. FCDs may be included in some of these statistical counterparts to the concept of money while they would not readily fit in others. Therefore, the question of the "moneyness" of FCDs could be tackled by discussing the question of the appropriate definition of money.

Among the descriptive a priori approaches, a prominent one identifies the medium of exchange/means of payment function of certain assets as the defining criterion of the money concept. Although it is irrefutable that money has been associated in the discourse of the general public (and of economists) with a means of payment function, it may not be easy to clearly identify which assets have and which do not have the characteristic of being means of payment. This is due to the fact that different assets can be accepted as means of payment on some occasions but not others. Therefore, even if one accepts the a priori definition of money as a medium of exchange, it is not clear that an unambiguous set of assets fulfilling that definition can be put together. 2/

The other major descriptive a priori approach to the definition of money focuses on the 'liquidity' of assets. However, attempts to define 'liquidity' precisely have not produced a consensus. Some have argued that this is natural since liquidity refers to an "amorphous collection of asset attributes". 3/ Therefore, different analysts stress different characteristics that assets ought to have to be classified as liquid. One such characteristic often put forth is the ability of an asset to be exchanged for a fixed number of units of currency. An alternative characteristic that is often proposed is the degree of perfection of the

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1/ Bryant (1980) has used the distinction between "descriptive" and "prescriptive" definitions of money in his discussion of the appropriate definition of money.

2/ Kaufman (1969) and Friedman and Schwartz (1970) have expressed such a criticism. However it may be argued that the difficulties, referred to in this criticism, are not overwhelming.

3/ For this point of view, see, for example, Bryant (1980).

market in the asset, as manifested in the ready salability of the asset at a well-defined market price. However, these different characteristics imply different bundles of financial assets and thus critics have argued that the concept of liquidity does not provide an unambiguous way to classify assets by degree of "liquidity", let alone draw a line between assets that can be termed "non-liquid" and those "liquid" assets whose total value could be considered the money stock. 1/

Apart from difficulties in trying to make both a priori descriptive definitions of money (i.e., both the "medium of exchange" and "liquidity" definitions) operational, it may not be that helpful anyway to use these definitions in the context of a certain macroeconomic framework of analysis. Specifically, if that framework emphasizes the stable relationship between money and nominal GNP, the search for assets fulfilling some a priori criterion may be superfluous, indirect and possibly wrong. As the proponents of the empirical definition of money have argued, it might be preferable, instead, to try to identify (through an empirical investigation) a bundle of assets that has the most stable relationship with nominal GNP and then, after having labeled it money, to discuss ex post the various characteristics of assets included in it.

A final alternative to the definition of money that is considered here is the prescriptive approach. This approach aims at finding a group of assets that not only bears a close and predictable relationship to a target variable (like nominal GNP), but is also subject to control by the monetary instruments available to the monetary authorities. 2/ However, restricting the concept of money exclusively to controllable assets, especially if this definition is being used in the context of a macroeconomic framework where the stable relationship between money and nominal GNP is central, would result, in most cases, in an amputated version of the appropriate aggregate being called money. Specifically, in the case where FCDs are available, the latter would probably be excluded from the contents of money because the monetary authorities would be deemed to have little control over the FCDs' domestic currency

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1/ See Friedman and Schwartz (1970).

2/ The use of the prescriptive definition of money is not equivalent to using some definition of money in order to carry out policy. In the latter case, in general, not being able to control some asset does not a priori preclude that asset from being included in the definition of money. In this case, policymakers just need to identify certain assets whose total they will call money and will attempt to control.

value. 1/ This would be the case despite the existence of a high probability that the inclusion of FCDs in money would produce a total more highly correlated with GNP than the smaller total corresponding to the prescriptive definition.

In sum, it appears that the best solution to the definition problem, in the context of economic models which emphasize the money-nominal GNP relationship, is to adopt the empirical approach. Actually, the empirical approach could be interpreted as the empirical/operational expression of the definition of money implicitly used in such models. However, if the empirical definition is adopted, it becomes evident that nothing definite can be said a priori about the inclusion of FCDs in the aggregate that is money. This is so because, in general, it is not possible to decide on the inclusion of an asset in money unless prior empirical work for the country and the time period in question is carried out. 2/ However, and despite the fact that this paper will not carry out such tests, it is possible to argue that in periods of high inflation a measure of money that includes FCDs would have a more stable relationship with nominal GNP than a measure of money that does not include FCDs. This would be the case because (1) the velocity of domestically issued money would be rising very fast and (2) substitution between foreign and domestic money is likely to be taking place. 3/ Therefore, for the purposes of the analysis in this paper, it will be assumed that FCDs are part of money. Thus, the conclusions drawn will be contingent on the appropriateness of the assumption of FCDs being money.

## III. Demand and Supply of Foreign Money

This section explores the conditions under which the residents of a country decide to hold foreign money in place of the domestic money. In many developing economies where there is an inflationary environment with a depreciating currency and interest rate restrictions on domestic currency deposits (DCDs), the capacity of domestic money to transform or

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1/ There are several reasons for this lack of control. Since FCDs are "indexed" to the exchange rate, their domestic currency value changes following any changes in the exchange rate. Furthermore, their foreign currency value is affected by private transfers from abroad over which the authorities also have limited control.

2/ A test of the hypothesis of the moneyness of FCDs could follow the methodology in Kaufman (1969). Correlations of different aggregates with incomes can be computed (taking in consideration, as Kaufman did, the possible lead-lag relationship between money and income) and a bundle of assets can be chosen which (1) has the highest correlation with income and (2) has a higher correlation with income than any of its components separately. FCDs will be money to the extent that they belong to the bundle of assets that is chosen by the procedure outlined above.

3/ Experience in different countries supports this view. A typical example is Yugoslavia.

preserve wealth over time becomes inferior to that of foreign money. Under these circumstances money substitution takes place in order to protect the purchasing power of money holdings. 1/ With higher expected inflation and greater financial repression, the confidence in domestic money as a store of value declines and the degree of money substitution increases. 2/

Even indexation of DCDs to a price index may not be capable of preventing money substitution. With very high inflation rates, even monthly indexation of DCDs to the price index may not provide adequate protection against inflationary erosion. Therefore, even if there exist indexed domestic assets, a low frequency of revaluation of these assets will increase money substitution, given a high rate of inflation.

To the extent that domestic money serves as a store of value, it has a substitute not only in foreign money but also in a multiplicity of assets that can provide an inflation hedge. The presence and characteristics of such alternative assets, which can serve as stores of value, could affect the amount of substitution into foreign money that takes place. In particular, the degree of development of domestic capital markets will determine the range of domestic assets that can serve as stores of value and will therefore affect the degree to which wealth is kept in the form of foreign money. Furthermore, the existence and magnitude of restrictions on these capital markets will also be important in that context. Finally the transaction costs of moving into foreign money relative to the transaction costs of moving into other inflation hedges will affect the degree to which residents hold foreign money. 3/

The need to carry out transactions in the international goods and capital markets has also been identified as a reason for engaging in money substitution. 4/ Travelers, border residents, importers and exporters, and firms with foreign denominated liabilities would be interested in holding foreign money. This is especially true when there is foreign exchange risk and/or exchange restrictions limit the availability of foreign exchange. It is evident that the greater the

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1/ See, for example, Tanzi and Blejer (1982) and Lipton (1986).

2/ The presence of transaction costs incurred in moving between domestic and foreign money affects the magnitude of money substitution (especially in the short run). The lower these transaction costs are, the greater the degree of money substitution which is aimed at preserving the purchasing power of money holdings.

