INTERNATIONAL MONETARY FUND

STAFF PAPERS

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From the Foreword to the first issue:

> **"Among the responsibilities of the International Monetary Fund, as set forth in the Articles of Agreement, is the obligation to 'act as a center for the collection and exchange of information on monetary and financial problems,' and thereby to facilitate 'the preparation of studies designed to assist members in developing policies which further the purposes of the Fund.' The publications of the Fund are one way in which this responsibility is discharged.**
>
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The authors of the papers in this issue have received considerable assistance from their colleagues on the staff of the Fund. This general statement of indebtedness may be accepted in place of a detailed list of acknowledgments.

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Exchange Rate Dynamics and the Overshooting Hypothesis

JACOB A. FRENKEL and CARLOS A. RODRIGUEZ*

THE EVOLUTION of the international monetary system into a regime of flexible exchange rates and the large volatility of these rates during the 1970s have led to a renewed interest in studying the principal determinants of equilibrium exchange rates. The large fluctuations stimulated theories of exchange rate dynamics and have led to the development of various versions of the overshooting hypothesis.[1] The explanations of the overshooting phenomenon vary, but they all rely on the short-run fixity of some nominal quantity. Some account for it by the assumption that in the short run commodity prices are slow to adjust relative to asset prices (Dornbusch, 1976); some attribute it to the lack of sufficient speculation in the markets for foreign exchange (McKinnon, 1976); some attribute it to the differential

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This paper is a revised version of an earlier paper written in the fall of 1977 and entitled "The Anatomy of the Overshooting Hypothesis in the Market for Foreign Exchange." The authors are indebted to Joshua Aizenman, Kent Kimbrough, and Michael Mussa, and to participants of the joint international economics workshop of Tel Aviv University and the Hebrew University of Jerusalem for useful comments. Mr. Frenkel acknowledges research support from the National Science Foundation, grant SOC 78-14480. This research is part of the National Bureau of Economic Research's Program in International Studies.

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[1]For a classification of the various versions of the overshooting hypothesis, see Levich (1981).

effects of new information on commodity and asset markets (Dornbusch, 1979; Frenkel, 1981 a, 1981 b; Frenkel and Mussa, 1980; Mussa, 1979); and some attribute it to the implications of the process by which asset holders restore portfolio balance in the face of disturbances (Kouri, 1976; Calvo and Rodriguez, 1977; Branson, 1979; Ethier, 1979).[2]

In this paper the implications of two classes of models for the dynamics of exchange rates are analyzed. It is assumed throughout that expectations are formed rationally and that individuals are fully informed. Therefore, the possibility that the dynamics of exchange rates are due to systematic expectational errors is precluded.

In Section I, the dynamics of exchange rates in a model in which commodity prices are slow to adjust is analyzed. The basic structure of the model is due to Dornbusch (1976). The extension here allows for a finite rate of capital mobility, and it is shown that the speed of adjustment in capital markets plays a critical role in determining whether or not following a monetary disturbance the exchange rate overshoots its equilibrium value. It is shown that, when the degree of capital mobility is low, the exchange rate is likely to undershoot its equilibrium value.

In Section II, the dynamics of exchange rates within the framework of the portfolio-balance model with complete flexibility of prices is analyzed. In this context, earlier results of Calvo and Rodriguez (1977) concerning the effect of monetary growth on the real exchange rate are interpreted. It is shown that the fundamental factors determining the dynamics of the real exchange rate are the specification of the portfolios of assets, the degree of capital mobility, and the relative qualities of the various assets as hedges against inflation. The study of the dynamics of the real exchange rate shows that throughout the adjustment process the nominal exchange rate is changing at a rate that differs from the rate of inflation. It follows that a policy that ties the exchange rate to the rate of inflation would be inconsistent with the equilibrium self-fulfilling expectations adjustment path.

[2]In addition to these studies, a partial list of recent studies includes Bilson (1979), Boyer and Hodrick (1982), Flood (1979), Henderson (1980), Kimbrough (1980), Liviatan (1981), Mussa (1982), and Shafer (1980). Further references are included in the following sections of this paper.

I. Exchange Rate Dynamics and the Speed of Adjustment in Commodity and Asset Markets

In this section, the dynamics of exchange rates and the overshooting hypothesis are analyzed from the perspective that emphasizes the speeds of adjustment in commodity and asset markets. This perspective was developed by Dornbusch (1976), who assumed that, as a first approximation, asset markets clear instantaneously while adjustment in commodity markets is sluggish. Dornbusch showed that, when these assumptions are coupled with the assumption that expectations are rational, a monetary expansion induces an immediate depreciation of the currency in excess of its long-run equilibrium value; that is, a monetary expansion results in an overshooting of the exchange rate. To gain further understanding of the relationship between the dynamics of exchange rates and the speeds of adjustment in goods and asset markets, the Dornbusch model is modified and allowance has been made for a finite speed of adjustment in asset markets. It is shown that under these circumstances the key factors determining whether the exchange rate overshoots or undershoots its equilibrium value are the relationship between the speed of adjustment in asset markets, the interest elasticity of the demand for money, and the effects of relative prices on the balance of trade. The speed of adjustment in commodity markets does not seem to be a fundamental factor.

The analysis draws on the analytical framework developed by Dornbusch (1976) and, in order to highlight the key point, the model has been simplified by abstracting from many of the inconsequential details. It is assumed that the economy faces a given price of foreign output and a given world rate of interest, that domestically produced goods differ from foreign goods, and that the supply of output is fixed.

THE MONEY MARKET

Let the demand for real balances depend on real income, Y, and on the rate of interest, and let the logarithm of the demand be linear in the logarithm of income, y, and in the rate of interest, i. Equilibrium in the money market attains when

$$m - p = \phi y - \frac{1}{b} i \tag{1}$$

where m and p denote, respectively, the logarithms of the nominal quantity of money and the price level. Thus, the equilibrium rate of interest can be written as

$$i = b\phi y - b(m - p) \tag{2}$$

THE GOODS MARKET

The demand for domestic output, D, is composed of domestic demand and foreign demand. This demand can be expressed as the sum of total domestic absorption (domestic demand for domestic and foreign goods) and the excess of exports over imports (the trade balance surplus). Absorption is assumed to depend on real income, while the trade balance is assumed to depend on the relative price of domestic and foreign goods.[3] Total demand for domestic output can therefore be written as

$$D = A(Y) + T(SP^*/P) \tag{3}$$

where A denotes domestic absorption, T denotes the balance of trade, S denotes the exchange rate (the price of foreign exchange in terms of domestic currency), P^* the fixed foreign price level (in terms of foreign currency), and P the price of domestic output. For convenience, units are defined so as to equate the foreign price level to unity; therefore, the trade balance may be viewed as depending on the real exchange rate, $s = S/P$. Furthermore, since real output is given, absorption is fixed and the demand for domestic output varies with the real exchange rate.

Long-run equilibrium obtains when the demand for domestic output equals the fixed supply, that is, when $D = Y$. The real exchange rate that is associated with this long-run equilibrium is defined by $\bar{s}$. In order to abstract from long-run accumulation of foreign assets, it is assumed that in the long run the trade balance is zero, so that $T(\bar{s}) = 0$. This assumption, made for convenience only, implies that absorption equals the given level of output $(A(Y) = Y)$.

[3]This specification abstracts from the effects of the rate of interest on absorption, the effects of income on the trade balance, and the distinction between gross national product and gross domestic product that results from interest income on net ownership of foreign securities. These abstractions are made for simplicity, since they do not affect the nature of the argument. Allowance is made for some of these factors by Dornbusch (1976).

Proceeding with the log-linear specification, the trade balance is written as

$$T = \delta \ln (s/\bar{s}) \tag{4}$$

or equivalently as

$$T = \delta (e - p - k) \tag{5}$$

where e, p, and k are the logarithms of S, P, and $\bar{s}$, respectively. Substituting equation (5) into equation (3), and recalling that $A(Y) = Y$, the demand for domestic output is

$$D = Y + \delta (e - p - k) \tag{6}$$

The percentage change in the price level, $\dot{p}$, is assumed to be proportional to excess demand $(D - Y)$:

$$\dot{p} = \pi (D - Y) \tag{7}$$

where the parameter π measures the speed of adjustment in the goods market.[4] Substituting equation (6) into equation (7) yields

$$\dot{p} = \alpha (e - p - k) \tag{8}$$

where $\alpha = \pi\delta$.

At each moment in time, the price level is given, and its evolution is described by equation (8). The coefficient α is the product of two factors: π—the speed of adjustment in the goods market, and δ—the sensitivity of the balance of trade to the real exchange rate. As will be seen below, of these two factors only the latter plays a role in determining whether or not monetary changes result in exchange rate overshooting.