3/ In centrally planned economies which are characterized by severe shortages of durable and other goods, the transaction costs associated with moving into foreign money are relatively lower than the transaction costs of moving into goods, and this will favor the holding of foreign money. Gegerly (1987) has noted that this was true in Poland, where exchange controls and restrictions were relatively soft while shortages of goods were protracted and widespread.

4/ See, for example, Miles (1978) and Marquez (1985).

volume of transactions with foreigners is, the greater the degree of money substitution will be. 1/ Furthermore, some countries (e.g., certain CPEs of Eastern Europe) have provided in the past special consumption opportunities for those who have access to foreign exchange. Such arrangements tend to promote money substitution. 2/

Finally, uncertainty about socio-political developments in the country would tend to increase the desire of residents to hold foreign money. 3/ Fear of expropriation of domestic assets and/or the possibility of a need to flee the country could be reflected in increased foreign money holdings.

The main sources of supply of foreign currency to the public vary from country to country. The absence of a total-surrender requirement for the foreign exchange from export receipts in some countries provides such a source. Private unrequited transfers can also be a major source of foreign exchange. Such transfers include migrants' transfers, workers' remittances and transfers among individuals and unofficial organizations. Other possible sources of foreign currencies are purchases of such currencies in the black market from persons arriving in the country and undeclared export earnings which accrue to domestic residents.

The foreign currency accumulated by residents in the ways described above usually finds its way into hoards of foreign currency, financial assets abroad, or FCDs with the domestic banking system. Therefore, a desire by the public to increase the volume of its FCDs will usually lead to both an intensification of its efforts to acquire foreign currencies in general and a diversion of such currencies from hoards within the country and from accounts held with banks abroad.

## IV. FCDs and Monetary Policy Under Various Exchange Rate Regimes

### 1. Floating exchange rates

The interaction between economic units which hold both domestic and foreign curencies and the flexible exchange rate system has traditionally been explored in the currency substitution framework. A simple model of currency substitution would postulate the real demands for domestic and foreign currency as functions of real wealth and the expected rate of depreciation of the home country's currency. The nominal exchange rate would be given by purchasing power parity and

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1/ It is interesting to note here the role of transactions costs. In this case, high transactions costs would actually increase the desire to hold hoards of foreign money so as to avoid these costs. In this context, lower transactions costs would cause money substitution to decline.

2/ Gegerly (1987).

3/ El Erian (1988).

wealth would be equal to the domestic currency value of domestic and foreign currency holdings. 1/ In this framework, the distribution of residents' demand for domestic and foreign currencies is determined by the expected rate of depreciation of the domestic currency. One of the implications of this model is that a given monetary expansion in the home country will result in larger and less predictable changes in the price level and the exchange rate than would be the case in the absence of currency substitution. Specifically, as an increase in the domestic money supply causes expectations of a depreciation of the local currency, residents move out of domestic and into foreign currencies thus reinforcing the inflationary pressures of the original monetary expansion. 2/

In the context of this currency substitution model, the adjustment of currency holdings to changes in relative opportunity costs enables monetary shocks in one country to be transmitted to another even with flexible exchange rates. Consider, for example, an increase in the supply of country A's currency. Expectations of depreciation of that currency would lead to a decrease in the demand for that asset both in country A and in country B, while the demand for country B's currency would increase among the residents of both countries. This would result in deflationary pressures in country B. If the monetary authority in country B was trying to keep the price level constant, it would have to increase the supply of its own currency. Thus, the policy action taken in country A would lead to a similar action by country B in this model--an event which is not commensurate with policy autonomy.

The conclusions of this currency substitution model, however, appear to hinge critically on the assumption that the rate of return on holding domestic money is minus the expected rate of depreciation of the domestic currency. This is a reasonable assumption if money takes the form of noninterest bearing currency. If, however, money can earn interest by taking the form of domestic or foreign currency deposits, and interest rates are market determined, the arguments in this currency substitution model would not be applicable. Changes in the distribution of residents' demand for domestic and foreign money, and thus a loss of policy autonomy, would be possible only if there exist rigidities in the determination of nominal interest rates.

In the case where residents hold foreign money balances in the form of FCDs but do not vary the quantity they hold over time, possibly because of the availability of market clearing interest rates on DCDs and FCDs, a question arises about the effects of FCDs viewed as a part of the money stock indexed to the exchange rate. This question is explored below in a simple framework which assumes a small country which produces only traded goods.

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1/ An example of such a model is given in Ramirez-Rojas (1985).
2/ See, for example, Batten and Hafer (1984) and Melvin (1985).

In this framework, when a monetary shock leads to an excess demand for or supply of money, the existence of FCDs will cause the resulting rate of deflation or inflation to be greater than in the case with no FCDs. The crucial assumption here is that money (M) is defined as the sum of the domestically issued money (D) and the domestic currency value of FCDs (E F). 1/ If we assume that the adjustment to monetary equilibrium is taking place at a finite rate, the change in the real money stock can be expressed as $(\frac{\dot{M}}{P}) = \lambda(\frac{L}{P} - \frac{M}{P})$. 2/ After a monetary shock, while there is a monetary disequilibrium, the rate of inflation is given by $\hat{P} = \lambda(\frac{M}{D})\ (\frac{M-L}{M})$. 3/ Given the assumption of purchasing power parity, this expression also provides the rate of depreciation (E) of the local currency. 4/ It is evident from this last expression that the greater the excess supply of money (M-L) resulting from the monetary shock, the greater the rate of inflation will be. As the price level is rising and the nominal demand for money increases, the excess supply of money declines and the rate of inflation decreases too.

The existence of FCDs here is reflected in the term $\frac{M}{D}$. This term would reduce to unity if there were no FCDs in the model. It is evident that, the higher the proportion of money corresponding to FCD holdings at any point in time, the higher will be the rate of change of prices (and of the exchange rate) for any monetary disequilibrium. This points

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1/ E is the nominal exchange rate and is assumed to be equal to the ratio of the domestic price level and the foreign price level (P/P*). F is the foreign currency value of the FCDs.

2/ L is the nominal demand for money balances in general and $\lambda$ is the fraction of the gap between desired and actual real balances that the public proceeds to close per unit time. The nominal demand for money (L) is assumed here to be equal to a constant fraction of nominal GNP, i.e., L = kPY. Y is real GNP and P is the domestic price level.

3/ The change in the money stock can be written as

$$\dot{M} = M\hat{P} + \lambda\ (L-M) \qquad (1)$$

Given that domestically issued money (D) is not changing, from the definition of money, the change in the total money stock must be

$$\dot{M} = (EF)\ \hat{E} \qquad (2)$$

Combining (1) and (2) and noting that PPP implies $\hat{P} = \hat{E}$ (when the world rate of inflation is zero) gives the instantaneous rate of inflation

$$\hat{P} = \lambda\ (\frac{M}{M-EF})(\frac{M-L}{M}) = \lambda\ (\frac{M}{D})(\frac{M-L}{M}).$$

4/ It is assumed that the home country is "small" and the world rate of inflation is zero.

to the fact that the mere presence of FCDs (with their foreign currency value remaining constant) results in higher than otherwise observed inflation rates and rates of depreciation during the adjustment process in case of monetary disequilibrium. 1/

In the long run, a given monetary disequilibrium will cause the price level and the exchange rate to increase by a larger percentage if FCDs are held by the public. 1/ Of course, there are also other factors that can affect the percentage of depreciation, i.e., changes in real output, the foreign price level, and the foreign currency value of FCDs. 2/ For example, if the foreign currency value of FCDs increases in response to a given monetary disequilibrium (produced possibly by an increase in the local money stock in the presence of rigid interest rates on DCDs), the end result will be an even larger percentage increase in the price level and the exchange rate. This implies, among other things, that, unless the monetary authorities are confident in their prediction of movements in the foreign currency value of FCDs, the effects of monetary policy on the price level and the exchange rate in the long run may not be controllable.

2. Fixed exchange rates with discrete changes

It has been argued that the public has an incentive to hold foreign money in place of domestic money only under flexible exchange rates. The argument is that since, under fixed exchange rates, central banks make foreign and domestic monies perfect substitutes from the supply side, the public will perceive no need to hold foreign money. However, to the extent that official exchange rates are not perceived to be maintained indefinitely, the public could see an advantage to holding foreign money. Furthermore, expectations of a devaluation could lead to an increase in the amount of foreign money held by residents.

In a simple framework of a small country with no capital flows, nontraded goods or FCDs, a devaluation will cause all prices in the economy to rise as given by the purchasing power parity hypothesis, thus creating an excess demand for real money balances. In order to satisfy this excess demand, the country will run a balance of payments/trade surplus which will cause the money stock to rise until no excess demand remains. In such a framework, a devaluation ($\Delta E$) will eventually cause

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1/ The underlying cause of this phenomenon is that, during the adjustment process to monetary equilibrium, the money supply does not remain constant; as prices increase, the money supply also increases to the extent that FCDs are part of it.

2/ This point is evident from the following expression which gives the long run percentage change in the price level (and the exchange rate) for a given original excess supply of money x:

$$dP/P = dE/E = X/D - \frac{d(P*kY-F)}{(P*kY-F)}$$

the money stock to rise by $\Delta M = \xi P^* \Delta E$. 1/ Since residents hold only domestic money in this economy, the domestic money stock will also rise eventually by $\Delta D = \xi P^* \Delta E$. The cumulative trade surplus that will come about will be $T = \Delta D = \Delta M$.

If the simple framework considered above is changed so that the public can now hold part of its money in the form of foreign money balances (e.g., in the form of FCDs), the consequences of a devaluation are modified. The devaluation would still cause the same increase in the domestic price level ($\Delta P = P^* \Delta E$); however, with the nominal money stock now being equal to the sum of domestic and foreign money ($M = D + E\ F$), the devaluation will instantly affect its magnitude through the increase in the domestic currency value of FCDs. In general, when FCDs are considered part of money, any change in the value of the currency (i.e., any change in E) will immediately alter the magnitude of the money stock. Therefore, the excess demand for real money balances that results from a given devaluation will be smaller in the presence of FCDs. The total increase in domestic money balances that will eventually come about will be $\Delta D = (\xi P^* - F)\ \Delta E$, which is smaller than $\xi P^* \Delta E$, the amount of the increase in the absence of FCDs. The total increase in money (M), however, will be the same irrespective of whether the public holds FCDs or not.

In the case where residents hold FCDs, the $\Delta D$ is equal to the cumulative trade surplus that will come about in the process of adjustment to monetary equilibrium. The larger the amount of FCDs held to satisfy the demand for money, the smaller the achieved trade surplus by a devaluation $\Delta E$. Put differently, if a government wants to achieve a certain trade surplus, it will have to devalue the domestic currency more in the presence of FCDs ceteris paribus in order to bring this surplus about. 2/ 3/ The greater the proportion of money demand satisfied by FCDs, the larger the required devaluation to bring a certain trade surplus about. In the extreme case where all demand for money balances is met with FCDs (i.e., $\xi P^* - F = 0$), a devaluation of any magnitude will cause only the price level to rise; no trade surplus will result from it. The entire money stock, composed entirely of FCDs, would automatically be revalued and thus no excess demand for money would appear.

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1/ $\xi$ is the real demand for money and it is equal to kY.

2/ This issue has been noted in Lipton (1986); Dodsworth, El Erian and Hammann (1987); van Elkan (1989).

3/ It is often the case that devaluations are not carried out to generate trade surpluses but as a short-cut to re-establish monetary equilibrium. A devaluation may return an economy instantly to monetary equilibrium thus avoiding adjustment through reserve movements. However, the presence of FCDs will erode the capacity of a devaluation to restore equilibrium after a disturbance. For example, in the case of a decrease in real money demand, the devaluation required would be $dE/E = -(M/D)(d\xi/\xi)$, i.e., it would be bigger the larger the share of FCDs in the money stock.

In the case where FCDs cover all the demand for money, the system becomes similar to one where gold is the only currency to the extent that devaluation is neutral. Any effort to raise the price of gold in a gold standard system (the equivalent of a devaluation in our model) will lead only to a proportional increase in domestic prices. In general, when it comes to the effects of a devaluation, the difference between an economy where residents hold only domestic money and an economy where FCDs are also held as money is the same as the difference between an economy with only fiat money and one where gold is also held as money and has a fixed price.

Up to now, nontraded goods have been excluded from the simple analytical framework used and thus no discussion of the real exchange rate was called for. In the case where the economy produces nontraded as well as traded goods, the real exchange rate can be defined as

$q = \frac{E}{P_N}$ where $P_N$ is the price of a nontraded composite good. 1/

Output of nontraded and traded goods is $Q_N = Q_N(q)$ and $Q_T = Q_T(q)$, respectively, with $Q'_N < 0$ and $Q'_T > 0$. The nontraded goods market is always in equilibrium, i.e.,

$$Q_N(q) = C_N(q, Y - \tilde{T}) \qquad (1)$$

where consumption of nontraded goods ($C_N$) is a function of the real exchange rate and of real expenditure measured in terms of traded goods. Real expenditure is defined as real income less the real trade account surplus, all measured in terms of traded goods. Real income (real value of total output) in terms of traded goods is defined as:

$$Y = \frac{Q_N}{q} + Q_T \qquad (2)$$

The trade surplus in terms of traded goods is given by:

$$\tilde{T} = kY - \frac{M}{E} \qquad (3)$$

where $kY$ is the demand for real money balances and $\frac{M}{E}$ is the stock of real money balances measured in terms of traded goods. At any point in time, conditions (1) - (3) hold and constitute a short-run equilibrium, in the sense that the home goods market is in equilibrium but external balance may not be attained. 2/ Using conditions (1) - (3) and the

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1/ The foreign currency price of the traded composite good has been set, for convenience, equal to one.

2/ The long-run equilibrium is characterized by equilibrium in the home goods market and by external balance--a situation in which the money supply ceases to change.

definition of the real exchange rate, it is possible to show that, when no FCDs exist,

$$d\tilde{T} = \frac{M}{E^2 g}\, dE$$

where g is a positive expression under reasonable assumptions. Therefore, a devaluation would improve the balance of payments.

When FCDs are present as money in a model with nontraded goods, the effect of a devaluation on the trade balance is given by:

$$d\tilde{T} = \frac{D}{E^2 g}\, dE = \left(\frac{D}{M}\right)\left(\frac{M}{E^2 g}\right) dE$$

where D is domestically issued money and is now smaller in magnitude than M. Therefore, the larger the share of FCDs in the total money stock, the smaller the effect on the trade balance of a given nominal devaluation. Put differently, to achieve a given real devaluation (and equivalently a given improvement in the trade account) would require a greater nominal devaluation in the presence of FCDs.