THE CAPITAL ACCOUNT AND THE BALANCE OF PAYMENTS

Equilibrium in the world asset market attains when the difference between the rates of interest on domestic and foreign securities, which are identical in all respects except for the currency of denomination, just equals the expected rate of change in the exchange rate. For example, when the domestic currency is

[4]The assumption that prices change at a finite speed is taken as a stylized fact and there is no attempt to rationalize it here. For an interesting theory of sticky prices, see Mussa (1981). The specification of the rate of inflation as a function of excess demand is analogous to the specification in Dornbusch (1976), equation (8).

expected to depreciate at the percentage rate x, long-run equilibrium requires that

$$i - i^* = x \tag{9}$$

where i^* denotes the rate of interest on assets denominated in foreign currency. It is assumed that expectations concerning the percentage rate of depreciation depend on the relationship between the equilibrium long-run exchange rate, $\bar{S}$, and the current rate, S. Expressed logarithmically,

$$x = \theta(\bar{e} - e);\ \theta > 0 \tag{10}$$

where $\bar{e}$ is the logarithm of $\bar{S}$ and where θ denotes the expectations adjustment coefficient, the determinants of which are analyzed below. Equation (10) states that, when the long-run value, $\bar{e}$, exceeds the current value, e, individuals expect a depreciation of the currency toward $\bar{e}$, that is, the expected depreciation, x, is positive.

The equilibrium that is described in equation (9) is attained through the mechanism of arbitrage that is effected through the international mobility of capital. It is assumed that capital flows are proportional to $(i - i^* - x)$—the discrepancy between the net rates of return on the various securities. Substituting equation (10) for the expected depreciation of the currency, the international flow of capital can be specified as

$$C = \beta\{i - i^* - \theta(\bar{e} - e)\} \tag{11}$$

where C denotes net capital inflow (the surplus in the capital account) and where β denotes the speed of adjustment in asset markets.[5] When capital is perfectly mobile, $\beta = \infty$, and the mobility of capital ensures that equation (9) holds all the time. At the other extreme, when $\beta = 0$, capital is completely immobile, and the mechanism of arbitrage in asset markets is completely inoperative. It is shown below that the magnitude of β is a key factor determining the dynamics of exchange rates.

Equilibrium in the balance of payments in the absence of central bank intervention is attained when the sum of the trade bal-

[5]The theoretical deficiencies of the capital flow equation (equation (11)) are well known. Since the purpose here is to highlight the role of alternative assumptions concerning the speed of adjustment in asset markets, it has been chosen to specify the simplest formulation and to abstract from many other issues.

ance and the capital account is zero. Adding equations (5) and (11) and substituting equation (2) for the (equilibrium) domestic rate of interest yields

$$\delta(e - p - k) + \beta\{b\phi y - b(m - p) - i^* - \theta(\bar{e} - e)\} = 0 \quad (12)$$

as the equilibrium condition for the balance of payments. It should be noted that the equilibrium condition for the balance of payments (which is a flow relationship) is necessary, since the speed of adjustment in asset markets is assumed to be finite. When asset markets clear instantaneously, equation (12) always holds as an *identity,* and the *equilibrium condition* is replaced by the interest parity condition as in equation (9) above.[6]

EQUILIBRIUM EXCHANGE RATE, SPEED OF ADJUSTMENT, AND THE PRICE LEVEL

An analysis of the equilibrium exchange rate and the relationship between the exchange rate, the price level, and the speed of adjustment in the goods and asset markets follows. It is noted, first, that in the long run, given the quantity of money, the exchange rate equals its long-run value[7] and $i = i^*$. Substituting i^* for i in equation (1)—the condition for money market equilibrium—the long-run price level, $\bar{p}$, can be expressed as

$$\bar{p} = m + \frac{1}{b} i^* - \phi y \quad (13)$$

To obtain the relationship between $\bar{p}$ and $\bar{e}$, it is noted that in the long run excess demand for goods is zero and, therefore, $\dot{p} = 0$; it follows from equation (8) that

$$\bar{e} = \bar{p} + k \quad (14)$$

As may be seen from equations (13) and (14), the system satisfies the homogeneity postulate: a given change in the money supply results in an equiproportional change in the long-run equilibrium price level and the exchange rate. Using equations (13) and (14)

[6]For a discussion of the role of flow equilibrium when asset markets adjust slowly, see Kouri (1976) and Niehans (1977). For a discussion of the conceptual issues involved in the formulation of flow equilibrium in asset markets, see Mussa (1976).

[7]In the present framework, the long-run value of the exchange rate is fixed. In general, the equilibrium value may be specified in terms of a movement along an equilibrium path; see Mussa (1982).

in equation (12), the equilibrium in the balance of payments can be written as

$$\delta\{(e-\bar{e})-(p-\bar{p})\}+\beta\left\{b(p-\bar{p})-\theta(\bar{e}-e)\right\}=0 \qquad (15)$$

Equation (15) expresses the various accounts in the balance of payments as functions of the discrepancies between current and long-run values of the price level and the exchange rate. Since at each moment in time the price level is given, equilibrium in the balance of payments is obtained only when the exchange rate is at a level that satisfies equation (15). By collecting terms in equation (15), the equilibrium exchange rate can be written as

$$e=\bar{e}+\varepsilon(p-\bar{p}) \qquad (16)$$

where $\varepsilon=\frac{\delta-\beta b}{\delta+\beta\theta}\gtrless 0$.

Equation (16), which is central to the analysis, relates the equilibrium exchange rate to its long-run value and to the discrepancy between current and long-run prices. This is a reduced form relationship that holds at each moment in time. It is pertinent to note that, depending on the sign of the parameter ε, the relationship between the price level and the exchange rate may be positive or negative. As may be seen, the sign of ε depends on the degree of capital market integration, which has been characterized here in terms of the speed of adjustment β. When the speed of adjustment is low, $\delta > \beta b$ and $\varepsilon > 0$. In that case, given $\bar{e}$ and $\bar{p}$, the exchange rate and the price level must move in the same direction. When the speed of adjustment is high, $\delta < \beta b$ and the opposite holds. In the extreme case for which $\beta = \infty$, the price level and the exchange rate are inversely related, since in that case $\varepsilon = -(b/\theta) < 0$.[8] The determinants of the relationship between the price level and the exchange rate may be interpreted in terms of equation (12) or equation (15). For given long-run values of prices and exchange rates, a rise in the price level worsens the balance of trade and improves the capital account. The improvement in the capital account results from the rise in the rate of interest necessary to restore money market equilibrium in the face of a higher price level. The extent of the required rise in the

[8]The case for which $\beta = \infty$ is the Dornbusch case. Equation (16) here coincides with equation (6) in Dornbusch (1976, p. 1164).

rate of interest depends on b—the interest (semi) elasticity of the demand for money. When the speed of asset market adjustment is high, a given rise in the rate of interest results in a large improvement in the capital account, which is likely to more than offset the deterioration in the balance of trade. To restore equilibrium in the balance of payments, the domestic currency will have to appreciate (i.e., e will have to fall). The reduction in e serves to restore equilibrium by worsening the trade balance and by creating expectations of currency depreciation and, thereby, worsening the capital account. In this case, the exchange rate and the price level move in opposite directions. If, on the other hand, the speed of adjustment in asset markets is low (or more precisely, if β is low relative to δ/b), the deterioration of the trade balance following the rise in the price level would outweigh the improvement in the capital account, and balance of payments equilibrium would require a depreciation of the currency, that is, a rise in the exchange rate. In that case, the dynamics of adjustment are characterized by a situation in which prices and exchange rates move in the same direction.

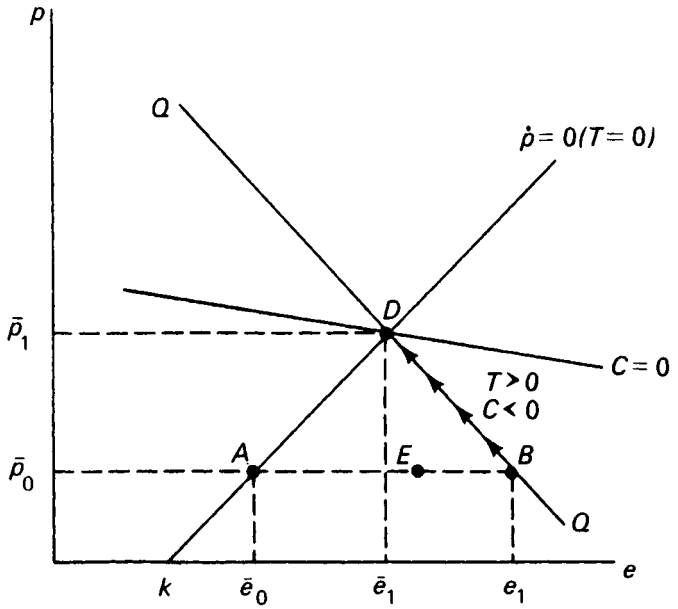
THE EFFECT OF MONETARY EXPANSION: OVERSHOOTING AND UNDERSHOOTING

In the previous section the relationship between the exchange rate, the price level, and the speed of asset market adjustment was characterized. This relationship can be illustrated with the aid of Figures 1 and 2, which will then be used to analyze the effects of monetary changes. In these figures, the $\dot{p} = 0$ schedule shows a combination of exchange rates and price levels for which there is no excess demand for domestic output. The schedule plots equation (8), and its slope is unity.[9] The intercept of the schedule corresponds to the (logarithm of the) equilibrium long-run real exchange rate, k. Also, along this schedule trade must be balanced, so that $T = 0$. All points to the right of the $\dot{p} = 0$ locus correspond to an excess demand for goods and to a trade balance surplus. Consider next the schedule along which the capital

[9]The $\dot{p} = 0$ schedule would be flatter than a 45° line if the demand for goods were to depend negatively on the rate of interest as in Dornbusch (1976). In that case, a rise in the price level lowers the demand via the higher relative price and via the rate of interest that must be higher in order to restore money market equilibrium.

FIGURE 1. HIGH CAPITAL MOBILITY

$\beta > \delta/b$



account is balanced. From equation (15), the capital account can be written as

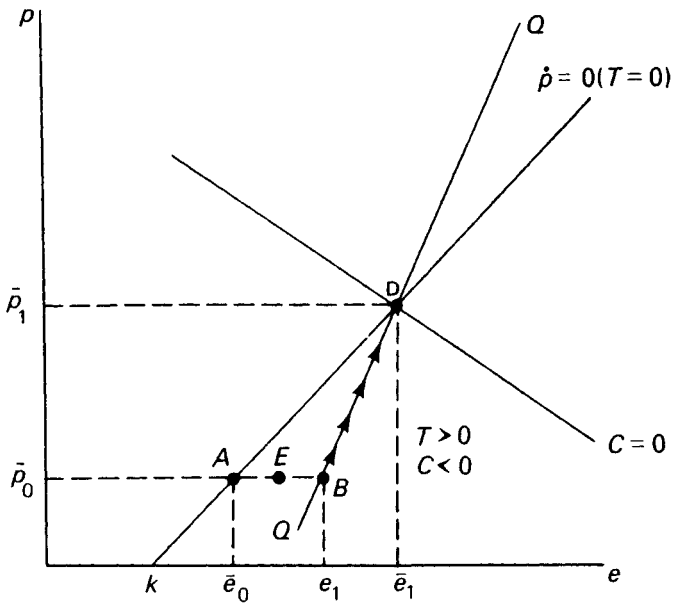
$$C = \beta[b(p - \bar{p}) - \theta(\bar{e} - e)]$$

Thus, the slope of the schedule along which the capital account is balanced ($C = 0$) is $-\theta/b < 0$, as is shown in Figures 1 and 2. Points below the $C = 0$ schedule correspond to a deficit in the capital account.

The equilibrium relationship between the price level and the exchange rate (which must hold at each moment in time) is summarized by equation (16), plotted as the QQ schedule in Figures 1 and 2. The slope of the schedule is $1/\varepsilon$, which may be positive or negative depending on the sign of ε, which in turn depends on whether β is smaller or larger than δ/b. When the degree of capital mobility is low, $\beta < \delta/b$, and the slope of the schedule is positive and larger than unity since $\varepsilon < 1$. When asset markets adjust relatively fast, the QQ schedule is negatively sloped. Since along the equilibrium path the balance of payments is balanced, the QQ schedule must pass in a region that is characterized by a surplus in the balance of trade and a deficit in the

FIGURE 2. LOW CAPITAL MOBILITY

$\beta < \delta/b$



capital account ($T > 0$, $C < 0$) or by a deficit in the balance of trade and a surplus in the capital account ($T < 0$, $C > 0$). Thus, when the QQ schedule is negatively sloped as in Figure 1, it must be steeper than the $C = 0$ locus.[10]

Consider point B in Figures 1 and 2. At this point, there is an excess demand for goods, and $\dot{p} > 0$. Also at point B there is a trade balance surplus ($T > 0$) and a capital account deficit ($C < 0$). The path of adjustment is described by the arrows along the equilibrium schedule QQ, and long-run equilibrium is reached at point D, where prices and exchange rates reach their equilibrium values $\bar{p}_1$ and $\bar{e}_1$. At this point, expected depreciation of the currency is zero, domestic and foreign rates of interest are equalized so that the capital account is balanced and the goods market clear so that $\dot{p} = 0$ and the balance of trade is balanced. As is evident, in this model the trade balance and the capital account play a *symmetric* role in determining the equilibrium exchange rate. It may not be argued, therefore, that the exchange

[10]The two schedules tend to coincide in the limit, when the magnitude of β tends to infinity.

rate is determined exclusively in asset markets and not in the commodity markets. In the extreme case, however, when $\beta = \infty$, as in the Dornbusch (1976) model, this dichotomy does exist. The exchange rate *is* determined at that level that ensures that the rates of return on domestic and foreign securities are equalized at each instant so as to satisfy equation (9). The *size* of the capital account, in turn, is determined by the balance of trade so as to ensure equilibrium in the balance of payments.

To analyze the effects of a monetary expansion, consider an initial long-run equilibrium at point A with $\bar{p}_0$ and $\bar{e}_0$ as the corresponding price level and exchange rate. Through point A passes a QQ schedule (not drawn) that corresponds to the initial quantity of money. A rise in the money supply raises the long-run equilibrium values of prices and the exchange rate equiproportionally to $\bar{p}_1$ and $\bar{e}_1$ and thus moves the long-run equilibrium combination from point A to point D. The initial QQ schedule moves to the right to the position that is drawn in Figures 1 and 2. Upon the change in the money supply, the price level is given at its initial value $\bar{p}_0$. Equilibrium in the balance of payments requires that the exchange rate jump immediately to e_1, and the short-run equilibrium is attained at point B. As may be seen, when the speed of adjustment in asset markets is relatively high, the exchange rate *overshoots* its equilibrium long-run value (as in Figure 1); when the speed of adjustment is relatively low, the exchange rate *undershoots* its long-run equilibrium value (as in Figure 2).

The impact effect of the monetary change can be analyzed in terms of equation (16). By the homogeneity postulate, $dm = d\bar{e} = d\bar{p}$ and thus, given the price level, the short-run elasticity of the exchange rate with respect to the money supply is

$$\frac{de}{dm} = 1 - \varepsilon \tag{17}$$

and substituting equation (16) for ε, the elasticity can be written as

$$\frac{de}{dm} = 1 - \frac{\delta - \beta b}{\delta + \beta\theta} \gtrless 1 \tag{18}$$

When the speed of adjustment is relatively high, so that $\beta > \delta/b$, $\varepsilon < 0$ and the short-run elasticity exceeds unity as in Figure 1. This is the overshooting phenomenon that corresponds to the Dornbusch case. On the other hand, when the speed of adjustment is relatively low, so that $\beta < \delta/b$, ε is positive but smaller than unity, the short-run elasticity is smaller than unity, and the exchange

rate undershoots its new long-run equilibrium value. In the border case for which $\beta = \delta/b$, the QQ schedule is vertical and the exchange rate reaches immediately its long-run value, as e_1 coincides with $\bar{e}_1$. It may also be noted from equation (18) that the extent of overshooting or undershooting depends on the magnitude of θ—the speed of adjustment of expectations, the determinants of which are analyzed below. As is clear from equation (18), other things being equal, the short-run elasticity gets closer to unity as the value of θ increases, thereby reducing the extent to which the current exchange rate differs from its long-run value. It is also evident that as long as θ is not negative its magnitude is irrelevant for determining whether the short-run elasticity is larger or smaller than unity, and, therefore, the analysis is consistent with a variety of assumptions concerning the formation of expectations, ranging from the assumption of static expectations (for which $\theta = 0$) to the assumption of perfect foresight, which is analyzed below.

As is evident, the key factor determining whether the exchange rate overshoots or undershoots its long-run equilibrium value is the relationship between β and δ/b. These parameters characterize the speed of adjustment in asset markets, the sensitivity of aggregate demand (the balance of trade) to relative prices, and the interest (semi) elasticity of the demand for money. As long as the speeds of adjustment are finite, the speed of commodity price adjustment, π, does not determine whether or not there is overshooting.

Turning to the effect of the monetary expansion on the international accounts, it is noted that, at point B, independent of whether the exchange rate overshoots or undershoots, the rise in e improves the balance of trade and the rise in m deteriorates the capital account by lowering the rate of interest. The deterioration in the capital account due to the interest rate effect is mitigated when the exchange rate overshoots its long-run equilibrium value, since, in that case, expectations are for an appreciation of the currency (a decline in e). In the case of undershooting, the expectations for a further depreciation reinforce the interest rate effect in deteriorating the capital account. The transition toward the long run (the path between points B and D) is characterized by a rising price level and by a decline in the *real* exchange rate. The decline in $(e - p)$ results in a deterioration of the balance of trade and, therefore, equilibrium in the balance of payments implies that during the transition the capital account improves.