## 3. Balance of payments targeting and real exchange rate rules

The cases of flexible and fixed exchange rates do not exhaust the possible exchange rate regimes. A government may opt for an exchange rate policy which calls for a continuous depreciation or appreciation of the currency. The reasons behind such a policy can usually be found in the desire to achieve a certain outcome in the balance of payments. Aiming for a certain perpetual balance of payments surplus might necessitate, under certain conditions, that the nominal exchange rate is depreciated continuously while a continuous nominal appreciation might be called for if the aim is a perpetual balance of payments deficit. The focus of this section is on the effects of FCDs in a situation where the aim of policymakers is a permanent imbalance in external flows.

Consider a simple economy with no capital flows, nontraded goods or FCDs. The government is assumed to adjust the nominal exchange rate (E) in such a way so as to produce a perpetual balance of payments surplus. 1/ If domestic credit (DC) by the central bank is not permitted to change and thus no sterilization can take place, this economy can be represented by the following expressions:

$$\hat{P} = \hat{E} \; ; \; \hat{L} = \hat{P} \; ; \; \mathring{M} = E\mathring{R} = \lambda(L - M)$$

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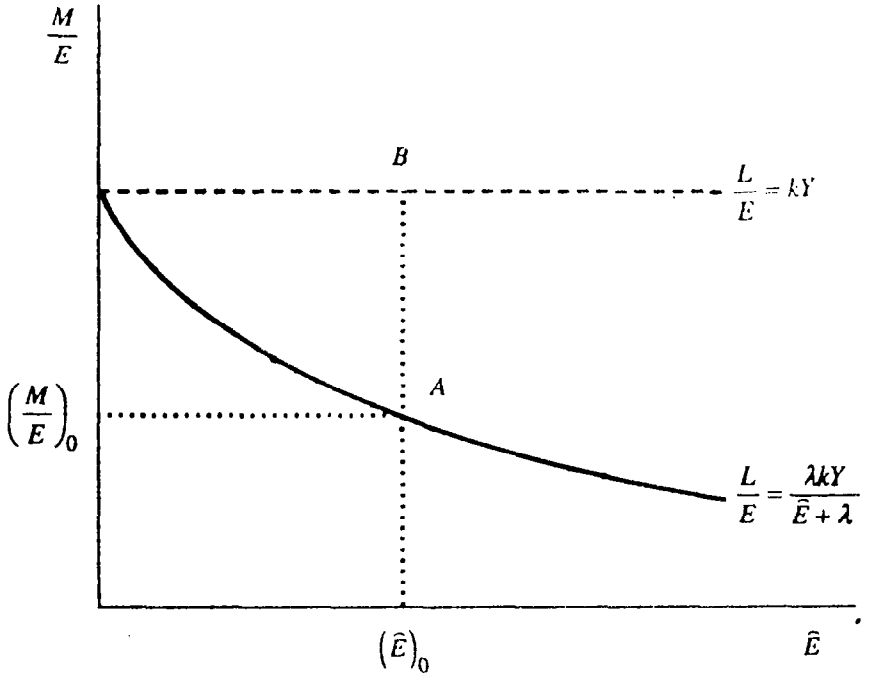
1/ In this example the balance of payments and the trade balance are assumed to be equivalent. Hereafter there will be references only to the trade balance.

Figure 1


$\frac{M}{E}$
B
$\frac{L}{E} = kY$
A
$\left(\frac{M}{E}\right)_0$
$\frac{L}{E} = \frac{\lambda kY}{\hat{E} + \lambda}$
$(\hat{E})_0$
$\hat{E}$

The first expression reflects the assumptions of purchasing power parity and of the stability of the world level of prices. 1/ L is the nominal demand for money and is given by $L = kPY$, with k and Y assumed constant. M is the money supply which is augmented by the increase in the domestic currency value of net foreign assets, $\dot{ER}$. That increase is equal to the targeted trade surplus and that in its turn is equal to the amount of "hoarding" the public wants to engage in. Hoarding is proportional to the excess demand for money balances.

If the government wants to achieve a certain, constant real trade surplus $\tilde{T}$, it must depreciate the currency at a rate $\hat{E} = \frac{E\tilde{T}}{M}$. This is a steady state rate of depreciation of the domestic currency and is equal to the rates of growth of the domestic price level, the money stock, and the nominal money demand. The expression $\hat{E} = \frac{E\tilde{T}}{M}$ can be rewritten as $\frac{M}{E} = \frac{\lambda kY}{\hat{E} + \lambda}$. It shows that there exists a tradeoff between the rate of depreciation (rate of inflation) and the level of the real money stock (Figure 1).

This graph shows that there also exists a tradeoff between the rate of depreciation (rate of inflation) and the trade surplus that can be sustained ceteris paribus. The trade surplus is equal to the distance AB multiplied by the constant $\lambda$. The government can target a higher trade surplus, via a greater wedge between real money demand and real money stock, only by accepting a higher rate of depreciation of the local currency, i.e., only by accepting a higher rate of inflation.

In this simple model it is possible to introduce FCDs which are held as money by the public. The way FCDs are introduced is equivalent to indexing a certain part of the domestic money supply to the exchange rate when only domestic money is held by the public. In this model, for simplicity, it is also assumed that there exists only one bank in the economy, the central bank (CB). Therefore, the Monetary Survey is the balance sheet of the CB. The net domestic assets of the CB are equal to domestic credit plus "other items", NDA = DC + OI. The change in "other items" is equal here to the revaluation of FCDs minus the revaluation of net foreign assets, $\dot{OI} = \dot{EF} - \dot{RE}$. While the magnitude of the money stock is given by the sum of the domestically issued money and the domestic currency value of FCDs, by the balance sheet identity it is also equal to the sum of net foreign assets and net domestic assets, i.e., M = NFA + NDA = ER + DC + OI. Given that $\dot{OI} = \dot{EF} - \dot{RE}$, the change in the money stock can be written as $\dot{M} = \dot{ER} + \dot{DC} + \dot{FE}$.

---

1/ The world price level will be assumed here to equal one.

In the case where domestic credit is assumed to be constant in nominal terms, the rate of growth of the money stock, in the presence of FCDs, is given by $\hat{M} = \frac{E\mathring{R}}{M} + \frac{EF}{M}\hat{E}$. This expression assumes that the foreign currency value of FCDs is not changing, i.e., there is no money substitution taking place at the moment. Under such conditions, the following expressions characterize the economy:

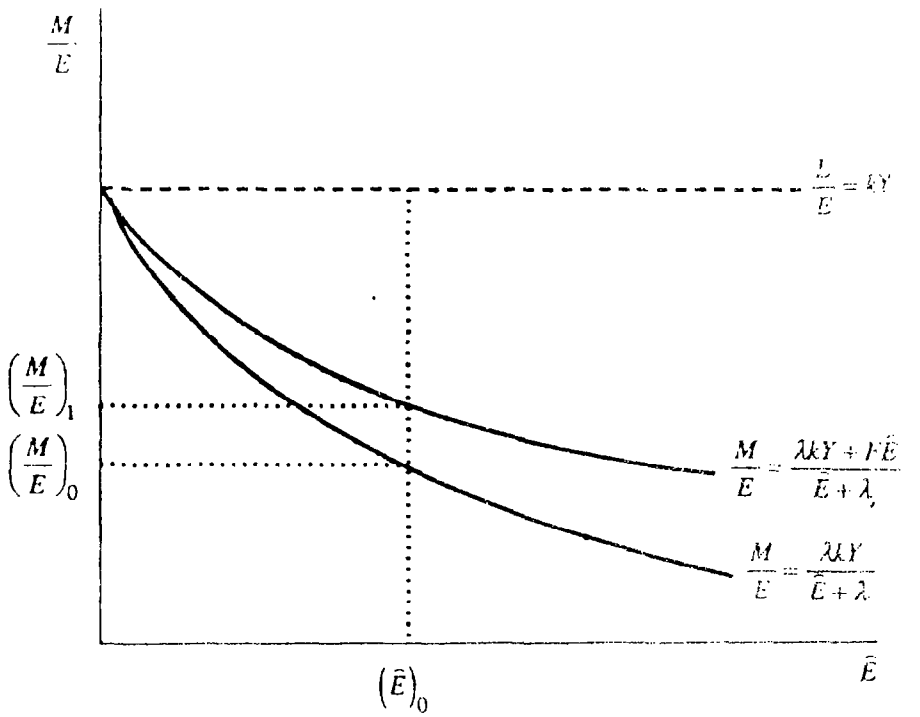
$$\hat{P} = \hat{E}; \quad \hat{L} = \hat{P}; \quad \hat{M} = \frac{E\mathring{R}}{M} + \frac{EF}{M}\hat{E}; \quad E\mathring{R} = \lambda(L - M)$$