The above analysis implies that the qualitative characteristics of

the dynamics of the price level, the trade balance, the capital account, and the real exchange rate are independent of whether there is overshooting or undershooting of the exchange rate. These given qualitative paths may be associated with a path along which the nominal exchange rate is rising, as well as with a path along which the nominal exchange rate is falling. The ambiguous relationship between the path of the nominal exchange rate and the other paths should not be taken to imply that the exchange rate does not exert a definite effect on the trade balance, the capital account, and the path of prices. Rather, it implies that one should not expect to observe, independent of the speed of adjustment, a unique qualitative relationship between the equilibrium paths of the exchange rate and those of prices and the international accounts. This lack of a unique general relationship between the exchange rate and the various balance of payments accounts may be responsible for the view that in recent years exchange rates have shown erratic and unpredictable movements.[11]

In this section the effects of a once-and-for-all unanticipated change in the money supply have been analyzed. The analysis can be easily extended to examine the effects of other parametric changes such as changes in output, the foreign price level, and the foreign rate of interest. Similarly, the analysis can be extended along the lines suggested by Wilson (1979) and Gray and Turnovsky (1979) to examine the effects of an anticipated future change in the supply of money or in another parameter. For example, it can be shown that an anticipated future rise in the money supply induces an immediate adjustment of the exchange rate, which jumps, for example, to point E in Figures 1 and 2. The extent of the instantaneous jump in the exchange rate is smaller than the change that would have taken place had the money supply been expected to rise at the present (in which case the exchange rate would have adjusted to point B). Following the initial jump in e, both the exchange rate and prices proceed to rise gradually, and their path converges to the new QQ schedule (corresponding to the new quantity of money) at the point in time at which the rise in the money supply actually occurs. Thereafter, the

[11]The relationship between the exchange rate and the trade balance is analyzed in detail in many recent contributions. See, for example, Kouri (1976), Dornbusch and Fischer (1980), Mussa (1980), and Rodriguez (1980).

convergence proceeds along the (new) QQ schedule toward the new long-run equilibrium.[12]

PERFECT FORESIGHT AND THE COEFFICIENT OF EXPECTATIONS

So far it has been assumed (in equation (10)) that the expected percentage change in the exchange rate is proportional to the discrepancy $(\bar{e} - e)$, with $\theta > 0$ being the proportionality factor. Dornbusch (1976) showed that in a model of perfect foresight the coefficient θ cannot be chosen arbitrarily but, rather, that it must be consistent with the structure of the entire model. An analysis of the determinants of θ follows.

Using equation (14) in equation (8), the rate of inflation may be expressed as

$$\dot{p} = \alpha\{(e - \bar{e}) - (p - \bar{p})\} \tag{19}$$

and using equation (16), the rate of inflation can be written as

$$\dot{p} = \alpha\left(1 - \frac{1}{\varepsilon}\right)(e - \bar{e}) \tag{20}$$

The relationship between the equilibrium exchange rate and the price level that is described by equation (16) must always be satisfied. Therefore, given the long-run values of $\bar{e}$ and $\bar{p}$, changes in the exchange rate and in the price level must be related such that

$$\dot{e} = \varepsilon\dot{p} \tag{21}$$

Substituting equation (20) for $\dot{p}$ yields

$$\dot{e} = \alpha(1 - \varepsilon)(\bar{e} - e) \tag{22}$$

Equation (22) describes the *actual* change in the exchange rate, while equation (10) describes the *expected* change. It is clear that, under perfect foresight, consistency requires that the two be equal and, therefore,

$$\theta = \alpha(1 - \varepsilon) \tag{23}$$

[12]It follows that when capital is highly mobile, so that the QQ schedule is negatively sloped, the path of prices will be monotonic while the path of the exchange rate will exhibit a turning point, that is, e will initially rise and then decline; when capital is less mobile, so that the QQ schedule is positively sloped, both prices and the exchange rate will approach their new, higher values monotonically.

Substituting for ε from equation (16) results in

$$\theta = \alpha\left\{1 - \frac{\delta - \beta b}{\delta + \beta\theta}\right\} \tag{24}$$

from which it follows that the coefficient of expectations can be obtained by solving the quadratic equation

$$\theta^2 + \left(\frac{\pi\delta - \alpha\beta}{\beta}\right)\theta - \alpha\beta = 0 \tag{25}$$

From equation (25), the solution for θ (obtained by taking the positive root) is

$$\theta = -\frac{1}{2}\left[\left(\frac{\delta - \alpha\beta}{\beta}\right) - \left\{\left(\frac{\delta - \alpha\beta}{\beta}\right)^2 + 4\alpha b\right\}^{1/2}\right] > 0 \tag{26}$$

which expresses the coefficient of expectations as a function of the various parameters of the model.

As may be verified, the coefficient of expectations decreases with $1/b$, the interest (semi) elasticity of the demand for money, while it increases with π and β, the speeds of adjustment in the goods and asset markets, respectively. These propositions are independent of the degree of capital mobility. In contrast, however, it is noteworthy that the dependence of the coefficient of expectations on the parameter δ (the sensitivity of aggregate demand to relative prices) is ambiguous and depends on whether $\pi\beta$—the product of the speeds of adjustment in the goods and asset markets—is smaller or larger than a critical value that is equal to $1/(1 + b/\theta)$. For a given value of π, a high value of β, such that $\pi\beta$ exceeds the critical value, yields a positive relationship between the coefficient of expectations and the parameter δ. On the other hand, when β is small, such that $\pi\beta$ is smaller than the critical value, a high value of δ reduces the size of the coefficient of expectations. Since the relationship between the speed of adjustment of expectations and δ is ambiguous, it follows that the effect of a higher value of δ on the extent of the overshooting or undershooting is also ambiguous. Finally, it might be noted that in the extreme case for which asset markets clear instantaneously, so that $\beta = \infty$, equation (24) becomes

$$\theta = \alpha(1 + b/\theta) \tag{27}$$

which corresponds to equation (14) in Dornbusch (1976, p. 1167) and, as noted above, in that case δ and θ are positively related.

The dynamics of exchange rates within a rational expectations model in which commodity prices adjust slowly has been analyzed in this section. The analysis was based on a modified version of a model due to Dornbusch (1976). The model was modified to allow for a finite speed of adjustment in asset markets, and it was shown that the short-run effects of a monetary expansion depend on the degree of capital mobility. When capital is highly mobile the exchange rate must overshoot its long-run value,[13] but when capital is relatively immobile the exchange rate undershoots its long-run value. The key reason for the nonneutrality of money in the short run in this model arises from the assumption that prices are not fully flexible. The dynamics of exchange rates in a portfolio-balance model in which all prices are assumed to be fully flexible also in the short run is analyzed in the next section.

II. Exchange Rate Dynamics and Portfolio Balance

The development of a variety of portfolio-balance models that emphasize the effects of asset substitution on exchange rate determination are the subject of numerous recent articles (e.g., Kouri (1976), Branson (1979), Dornbusch (1979), Girton and Roper (1981), Frenkel and Clements (1981), and the references therein). The purpose here is to highlight the implications of alternative assumptions concerning the degree of substitution among assets on the dynamics of exchange rates. It will be shown that the effects of a monetary expansion on the dynamics of exchange rates and in particular on whether exchange rates overshoot or undershoot their equilibrium path depend critically on the specification of asset choice. To contrast the analysis with the one in the previous section, it will be assumed that goods markets clear instantaneously and that all prices are perfectly flexible.

THE CURRENCY SUBSTITUTION MODEL

The Calvo-Rodriguez (1977) model of currency substitution analyzes a fully employed small, open economy in which residents

[13]This conclusion is based on the assumption that output is fixed. Dornbusch (1976) shows that, when the monetary expansion induces a short-run rise in output, the exchange rate may undershoot its equilibrium level even if capital is highly mobile. This will occur if the rise in output raises the demand for money sufficiently so as to result in a rise in the rate of interest.

are assumed to hold portfolios of domestic and foreign currencies. The key building blocks of the model are the specifications of the markets for assets and goods.

The Asset Market

Asset holders are assumed to hold portfolios of domestic money, M, and foreign money, F. The value of assets in terms of foreign currency is denoted by a:

$$a = M' + F \tag{28}$$

where M' denotes the value of domestic currency holdings in terms of foreign exchange, that is, $M' \equiv M/S$.

The desired ratio of domestic to foreign money holdings is assumed to depend on the *expected* percentage change in the exchange rate, which measures the expected difference between the rates of return on the two assets. The assumption of rational expectations (which in this model amounts to perfect foresight) permits us to identify the expected change in the exchange rate with the actual change. Using a circumflex ($\hat{}$) to denote the percentage change in a variable, portfolio equilibrium can be written as

$$\frac{M'}{F} = L(\hat{S});\ L' < 0 \tag{29}$$

which indicates that the desired ratio of domestic money to foreign money declines when the domestic currency is expected to depreciate. It will prove useful to express the portfolio-balance relationship in terms of its inverse:

$$\hat{S} = l(M'/F);\ l' < 0 \tag{30}$$

The Goods Market

The economy is assumed to produce two classes of goods, tradable and nontradable. For a given state of technology and factor endowment, the rates of production of the two composite commodities depend on their relative price. Denoting the domestic currency price of traded goods by P_T and of nontraded goods by P_N, the relative price that is relevant for production decisions is P_T/P_N. The domestic price of traded goods is linked to the foreign price of that good, P_T^*, through international arbitrage, so that $P_T = SP_T^*$. The small country is assumed to face a given foreign

price for traded goods, which, for convenience, is normalized to unity. Thus, the relative price which governs the allocation of productive resources can be written as $s \equiv S/P_N$—the "real exchange rate"—and the output of the two goods can be specified as

$$\begin{aligned} Q_T &= Q_T(s);\ \partial Q_T/\partial s > 0 \\ Q_N &= Q_N(s);\ \partial Q_N/\partial s < 0 \end{aligned} \tag{31}$$

where Q_T and Q_N denote, respectively, the output of traded and nontraded goods.