If the government aims at achieving a certain, constant trade surplus $\tilde{T}$, it must depreciate the currency at a rate $\hat{E} = \frac{E\tilde{T}}{M - EF}$. This is a steady state rate of depreciation of the currency and, as in the case with no FCDs, it is equal to the rates of growth of the domestic price level, the money stock, and the nominal money demand. The expression $\hat{E} = \frac{E\tilde{T}}{M - EF}$ can be rewritten as $\frac{M}{E} = \frac{\lambda kY + F\hat{E}}{\hat{E} + \lambda}$. It is graphed in the figure below where the expression for $\frac{M}{E}$ corresponding to no FCDs is also graphed for comparison (Figure 2).

It is evident that the presence of FCDs results in a higher real money stock at every rate of depreciation (rate of inflation) i.e., there is less of a tradeoff between the rate of depreciation and the level of the real money stock when the public holds FCDs. Equivalently, there is less of a tradeoff between the rate of depreciation (rate of inflation) and the sustainable trade surplus. Therefore, in this framework, FCDs do not by themselves "cause" a higher rate of inflation; they require however a higher rate of inflation if the government is targeting a trade surplus in their presence. Specifically, if the foreign currency value of FCDs increases and the government does not change the rate of depreciation of the currency, inflation will not change; the only effect in this model will be a reduction in the achieved trade surplus. Finally, in the extreme case where FCDs become large enough to cover nearly all of the needs of the public for money, the rate of depreciation (inflation) becomes nearly infinite as the government aims to sustain a given trade surplus.

Up to now it was assumed that the CB could not change the level of domestic credit and thus no sterilization was possible. Under these conditions an effort to sustain a trade surplus necessitated a certain rate of depreciation of the currency and thus a positive rate of inflation. The presence of FCDs would just increase the magnitude of the rate of depreciation required to sustain a given trade surplus. If, however, domestic credit is permitted to change then it is possible to have both a sustained trade surplus and a constant exchange rate

Figure 2


$\frac{M}{E}$
$\frac{L}{E} = kY$
$\left(\frac{M}{E}\right)_1$
$\left(\frac{M}{E}\right)_0$
$\frac{M}{E} = \frac{\lambda kY + l\bar{E}}{\bar{E} + \lambda}$
$\frac{M}{E} = \frac{\lambda kY}{\bar{E} + \lambda}$
$\bar{E}$
$(\bar{E})_0$

(domestic price level) over time. In the simple model with no FCDs, sustaining a trade surplus $\tilde{T}$ and not inducing any inflation requires that the rate of growth of money is zero, i.e., $\hat{M} = \frac{E\tilde{T}}{M} + \frac{DC}{M}\hat{DC} = 0$. This can be achieved if the rate of change of domestic credit is given by $\hat{DC} = -\frac{E\tilde{T}}{DC}$. Therefore, in principle, a devaluation followed by 100 percent sterilization can provide for constant reserve accumulation (a constant trade surplus) with no inflation. The presence of FCDs would not change the basic point here. However, to achieve a given trade surplus $\tilde{T}$ in the presence of FCDs, the required devaluation will be larger than the one needed in the absence of FCDs. Thereafter, the required rate of domestic credit contraction will be larger, at all points in time, 1/ than the rate of contraction necessary in the absence of FCDs. Finally, it is evident that such a process of sterilization cannot go on forever. The existence of FCDs will limit further the time over which this kind of sterilization can take place by requiring larger reductions in domestic credit ceteris paribus. It should be kept in mind, however, that, although theoretically feasible, reductions in credit outstanding may be difficult to carry out anyway without causing severe disruptions in the economy.

The simple model used in this section can be extended to discuss the interaction between the real exchange rate and FCDs. The model presented below follows the previous one in assuming a "small" economy and no capital flows. The supply of traded and nontraded goods, $Q_T$ and $Q_N$ depend on the real exchange rate $q = \frac{E}{P_N}$ 2/ so that $Q'_T > 0$ and $Q'_N < 0$. The demand for the composite nontraded good, $C_N$, depends on the real exchange rate and aggregate real spending. Aggregate real spending is equal to total real output produced (income), Y minus the real trade surplus, $\tilde{T}$. 3/ The real trade surplus is given as a

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1/ Irrespective of the presence of FCDs, the rate of contraction of domestic credit will not be constant over time when 100 percent sterilization is required. The rate will have to become increasingly larger. What will have to remain constant is the amount by which domestic credit is being reduced per unit time.

2/ The foreign currency price of the composite traded good is assumed to be equal to 1.

3/ Real spending and all other real magnitudes are measured here in terms of traded goods.

fraction of the excess demand for real money balances: $\tilde{T} = \lambda(\frac{L}{E} - \frac{M}{E})$. 1/ The nontraded goods market must always be in equilibrium, so $Q_N = C_N$.

In the top panel of Figure 3, the schedule NN represents the combinations of $\frac{M}{E}$ and q for which the nontraded goods market clears. 2/ The zero trade balance locus TT is also graphed in this panel. Along this schedule trade is balanced, above TT the economy registers trade surpluses and below TT it registers trade deficits. The middle panel of the figure graphs the relationship between the rate of depreciation and the real money stock for the case where no FCDs exist (most elastic schedule) and for the case where FCDs are held as money along with domestic assets. 3/ The vertical line represents the real money demand $(\frac{L}{E})$. This panel is similar to the one presented earlier in this section and it shows the tradeoff between the rate of depreciation and the level of the real money stock. As noted before, the presence of FCDs will necessitate a higher rate of depreciation of the currency than the one necessary in the absence of FCDs in order to maintain a certain excess real money demand. The third panel in the figure graphs the real trade surplus as a function of the real money stock. From the figure it is evident that, if the government did not intervene, the real exchange rate would be given by the intersection of the nontraded goods' market equilibrium schedule and the zero trade balance schedule (top panel). At that real exchange rate, q*, there would be no excess demand for money and trade would be balanced. However, if the government decides to target a real exchange rate, $q_o$, which is above q*, for the purpose of bringing about and sustaining a trade surplus $\tilde{T}_o$, then in the absence of FCDs, a positive rate of depreciation of the currency, $\hat{E}_o$, would be required. In the case where there exist FCDs, the real exchange rate rule of $q_o$ (or equivalently the targeted trade surplus $\tilde{T}_o$) necessitates a higher rate of depreciation

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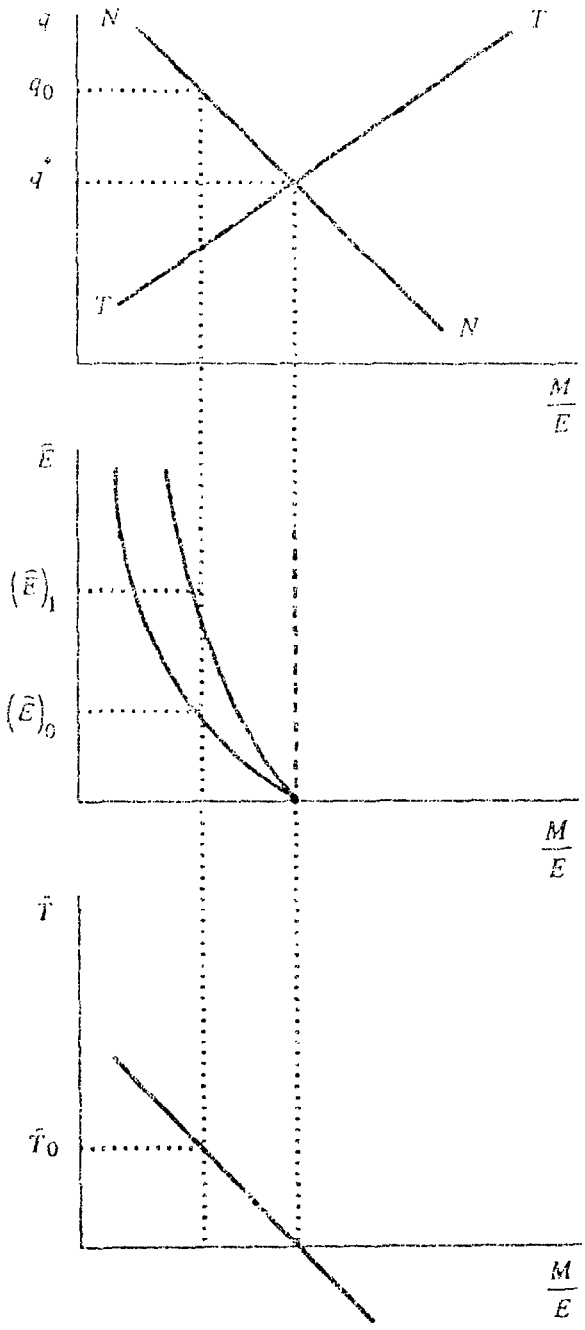
1/ L, like previously, is the nominal money demand and is equal to a fraction k of nominal income.

2/ These are the combinations of q and M/E which satisfy the condition: $Q_N(q) = C_N(q, Q_N(q)/q + Q_T(q) - \lambda k/q\ Q_N(q) - \lambda k\ Q_T(q) + \lambda M/E)$.

3/ In the case where there are no FCDs the expression graphed is $\hat{E} = \lambda(L/E - M/E)/(M/E)$, while in the case with FCDs the expression graphed is $\hat{E} = \lambda(L/E - M/E)/(M/E - F)$.

Figure 3


q
N
T
$q_0$
$q^*$
T
N
$\frac{M}{E}$
$\tilde{E}$
$(\tilde{E})_1$
$(\tilde{E})_0$
$\frac{M}{E}$
$\tilde{T}$
$\tilde{T}_0$
$\frac{M}{E}$

of the currency $\hat{E}_1 > \hat{E}_o$; 1/ the tradeoff between the rate of depreciation (inflation) and the real exchange rate (the trade surplus) becomes less favorable as the fraction of real money balances held in the form of FCDs increases.

In summary, in this framework, the necessary condition for inflation to take place is that the government follows a real exchange rate rule which sets the real exchange rate above q*. Although FCDs do not cause inflation, their presence makes it easier to end up with a high inflation rate. To halt the inflation process, in the absence of sterilization, the authorities must allow the real exchange rate to settle at its equilibrium value, q*. To arrive at this, one possibility is for the authorities to fix the nominal exchange rate and allow the real money stock to rise (via an accumulation of net foreign assets) to the level of real money demand. Alternatively, the exchange rate could be permitted to float. In this approach, the nominal exchange rate would appreciate which would cause the real exchange rate to appreciate to its equilibrium value, q*. Price level stability would be achieved, assuming domestic credit is permitted to grow only in order to satisfy increases in real money demand. 2/

## V. Fiscal Implications of FCDs

The existence of a part of money which is denominated in foreign currencies (or which is indexed to the exchange rate) has implications for fiscal policy to the extent that the revenue collected via the inflation tax is smaller than in the case where no part of the money stock is effectively indexed to the exchange rate. The revenue (in real terms) from the creation of domestic money balances is:

$$S = \frac{dD}{D}\frac{D}{P}$$

where D is the domestic money component of the money stock and P is the price level. The latter is equal to the nominal exchange rate if it is assumed that purchasing power parity holds and the foreign price level is set equal to 1. In the expression for the inflation tax revenue, the real domestic money stock , $\frac{D}{P}$, can be interpreted as the tax base and $\frac{dD}{D}$ as the tax rate.

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1/ A higher rate of depreciation would be required in order to introduce and maintain the same wedge between real money demand and the real money stock.

2/ A discussion of the choice between fixed and floating exchange rate systems in an effort to control inflation is beyond the goals of this paper. For a discussion of issues relevant to this choice see, for example, Aghevli, Khan, and Montiel (1991).

In steady state, $\frac{dD}{D}$ is equal to the rate of depreciation, $\frac{dE}{E}$, or equivalently the rate of inflation, $\frac{dP}{P}$. Furthermore, $\frac{D}{P}$ can be written as $\frac{D}{P} = \frac{M - E\,F}{P} = \frac{M}{E} - F$ , where M is the nominal money stock and F is the foreign currency value of FCDs, which for the moment is assumed to be constant. Therefore, the revenue from the inflation tax can be written as:

$$S = (\frac{M}{E} - F)\,\frac{dE}{E} = (\frac{M}{P} - F)\,\frac{dP}{P}$$

It is clear from this expression that, if FCDs exist, the revenue that the government can collect at any rate of inflation is lower than it would be, were FCDs absent. A larger amount of FCDs implies lower revenues ceteris paribus. In the case where foreign money fulfilled all the monetary needs of the public, the revenue raised by the government through the inflation tax would be zero, and money financing would disappear as a means of financing the fiscal deficit. The expression above can also be interpreted to mean that a certain revenue requirement (e.g., to finance a given fiscal deficit) would necessitate a higher rate of inflation when the public holds FCDs. Finally, any given increase in the rate of expansion of domestic money (or equivalently any given increase in the rate of inflation/depreciation) will yield smaller increases in revenue in the presence of FCDs than it would in their absence.