The demand for the two goods is assumed to depend on their relative price and on the value of assets according to

$$\begin{aligned} C_T &= C_T\ (s,a);\ \partial C_T/\partial s < 0,\ \partial C_T/\partial a > 0 \\ C_N &= C_N\ (s,a);\ \partial C_N/\partial s > 0,\ \partial C_N/\partial a > 0 \end{aligned} \tag{32}$$

where C_T and C_N denote, respectively, the demand for traded and nontraded goods.

At each point in time the stock of domestic holdings of foreign assets, F, is given, and the assumption that the small country's currency is not held by foreigners ensures that F cannot be adjusted instantaneously. Asset holders can, however, alter the stock of foreign assets gradually by running a surplus or a deficit in the balance of trade. Thus,

$$Q_T(s) - C_T(s,a) = \dot{F} \tag{33}$$

where $\dot{F} \equiv dF/dt$ denotes the rate of change in F. Equilibrium in the market for nontraded goods requires that the rate of domestic production equal the domestic demand, so that

$$Q_N(s) - C_N(s,a) = 0 \tag{34}$$

Equation (34) implies that there is a specific relationship between the real exchange rate and the value of assets that is consistent with equilibrium in the market for nontraded goods. A rise in the value of assets must be accompanied by a decline in the real exchange rate, since the former creates an excess demand for nontraded goods while the latter induces an excess supply. This relationship is summarized by

$$s = s(a);\ s' < 0 \tag{35}$$

Since equation (35) must hold at each moment in time because of the assumed flexibility of prices, it can be substituted into equa-

tion (33) to yield a relationship between the rate of change in F and the value of assets:

$$\dot{F} = f(a); f' \equiv \left(\frac{\partial Q_T}{\partial s} - \frac{\partial C_T}{\partial s}\right)s' - \frac{\partial C_T}{\partial a} < 0 \tag{36}$$

The value of assets is uniquely related to the equilibrium real exchange rate and thereby to the rates of production and consumption of goods and to the rate of accumulation of foreign currency. Therefore, knowledge of the time path of assets is necessary for determining the time path of these variables.

Dynamics

Changes in asset holdings arise from changes in the domestic and the foreign asset components of the portfolio:

$$\dot{a} = \dot{M}' + \dot{F} \tag{37}$$

Recalling that $M' \equiv M/S$, it follows that $\dot{M}' = M'(\mu - \hat{S})$, where μ denotes the percentage change in the nominal money supply, that is, $\mu \equiv \dot{M}/M$. Since $M' = a - F$, the change in M' can be expressed as $\dot{M}' = (a - F)(\mu - \hat{S})$. Thus, equation (37) can be written as

$$\dot{a} = (a - F)\left\{\mu - \ell\left(\frac{a - F}{F}\right)\right\} + f(a) \tag{38}$$

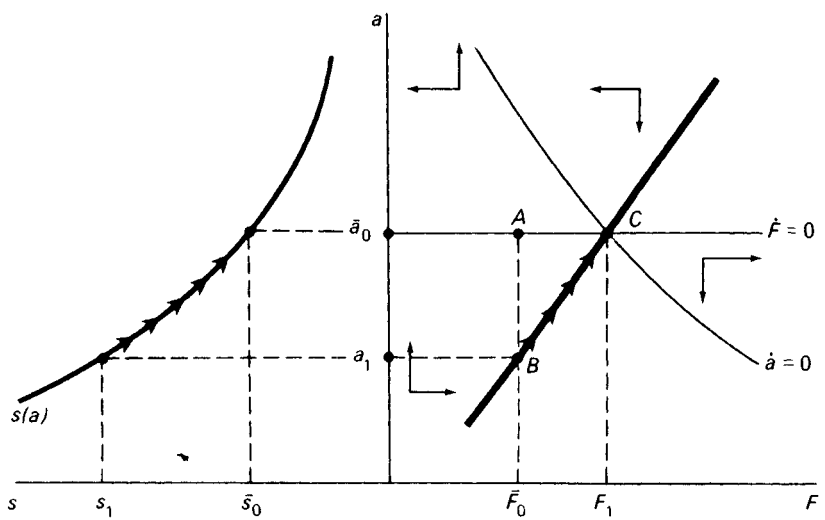
where, using equations (30) and (36), $\ell\left(\frac{a - F}{F}\right)$ was substituted for $\hat{S}$ and $f(a)$ was substituted for $\dot{F}$.

Equations (36) and (38) characterize the dynamics of the system. As is clear, in the steady state, when $\dot{F} = \dot{a} = 0$, $f(a) = 0$ (equation (36)) and $\mu = \hat{S}$ (equation (38)). The steady-state values of a and F are denoted by $\bar{a}$ and $\bar{F}$ and, using equation (35), the implied steady-state real exchange rate is denoted by $\bar{s}$. It is also noteworthy that the system satisfies the homogeneity postulate: a once-and-for-all rise in the nominal quantity of money results in an instantaneous equiproportional rise in the money price of nontraded goods and in the nominal exchange rate (and thereby in the money price of traded goods). These changes leave all real variables (including the real exchange rate) unchanged. In contrast with the discussion in Section I, where due to the assumed slow price adjustment a once-and-for-all change in the nominal quantity of money exerted real effects (by inducing in the short run a

rise in the *real* quantity of money), the flexibility of prices assumed in the present section rules out such effects. In the present model, however, changes in the percentage rate of growth of the money supply are not neutral in the long run and do result in a gradual transition period.

Figure 3 describes the dynamics of the system. In the panel on the right, the $\dot{F} = 0$ and the $\dot{a} = 0$ schedules describe combinations of a and F that satisfy equations (36) and (38), respectively. The slope of the $\dot{a} = 0$ schedule is drawn on the assumption that (around the steady state) $\partial \dot{a} / \partial a < 0$. As is evident, the system exhibits a saddle-path stability, and the motion of the variables is described by the arrows that are implied by the signs of the partial derivatives of equations (36) and (38) around the steady state. None of the qualitative conclusions is altered in the case for which $\partial \dot{a} / \partial a > 0$. In that case, the $\dot{a} = 0$ schedule is positively sloped and is steeper than the saddle path. In general, along the perfect-foresight path (which is the unique path that converges to the steady state and satisfies the laws of motion and the initial conditions) a higher value of F is associated with a higher value of a. The panel on the left in Figure 3 presents the combinations of the

FIGURE 3. EXCHANGE RATE DYNAMICS IN THE CURRENCY SUBSTITUTION MODEL



value of assets and the real exchange rate that satisfy equation (35). These are the combinations that are consistent with equilibrium in the nontraded goods market for which a rise in the value of assets must be associated with a decline in s.

Consider a rise in the rate of monetary expansion. From equation (38) it is seen that the higher value of μ shifts the $\dot{a}=0$ schedule, and hence shifts the saddle path to the right, and results in new, higher steady-state holdings of foreign assets. In the new steady state, the real value of assets remains unchanged so as to ensure that $\dot{F}=0$ (equation (36)). Since the equilibrium real exchange rate is uniquely related to the value of assets, also the steady-state real exchange rate remains unchanged and, thus, production and consumption of both goods remain unchanged. Finally, since in the new steady state the new rate of monetary expansion equals the rate of depreciation, $\hat{S}$, individuals will lower the desired ratio of domestic to foreign currency holdings, which, given the unchanged value of assets, implies that F rises and M' falls.

The dynamics of adjustment are shown in Figure 3, where it is assumed that the initial steady-state position was at point A, with $\bar{F}_0$, $\bar{a}_0$, and $\bar{s}_0$ as the initial equilibrium values of foreign currency holdings, total assets, and the real exchange rate, respectively. The schedules that are drawn correspond to the new higher rate of monetary expansion. Upon the rise in μ, the instantaneous equilibrium jumps to point B along the new saddle path. Since F cannot change instantaneously, point B is the only position of short-run equilibrium that is consistent with the perfect-foresight path that converges to the new steady state. At point B, the value of assets falls from $\bar{a}_0$ to a_1. This decline in the value of assets is necessary, since the rise in the expected relative cost of holding domestic money induces a reduction in the desired ratio of domestic to foreign monies, which, given the initial value of foreign currency holdings, $\bar{F}_0$, can be brought about only by a decline in M' and thus in a. Since at the initial point in time the nominal stock of domestic money, M, is given, the decline in $M' \equiv M/S$ is brought about through a rise in the nominal exchange rate, S (i.e., through a depreciation of the domestic currency). Finally, as indicated in the panel on the left in Figure 3, equilibrium in the nontraded goods market implies that when the value of assets falls to a_1 the real exchange rate rises to s_1. Since the real exchange rate is the ratio of the nominal exchange rate, S, to the price of nontraded goods, P_N, it follows that $\hat{S} > \hat{P}_N$. If the aggregate price

level is a weighted average of S and P_N, it follows that the exchange rate changes by more than the overall price level. This is the *overshooting* phenomenon in the Calvo-Rodriguez (1977) model.