Up to now in this section it has been assumed that the foreign currency value of FCDs does not vary as the inflation/depreciation rate changes. Therefore, the lower government revenues from inflation come about solely because FCDs behave as monetary liabilities of the banking system indexed to the exchange/inflation rate. However, if residents can respond to higher inflation/depreciation rates by increasing the volume of FCDs they hold, i.e., if they can engage in active monetary substitution, then government revenues from inflation will be even lower. This also implies that a given fiscal deficit will require an even higher inflation rate if it is to be financed when the public can engage in active monetary substitution. In effect, what the capacity to engage in active monetary substitution does is (to permit residents) to further decrease the base on which the government can levy its inflation tax. 1/

While the existence of FCDs and the active substitution of domestic money by FCDs makes it more difficult to raise revenues via the inflation tax, the capacity of the public to hold FCDs may increase the revenues of the government through other routes. When the public holds foreign money outside the banking system, fiscal revenues are negatively

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1/ Adverse effects of active currency substitution on fiscal revenues have been discussed in Khan and Ramirez (1986); Tanzi and Blejer (1982); van Elkan (1989).

affected to the extent that both these holdings and the economic activities associated with them are effectively not subject to government taxation. 1/ What the introduction of FCDs can do is to diminish the relative advantages of routing transactions through the informal sector. As a result, transactions through the formal sector might increase, at the same time increasing the tax revenues from that sector. Furthermore, the FCDs themselves are potentially a source of revenue to the government as interest earnings on such accounts could be taxed to some (albeit limited) extent. This would not be a possibility when foreign money is held by the population in the form of "mattress savings" or outside the country.

## VI. Financial Programming and FCDs

This section discusses the following issues which arise in the context of financial programming when the public holds FCDs as money: (i) the appropriate concept of money whose demand should be projected in a programming excercise. This subject is closely linked to the question of the appropriate growth rate for domestic credit; (ii) the formulation of credit ceilings when monetary liabilities are partly denominated in foreign currency; (iii) the contribution of FCDs to the success rate of financial programming; (iv) the willingness of governments to undertake adjustment programs in the presence of FCDs.

(i) In the case where FCDs are part of money 2/ and the public is indifferent as to the proportion of its money held in the form of FCDs, financial programming should involve the projection of the demand for money as a whole. Projecting the demand for an aggregate like $M_2X$ is preferred under those circumstances, because that demand is more stable than the demand for any component of $M_2X$ (i.e., $M_2$ or FCDs). 3/ Higher stability implies that more accurate projections can be made, which in turn implies smaller deviations from the objectives of the program.

In the absence of convertibility, 4/ the recommendation to project the demand for $M_2X$ as a whole is appropriate to the extent that the public is willing to accept domestic money to cover increases in its demand for money in general. In the case where the public sees FCDs as perfect substitutes of domestic currency deposits (DCDs), this willingness will exist insofar as the interest rate offered on DCDs is equal to

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1/ See also Dodsworth, El Erian, and Hammann (1987); van Elkan (1989).

2/ This is the case when FCDs are included in the monetary aggregate that bears the closest and most stable relationship to nominal GNP.

3/ In the extreme case where the public treats foreign and domestic money as pure substitutes, it is impossible to estimate separate demands for domestic money and FCDs; it is possible to estimate only the demand for the aggregate of $M_2$ and FCDs.

4/ Convertibility here entails the capacity of domestic residents to acquire FCDs in the domestic banking system by selling domestic money to the central bank.

the total nominal return on FCDs. 1/ Under such conditions, domestic credit growth could be geared to cover the full projected increase in the demand for $M_2X$ (net of $F\Delta E + E\Delta R$) without compromising the inflation and balance of payments objectives of the programming exercise.

In the case where FCDs and DCDs are not perfect substitutes, the proportion of money the public holds in the form of FCDs would be influenced at the margin by their relative expected rate of return. Under such circumstances, suppose that at the start of the program period the public holds the desired proportion of FCDs and domestic money. If the authorities decide to increase domestic credit to the full extent of the projected increase in $M_2X$ (net of $E\Delta R + F\Delta E$) keeping everything else constant, the result will most likely be an excess supply of domestic money and an excess demand for FCDs. 2/ This imbalance, in the absence of convertibility, will produce an inflation rate that is higher than that specified in the program objectives. Moreover, with a fixed exchange rate, the balance of payments objective of the program may not be achieved.

Under such circumstances, one possibility would be to increase the rate of interest offered on DCDs. This increase would have to be large enough to induce the public to hold all of the new domestic money balances. Such an interest rate policy would permit the achievement of program objectives vis-à-vis the inflation rate or the balance of payments. However, the capacity or willingness of the authorities to use interest rate policy as an instrument to alter the mix of FCDs and DCDs in private money holdings may be limited. The rate of interest on DCDs which would induce the public to hold all the new domestic balances issued may be different from the interest rate needed for example for the efficient mobilization and/or allocation of domestic resources or for the desired capital inflow. 3/

In the case where the interest rate on DCDs cannot be increased enough, one way to achieve the inflation and balance of payments objectives is to permit convertibility of domestic money into FCDs for all those wishing to constitute FCDs. Under such an arrangement, the central bank would have to take precautions to avoid having these new

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1/ In this case, failure to have high enough interest rates on DCDs would induce residents not only to refuse to hold the newly issued domestic money balances but to move out completely from DCDs.

2/ It should be noted that when there exist fixed costs that have to be incurred to acquire foreign money balances, the public may be willing to accept domestic money to cover the increase in its demand for money balances. Specifically, if these fixed costs are high enough relative to the cost of holding the newly issued domestic money balances, domestic credit growth could cover the full projected increase in the demand for $M_2X$ (net of $F\Delta E + E\Delta R$).

3/ Tanzi and Blejer (1982) discuss how interest rate policy may be unable to deal simultaneously with several objectives, one of them being prevention of currency substitution.

FCD liabilities it creates backed by assets denominated in domestic currency, since this would worsen gross reserve management problems. 1/ If convertibility is permitted, the balance of payments objective of the program will be achieved as long as the public keeps in the domestic banking system the foreign exchange it acquires from the central bank. Under such circumstances, foreign exchange reserves of the whole banking system will not be negatively affected, although the net foreign assets of the central bank will weaken.

In the absence of convertibility and of any changes in interest rate policy, achievement of the inflation and balance of payments objective when the public is not willing to hold all the increase in desired money balances in the form of domestic money, financial programming should involve the projection of the demand for domestic money ($M_2$). 2/ Accordingly, domestic credit growth should be adjusted downward to correspond to the projected growth of only domestic money demand. In this approach, any increase in the demand for FCDs (in foreign currency terms) will have to be satisfied by the transfer of assets held by depositors outside the banking system or assets acquired through balance of payments transactions.

(ii) A second issue that arises in financial programming concerns the formulation of credit ceilings for the central bank or the banking system, whose monetary liabilities are partly denominated in foreign currency. This is of particular interest in the context of a flexible exchange rate system. 3/ There are two approaches on this matter. The first sets a ceiling on the growth of NDA excluding the valuation effect of exchange rate changes on NFA. The second instead sets a ceiling on the growth of NDA excluding the valuation effect of exchange rate movements on both NFA and FCDs. The approach chosen can greatly affect the success of programs where there are unanticipated movements in money demand or the real exchange rate. If there is uncertainty about developments during the program period, setting the ceiling on NDA (excluding only the valuation effect of NFA) renders the program less vulnerable to unforeseen developments. This is achieved by effectively forcing domestic credit to adjust in the presence of these shocks. The alternative approach, which effectively sets the ceiling on domestic credit, does not call for such adjustments and thus it tends to accommodate shocks that set the program off track. One drawback, however, of the approach which sets the ceiling on NDA growth (excluding only the valuation effect of NFA) is that it may call for reductions in the level of domestic credit in some cases, which might be difficult to

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1/ See also Lipton (1986) and van Elkan (1989).

2/ Projection of the demand for $M_2$ takes the place of the projection of the demand for $M_2X$. Although necessary in this case, the projection of the demand for $M_2$ is subject to greater uncertainty than that for $M_2X$.