The transition toward the new steady state is characterized by the path between B and C, along which s declines (so that $\hat{S} < \hat{P}_N$), and the value of assets rises as does the value of foreign currency holdings. The model implies that during the transition period a higher depreciation of the currency is associated with a trade balance surplus and an accumulation of foreign assets. This characteristic is typical of the currency substitution model, reflecting the desired change in the composition of assets.[14]

The key feature of the Calvo-Rodriguez model is the specification of the portfolio of assets, where it is assumed that the two alternative assets are domestic and foreign currencies. Since the foreign currency price of traded goods is assumed to be given, the accumulation of foreign currency is equivalent to an accumulation of claims on stocks of traded goods. With this perspective, the currency substitution model can be specified in terms of choice and substitution between domestic money and traded goods. It is intuitively clear, therefore, that following the rise in the rate of monetary expansion asset holders wish to hedge against the expected inflation by shifting the composition of portfolios toward the inflation hedge (traded goods), a shift which results, in the short run, in a rise in s—the relative price of traded goods.

This interpretation of the currency substitution model suggests that, when the inflation hedges are stocks of nontraded goods instead of traded goods, the rise in the rate of monetary expansion might result in an *undershooting* of the exchange rate as the relative price of nontraded goods rises. A formal analysis of this possibility follows.

NONTRADED GOODS AS INFLATION HEDGE

The structure of the model in which nontraded goods are used as the inflation hedge is very similar to the one described in the currency substitution model. In what follows the minimal modifications are introduced.

[14]This characteristic may not be necessary in a model with intertemporal utility maximization; see Liviatan (1981).

The Asset Market

To sharpen the contrast with the currency substitution model, it is assumed that the portfolios of assets are composed of domestic money and stocks of nontraded goods, N. The value of assets in terms of foreign exchange is

$$a = M' + N/s \tag{39}$$

where $N/s = P_N N/S$. As before, the desired ratio of money to inventories of goods is assumed to depend on the difference between their rates of return, that is, on the expected percentage change in the price of nontraded goods. Assuming that expectations are always realized, the desired portfolio composition depends on $\hat{P}_N$, and analogously to equation (30) the portfolio-balance relationship can be written as

$$\hat{P}_N = g\left(\frac{M'}{N/s}\right);\ g' < 0 \tag{40}$$

The Goods Market

The specification of production and consumption is assumed to be the same as in the previous section and is summarized by equations (31) and (32). In the present case, however, an allowance is made for an accumulation of inventories of nontraded goods that must equal the excess of production over consumption of these goods.

$$Q_N(s) - C_N(s,a) = \dot{N} \tag{41}$$

where N denotes the rate of accumulation of nontraded goods.

Since in this case no allowance is made for capital mobility, equilibrium in the market for traded goods requires that

$$Q_T(s) - C_T(s,a) = 0 \tag{42}$$

Equation (42) implies that there is a specific relationship between the real exchange rate and the value of assets that guarantees trade balance equilibrium. A rise in the value of assets raises the demand for traded goods and, therefore, to eliminate the excess demand, it must be accompanied by a rise in the real exchange rate, s. This relationship, which must be satisfied at all times, can be written as

$$s = v(a);\ v' < 0 \tag{43}$$

For later use, it is noted that

$$\hat{s} = \gamma \hat{a} \tag{44}$$

where γ denotes the elasticity of the real exchange rate with respect to the value of assets. Substituting equation (43) into equation (41) yields a relationship between the rate of accumulation of nontraded goods and the value of assets:

$$\dot{N} = h(a);\ h' \equiv \left(\frac{\partial Q_N}{\partial s} - \frac{\partial C_N}{\partial s}\right) v' - \frac{\partial C_N}{\partial a} < 0 \tag{45}$$

Dynamics

The rate of change in the value of assets can be written, using equation (39), as

$$\dot{a} = M'\hat{M}' + (N/s)(N\hat{/}s) \tag{46}$$

Noting that $P_N = \dfrac{M}{(M/S)(S/P_N)}$, it follows that $\hat{P}_N = \mu - \hat{M}' - \hat{s}$, and using equation (40) yields

$$\hat{M}' = \mu - g\left(\frac{v(a)a}{N} - 1\right) - \gamma \hat{a} \tag{47}$$

where $(v(a)a/N) - 1$ was substituted for $M'/(N/s)$ by using equations (39) and (43) and where $\gamma\hat{a}$ was substituted for $\hat{s}$ by using equation (44).

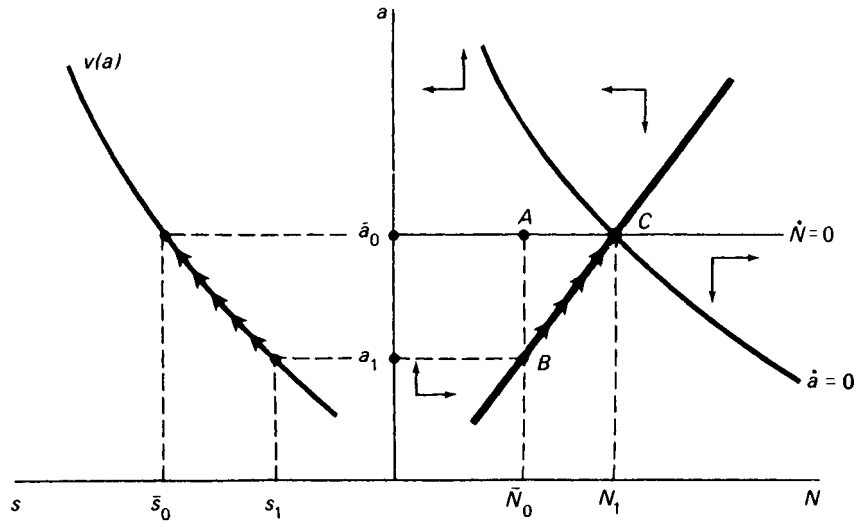
Using equations (45) and (47) in equation (46) yields

$$\dot{a} = \frac{1}{1+\gamma}\left\{\left(a - \frac{N}{s}\right)\left\{\mu - g\left(\frac{v(a)a}{N} - 1\right)\right\} + \frac{h(a)}{v(a)}\right\} \tag{48}$$

Equations (45) and (48) characterize the dynamics of the system. In the steady state, $\dot{N} = \dot{a} = 0$, the value of assets is $\bar{a}_0$, the holdings of nontraded goods are $\bar{N}_0$, and the rate of monetary expansion, μ, equals $g(.)$—the rate of change of the price of nontraded goods, $\hat{P}_N$. Equilibrium in the balance of trade implies that $\bar{a}_0$ is associated with a specific steady-state real exchange rate, $\bar{s}_0$. Since in the steady state the percentage change in the nominal price of nontraded goods equals the rate of monetary expansion, and since the real exchange rate is given at $\bar{s}_0$, the percentage change in the nominal exchange rate, $\hat{S}$, must also equal the rate of monetary expansion.

The dynamics of the system are described in Figure 4. In the

FIGURE 4. EXCHANGE RATE DYNAMICS WHEN PORTFOLIOS CONTAIN MONEY AND NONTRADED GOODS.



panel on the right, the $\dot{N} = 0$ and the $\dot{a} = 0$ schedules show combinations of a and N that satisfy equations (45) and (48), respectively. The slope of the $\dot{a} = 0$ schedule is drawn on the assumption that around the steady state $\partial\dot{a}/\partial a < 0$. As in the currency substitution model, the system exhibits a saddle-path stability and the motion of the variables is described by the arrows, which reflect the signs of the partial derivatives of equations (45) and (48) around the steady state. When $\partial\dot{a}/\partial a > 0$, the $\dot{a} = 0$ schedule is positively sloped and is steeper than the saddle path. As before, none of the qualitative conclusions are altered in that case. The key difference between the analysis in Figure 4 and that in Figure 3 lies in the panel on the left, which shows the equilibrium relationship between the real exchange rate and the value of assets. In contrast with the currency substitution model, here s and a must be positively related so as to ensure trade balance equilibrium (equation (42)).

A rise in the rate of monetary expansion results (from equation (48)) in a rightward shift of the $\dot{a} = 0$ schedule and hence of the saddle path. The new steady state is associated with larger holdings of nontraded goods, whose attractiveness has risen with the accelerated inflation. Suppose that the initial equilibrium is

described in Figure 4 by point A and that the schedules drawn correspond to the new higher rate of monetary expansion. Since at the initial point in time the stocks of nontraded goods are given at N_0, the instantaneous equilibrium is reached at point B with a lower value of assets, a_1. The reduced value of assets lowers the demand for traded goods and, therefore, to restore trade balance equilibrium, the real exchange rate must fall to s_1, as indicated in the panel on the left.

The higher expected rate of inflation lowers the desired ratio of money to inventories of nontraded goods, $\frac{M'}{N/S} = M/P_N N$. At the initial moment the quantities of M and N are given, and the desired ratio is attained, therefore, through a rise in P_N. Since, however, the value of assets declined and since N/s rose, it follows that the nominal exchange rate, S, must have risen (i.e., the domestic currency must have depreciated) so as to yield a decline in $M' \equiv M/S$. The rise in S must be sufficiently large so as to more than offset the effect of the rise in N/s on the value of assets. While both the nominal exchange rate, S, and the price of nontraded goods, P_N, jump upon the rise in the rate of monetary expansion, the fact that the real exchange rate falls to s_1 implies that $P_N > S$. Thus, in this model the exchange rate *undershoots* the price level.