3/ In the case of a fixed exchange rate system, any discreet changes in the exchange rate could be dealt with explicitly in the design of the program.

carry out without some disruption in economic activity. On the other hand, using this approach helps protect the program, especially in cases when programming must be carried out with little available information and/or with unreliable statistics. 1/ Furthermore, in this approach, staying below the ceiling provides a good indication that the program target is being met. In this sense, such a ceiling is an efficient indicator of performance under the program.

In the discussion above, it has been implicitly assumed that either all monetary transactions go through the central bank (i.e., there is no commercial banking system) or alternatively the central bank is capable of controlling the development of NDA of the banking system to the same extent that it can control its own NDA. This has served as a simplifying assumption; however, in cases where a two-tier banking system is in place it has to be decided whether ceilings should be established on NDA of the banking system or on NDA of the central bank. In the case when the money multiplier is unstable and/or the existence of FCDs affects the money multiplier, it may be preferable to establish a ceiling on NDA of the banking system as a whole. 2/ In this case, however, competition within the commercial banking system may suffer if the central bank attempts to achieve the NDA target through administrative means.

(iii) A third issue concerns the contribution of FCDs to the success rate of financial programming. Before FCDs are introduced it is usually the case that the public already holds substantial amounts of foreign currency. These holdings are quite similar to FCDs in their macroeconomic effects. The authorities in that situation do not have a picture of the total amount of assets serving as money; instead they can only calculate and attempt to project the holdings of local money. Therefore, one could argue that the introduction of FCDs provides the authorities with a more accurate picture of the money holdings of the public, thereby potentially increasing the capability of policymakers to predict the behavior of the economy in the presence of various shocks. Furthermore, by increasing the transparency of the economy and by providing more options in the design of financial programs, the introduction of FCDs could potentially improve the performance of such programs.

However, it could also be argued that the introduction of FCDs makes it more difficult to successfully implement financial programs. To the extent that the introduction of FCDs increases the substitutability between domestic and foreign money, larger and less

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1/ The establishment of a ceiling on the growth of NDA excluding the valuation effect of NFA and FCDs requires the projection of domestic money demand and of the demand for FCDs separately; this has been shown to be difficult to do. On the other hand, using the alternative approach requires only the relatively easier projection of the demand for $M_2X$.

2/ van Elkan (1989), reaches the same conclusion.

predictable shifts between these two become possible. 1/ Furthermore, errors in programming will trigger larger movements in the domestic money demand and thus cause more adverse developments in inflation or the balance of payments than prior to the introduction of FCDs. On the other hand, one might expect that a credible adjustment program, correcting domestic imbalances, might benefit from an increased substitutability between domestic and foreign money. Expectations of an improvement in the return on domestic money would lead to a larger reduction in foreign money holdings (increase in domestic money) which would ease the stabilization effort.

(iv) Another issue is the willingness of governments to undertake adjustment programs in the presence of FCDs. FCDs, which are constituted with foreign exchange brought from outside the banking system, 2/ can and have been seen by governments as foreign borrowing which can be used to support the balance of payments (BOP). 3/ To that extent, FCDs affect the willingness to undertake adjustment efforts in more or less the same way as BOP support loans do. It is possible that the foreign exchange which becomes available to the central bank, either from foreign creditors or from the FCDs, will be used to support an external imbalance without undertaking the needed adjustment effort. So, FCDs could be used to finance an undesirable postponement of adjustment, substituting for sound policies. However, it is also possible that FCDs would be compatible with and supportive in an adjustment effort if, for one reason or another, new credits were not yet available or were only available on less favorable terms than those paid to attract FCDs. In sum, it is not possible to say a priori whether the introduction of FCDs would make governments more or less willing to undertake needed adjustment efforts.

## Conclusion

This paper explored the macroeconomic policy implications of foreign currency deposits (FCDs). It was argued that in order to provide the basis for an investigation of these implications it is necessary to determine the "moneyness" of FCDs, which in turn can only be done in the context of a clear definition of money. This paper argued for the adoption of the empirical definition of money, which implies that in principle it is not possible to decide on the appropriateness of the inclusion of FCDs in money before empirical work for the country and time period in question is carried out. However, it is quite probable that, in an inflationary environment, a measure of

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1/ Lipton (1986).

2/ These FCDs must be contrasted with the foreign currency liabilities of the banking system that are created as interest payments accrue in foreign currency to residents' foreign currency accounts.

3/ Some governments have even preferred offering FCDs to borrowing in the international capital markets because FCDs do not automatically require servicing in foreign exchange; under normal conditions, interest is redeposited and the principal is rolled over.

money which includes FCDs will satisfy the criterion of the empirical approach.

Residents of a country may hold FCDs and foreign money in other forms in order to protect the purchasing power of their money holdings from domestic inflation, and to carry out transactions with foreigners, especially when there is foreign exchange risk and/or exchange restrictions. The degree of financial repression, political stability, and development of capital markets will affect the decision to hold foreign money.

This paper used a simple framework to show that, with flexible exchange rates, the presence of FCDs as money increases the rate of change of prices and of the exchange rate in the face of any monetary disequilibrium. In the long run, the percentage increase in the price level and the exchange rate will also be higher if FCDs are present. These phenomena are due to the endogenity of the nominal money supply in the presence of FCDs. Furthermore, if the foreign currency value of the FCDs increases in response to the monetary disequilibrium, there will be even larger and possibly less predictable long-run changes in the price level and the exchange rate.

In the case where a normally fixed exchange rate system is in place, the presence of FCDs will diminish the effect of a devaluation on the real exchange rate and thus on the balance of payments, since the part of money corresponding to FCDs is effectively indexed to the exchange rate. When a continuous depreciation of the currency (i.e., a real exchange rate rule) is followed in order to achieve a perpetual balance of payments surplus, the presence of FCDs implies that there is less of a tradeoff between the rate of depreciation/inflation and the sustained balance of payments surplus/real exchange rate. Furthermore, when a policy of 100 percent sterilization is adopted to keep inflation at zero, the presence of FCDs implies higher rates of domestic credit contraction and shorter periods over which this sterilization can be carried out.

This paper has argued that FCDs will have a detrimental effect on fiscal revenues from the inflation tax. Larger amounts of FCDs, ceteris paribus, decrease the base over which the inflation tax can be levied. It is possible, however, that FCDs could have a positive effect on government revenues to the extent that, when they are available, economic transactions are more likely to take place through the taxable formal sector, and to the extent that FCD interest income is taxable.

The presence of FCDs does not fundamentally alter the method of financial programming; however, it can have implications about certain aspects of it. If the public treats FCDs and DCDs as perfect substitutes, programming should involve the projection of the demand for a broad monetary aggregate which includes FCDs and domestic credit expansion should be geared to cover the full projected growth in that broad aggregate (net of the revaluation effect of FCDs and the desired

increase in NFA). If, however, FCDs and DCDs are treated as imperfect substitutes, such an approach would jeopardize the program objectives, unless the government is willing to either increase interest rates on DCDs or permit internal convertibility for the purpose of constituting FCDs. In case these options are not available, the programming exercise should involve the projection of the demand for domestic money and should gear domestic credit growth to the projected growth of only domestic money demand.

In the presence of unanticipated movements in money demand or the real exchange rate, setting a ceiling on NDA (excluding only the valuation effect of NFA) would possibly call for unplanned contractions in domestic credit but would protect the program more than setting a ceiling on NDA excluding the valuation effect of both NFA and FCDs.

This paper has also attempted to identify whether the presence of FCDs affects, first, the willingness of governments to undertake adjustment programs, and, second, the probability of success of financial programming. However, a number of arguments can be made which provide divergent answers to these issues.

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