The transition toward the steady state is described by the path from B to C, along which the value of assets and the holdings of nontraded goods increase and the real exchange rate rises toward its initial level. Since along the path s rises, the nominal exchange rate must rise faster than the price of nontraded goods.

The fact that the rise in the rate of monetary expansion results in an instantaneous rise in the price level that exceeds the rise in the depreciation of the currency is consistent with the general principles that were outlined at the end of the discussion of the currency substitution model. In this class of the portfolio-balance model, the key factor determining whether following a monetary disturbance the exchange rate overshoots or undershoots the domestic price level is the specification of the inflation hedge. When the domestic rate of inflation accelerates, asset holders substitute away from domestic money into alternative assets. To the extent that the alternative assets are traded goods, their relative price will rise and the nominal exchange rate will *overshoot* the domestic price level. To the extent that the alternative assets are domestic nontraded goods, their relative price will rise and the exchange rate will *undershoot* the domestic price.

In this section the two polar cases in which the substitutes for domestic money were either foreign currency (or equivalently traded goods) *or* stocks of domestic nontraded goods were analyzed. A more general model would allow for portfolios that consist of domestic and foreign monies as well as of domestic goods. The general principles, however, are likely to be the same. Whether exchange rates overshoot or undershoot the domestic price level will depend on the relative degree of substitution among domestic money, traded goods, and nontraded goods. The relative degrees of substitution will reflect the degree of capital mobility and the qualities of the various assets as hedges against inflation.

III. Concluding Remarks

This paper has analyzed the determinants of the evolution of exchange rates within the context of alternative models of exchange rate dynamics. It has examined the overshooting hypothesis in models that emphasize differential speeds of adjustment in asset and goods markets as well as in models that emphasize portfolio-balance considerations. It has been seen that exchange rate overshooting *is not* an intrinsic characteristic of the foreign exchange market and that it depends on a set of specific assumptions. It has been shown that the overshooting *is not* a characteristic of the assumption of perfect foresight, nor does it depend in general on the assumption that goods and asset markets clear at different speeds. As long as the speeds of adjustment in the various markets are less than infinite (which is obviously the case), the key factor determining the short-run effects of a monetary expansion is the degree of capital mobility. When capital is highly mobile, the exchange rate overshoots its long-run value, and when capital is relatively immobile, the exchange rate undershoots its long-run value.

Within the context of the portfolio-balance model, it has been shown that the effects of a monetary expansion on the dynamics of exchange rates and in particular on whether exchange rates overshoot or undershoot their equilibrium path depend critically on the specification of asset choice, on the degree of substitution among assets, and on the quality of the various assets as a hedge against inflation.

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Interest Rate Consequences of Targeting Money

WARREN L. COATS, JR.*

A REVOLUTION in monetary policy attitudes in the past decade—a revolution ignited by that period's worldwide explosion of prices—has shifted the formulation and assessment of monetary policy from the behavior of interest rates to that of monetary aggregates. Increasingly, monetary authorities are striving to achieve specific, formal or informal, targets for monetary growth. Nevertheless, the behavior of interest rates, both rate levels and volatility, remains an abiding concern of policy. This paper examines the implications of pursuing monetary targets for the behavior of interest rates in the vastly differing economic and political environments found among countries. The paper starts with the case of a financially repressed, closed economy where independent interest rate and money supply targets are, at least in principle, possible. However, even in such economies the degree of this independence is easily overstated. In countries with active (secondary) markets in financial instruments, the existence of which presupposes market-determined interest rates, interest rate targets can be pursued only by subordinating the money supply to that end. Economic liberalization not only precludes independent monetary and interest rate targets, but ultimately makes the independent setting of interest rates impossible, since price level and balance of payments adjustments make the real quantity of money

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totally market determined. With fixed exchange rates, even the nominal quantity of money is endogenous. Therefore, the paper then turns from setting interest rate levels to the implications of monetary targets for the volatility of market-determined interest rates. It concludes that while monetary targets may increase interest rate volatility somewhat, that increase should be modest.

I. Financially Repressed Economies

Many less developed countries have no organized money markets and have negligible capital markets. Savings are invested directly or through banks. When these conditions are combined with "effective" capital controls, money and interest rate targets can be set independently. Such countries often set interest rates below their equilibrium (market clearing) levels, which unfortunately precludes the subsequent development of markets in these financial instruments.[1] These conditions make it possible to independently set monetary and below-equilibrium interest rate targets. This is not possible if rates are set above equilibrium, because at such levels banks may not be able to lend an amount consistent with creating the targeted level of deposits.

The adverse effects on economic development of below-equilibrium interest rates, that is, of financial repression, are well known (McKinnon, 1973; Shaw, 1973; Coats and Khatkhate, 1980). But even in the most backward economies, market forces (i.e., profit incentives) tend to erode repressive controls. Significantly below-equilibrium interest rates leave money borrowers unsatisfied by official domestic credit institutions, who then turn to "unorganized" or black markets for funds at significantly above-equilibrium rates. This stymies the development of organized financial markets, thus impeding economic development in general and diminishes the effectiveness of the very interest rate

[1]In several less developed countries, ceilings on deposit rates have resulted in the emergence of substitutes for deposits, with the yield much higher than the stipulated deposit rates (Khatkhate and Villaneuva (1979)). The same holds true for advanced economies such as the United States where efforts to keep bank deposit rates below their equilibrium values have been thwarted by the development of alternative (and often unregulated) intermediaries such as credit unions and mutual funds, but not before seriously distorting the structural development of financial institutions. These interest rate controls must be phased out in the United States by 1986.

controls causing the problem in the first place. In addition, repressed interest rates and the nonprice rationing that must accompany them create an incentive for borrowers to find credit abroad and for savers to lend abroad. The capital controls that inevitably accompany repressed interest rates are effective in reverse proportion to their need. The more out of line domestic rates are with exchange rate adjusted world rates, the more capital controls will be evaded. Therefore, even in the most extreme case of a financially repressed, closed economy, there are limits on the independence of monetary and interest rate objectives.

II. Economies with Financial Markets

It is easier for governments to regulate interest rates in primary credit markets, for example, on bank deposits and loans, or on the initial issues of securities, than in secondary (resale) markets. Attempts to regulate sales in secondary markets are generally enough to prevent such markets from existing (Khatkhate, 1977; Porter, 1973). The development of secondary markets in financial instruments is desirable because they generate better (more accurate) information on the opportunity cost of funds, improve the efficiency with which funds flow from savers to investors, increase the attractiveness of saving in general, help rationalize the structure of investment by increasing the probability that what is saved will be made available to the most productive investments, and provide the monetary authorities with greater independence from the finance ministry. Well-established money markets make possible central bank open market operations and potentially weaken the link between government budget deficits and central banks' creation of base money.

Active markets in financial instruments, both primary and secondary, and the market-determined interest rates they require, eliminate whatever limited independence there may have been without them between monetary and interest rate targets. This is true even in the closed economy case, where monetary authorities are free to set either a monetary or an interest rate target independently of conditions in the rest of the world. This well-known proposition is graphically revealed by the famous Hicksian *IS-LM* curves (Hicks, 1967, Chap. 7). For the monetary authorities to hit an interest rate target, they must accept whatever quantity of

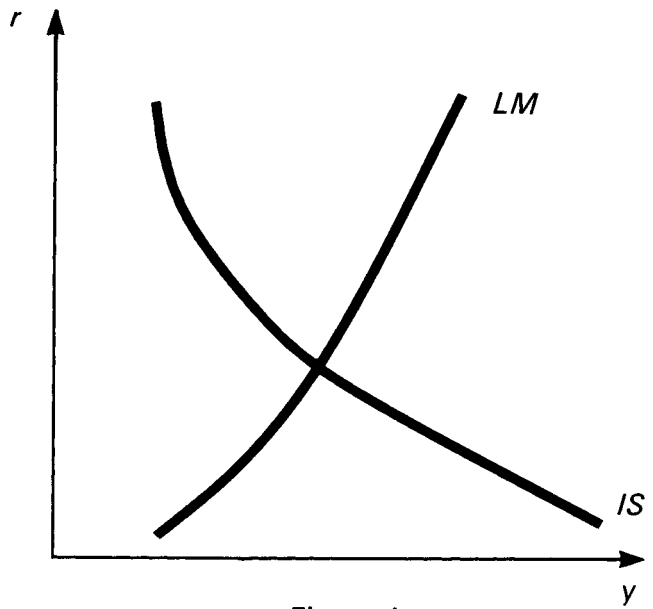


Figure 1

money is consistent with monetary equilibrium (*LM* curve) at the targeted interest rate and the level of real income consistent with real sector equilibrium (*IS* curve). A monetary target requires accepting whatever interest rate results from the specified quantity of money (see Figure 1).[2]

As Hicks pointed out, and as the experience of the past decade has made very clear, this analysis exaggerates the monetary authority's ability to set interest rate targets even in the closed economy context by ignoring the labor market and the eventual adjustment of the price level. That is, in Hicks's corrected model (Chap. 8), the real rate of interest is not a monetary variable at all. The price level will adjust to any nominal quantity of money so as to intersect the *IS* curve at the full employment levels of income (y_f) and the interest rate (see Figure 2). Furthermore, continuous growth in money in excess of the growth of income (a money growth rate target) will lead to continuous inflation, which will drive a wedge between market and real interest rates but will not

[2]By adding fiscal policy (shifts in the *IS* curve) to monetary policy, it is possible in Hicks's model to meet both interest rate and money targets.

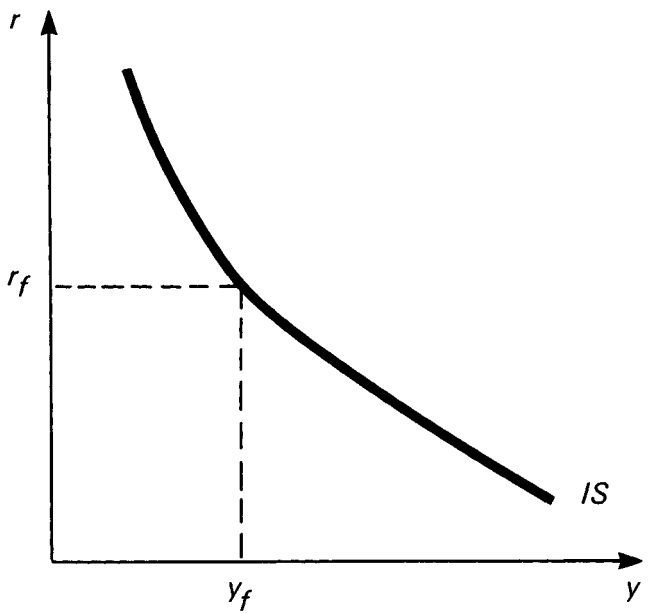


Figure 2

otherwise affect real rates.[3] Once the price level is allowed to adjust in the model, the effort to hold the real rate of interest below r_f in Figure 2, which requires the *IS-LM* curves to intersect to the right of full employment income (y_f), will require accelerating injections of nominal money. However, these temporary increases in real money balances will precipitate exploding increases in the price level. Like a dog chasing its own tail, the process must explode, since there is no market reconciliation possible between the monetary authorities' interest rate target and the rate required for market equilibrium (r_f). Needless to say, nominal rates will actually rise (with inflation) further and further above the target value the harder the authorities press to achieve it.

In the open economy case with a high degree of capital mobility, interest arbitrage ensures interest rate parity with the rest of the world (adjusted by the expected rate of change in the exchange rate, which, in general, will equal expected inflation dif-

[3]However, see Mundell's questionable (Coats, 1976), subtle modification of this proposition.

ferentials). In the fixed exchange rate case, independent monetary targets are also ruled out, since the addition of commodity arbitrage to interest arbitrage links domestic prices to world prices, making the equilibrium nominal money stock endogenous.

III. Interest Rate Volatility

In the light of these considerations, countries with developed markets in financial instruments have increasingly adopted monetary rather than interest rate targets as the central objective of monetary policy. As a result, the still considerable concern over the behavior of interest rates has tended to shift from their equilibrium level to their variations around that level, that is, to interest rate volatility. The desire to balance avoidance of "unnecessary" interest rate volatility against the achievement of monetary targets has focused attention on the horizon, over which control of the monetary supply should be sought. Closer control of money (i.e., a shorter control horizon) increases the variability of the yields on financial instruments. In addition to other objectives, central banks have traditionally sought to moderate or prevent short-term fluctuations in interest rates out of the concern that

> the increased volatility of interest rates would disrupt the functioning of financial markets by increasing risks borne by lenders and borrowers. This, in turn, will spill over into the nonfinancial sector by disrupting the savings-investment process and thereby increase the instability of prices, employment, and output.—Lombra and Struble (1979), p. 285, who cite Hayes.

Most of the central banks of these countries have conducted their day-to-day operations in terms of interest rates, even when pursuing monetary targets in the medium or longer run. For example, the Federal Republic of Germany, the United Kingdom, and the United States (until October 1979), all of whose central banks set monetary aggregate targets, all operate by setting or manipulating interest rates so as to elicit the desired monetary behavior over the longer run. Short-run deviations from longer-run (usually annual) monetary targets have been tolerated on the grounds that (a) tight, very short-run (weekly, monthly, and perhaps quarterly) control of the money supply is not very important as long as the longer-run behavior is appropriate; (b) short-run deviations in money growth tend to be self-reversing; and (c) interest rates would be dramatically more volatile with rigid adherence to very short-run monetary targets, which in turn would have important adverse effects on financial markets.

An empirical assessment of the validity of each of these propositions is needed in order to determine the optimal control horizon. In the United States, these issues are discussed in connection with the choice of a monetary policy "operating strategy." This and the next sections examine the "key issues involved in assessing the degree of [short-term] rate volatility likely to be generated by the attempt to exercise closer control over the monetary aggregate" (Lombra and Struble (1979), p. 286).[4]

Efforts to assess the likely short-run interest rate consequences of tighter money supply control have focused on the public's demand for money and the need for interest rates to adjust to changes in the money stock for that market to clear. *Ceteris paribus,* a lower interest elasticity of demand for money and a slower adjustment of short-run demand (or of supply) to long-run demand mean a more volatile interest rate when controlling the money supply. A widely used formulation postulates a money demand function such as

$$\ln m^d = \ln\left(\frac{M}{P}\right)^d = a_0 + a_1 \ln y - a_2 i + \varepsilon_m \tag{1}$$

in which the long-run demand for real money (m) depends on real income (y) and an interest rate (i), which is related to the money supply through a stock adjustment relation as in

$$\Delta \ln m = \lambda(\ln m^d - \ln m_{-1}) \tag{2}$$

This reflects the assumption that adjustment costs make gradual adjustment of supply to demand optimal.[5] By solving equations (1) and (2) for the interest rate and assuming that in the short run real income and prices adjust little to changes in the money stock or shifts in money demand (ε_m), it is seen that larger changes in i are required to clear the market (i.e., to satisfy equations (1) and (2)) in the face of changes in the money supply, the smaller are the values of a_2 and λ.

$$i = \frac{a_0}{a_2} + \frac{a_1}{a_2}\ln y - \frac{1}{a_2\lambda}\ln m + \frac{1-\lambda}{a_2\lambda}\ln m_{-1} + \frac{1}{a_2}\varepsilon_m \tag{3}$$

Therefore, $\dfrac{\partial i}{\partial \ln M} = -\dfrac{1}{a_2\lambda}$.

[4]Many but not all of the points made here are covered in Lombra and Struble, which also contains an excellent bibliography of the relevant literature. The difficulties of achieving money supply control with an interest rate operating strategy are discussed in Coats (1981).

[5]See Coats (1982) for a fuller discussion of equation (2) and its inappropriateness if money demand is adjusting gradually to changes in supply.

Estimated values of a_2 and λ are generally very small (on the order of 0.1), so that ignoring induced changes in y and P implies very large changes in i from changes in M.

A more thorough analysis would require solving a complete model for i. This would take account of the extent to which y and/or P respond to changes in M and thus diminish the work left for i. A partial step in this direction is to add the real sector (IS equation) to the above equations. To keep the analysis simple, the model continues to treat real output as exogenous, that is, the labor sector is omitted, so that it solves for the interest rate and the price level given real output, inflationary expectations, and the money stock. The following equations are added.

Aggregate demand:

$$\ln y^d = b_0 + b_1 \ln y - b_2 r + \varepsilon_I \tag{4}$$

where y is real income and r is the real rate of interest.

Fisher relationship:

$$i = r + \Pi \tag{5}$$

where Π is the expected rate of inflation.

Partial adjustment of nominal income to demand:

$$\Delta \ln Y = \alpha(\ln Y^d - \ln Y_{-1})$$

or

$$\ln P = \frac{\alpha}{1-\alpha}\ln y^d - \frac{1}{1-\alpha}\ln y + \ln Y_{-1} \tag{6}$$

where Y is nominal income. All coefficients are defined to be positive.

Combining equations (4) through (6) gives the IS equation:

$$\ln P = \frac{\alpha b_0}{1-\alpha} + \frac{\alpha b_1 - 1}{1-\alpha}\ln y - \frac{\alpha b_2}{1-\alpha} i + \frac{\alpha b_2}{1-\alpha}\Pi + \ln Y_{-1} + \frac{\alpha}{1-\alpha}\varepsilon_I \tag{7}$$

Combining the IS and LM equations (equations (7) and (3)) so as to remove the endogenous price level, and solving for i gives

$$i = \frac{\lambda a_0(1-\alpha) + \alpha b_0}{d} + \frac{\lambda a_1(1-\alpha) + \alpha b_1 - 1}{d}\ln y + \frac{\alpha b_2}{d}\Pi - \frac{1-\alpha}{d}\ln M + \frac{1-\alpha}{d}\ln Y_{-1} + \frac{(1-\lambda)(1-\alpha)}{d}\ln m_{-1} + \frac{\alpha}{d}\varepsilon_I + \frac{\lambda(1-\alpha)}{d}\varepsilon_m \tag{8}$$

where $d = a_2\lambda(1-\alpha) + \alpha b_2$

As real income is fixed, changes in Y reflect changes in P. Equation (8) shows that the interest rate effect is reduced to the extent the price level responds to changes in M (i.e., to the extent that $\alpha > 0$):

$$\frac{\partial i}{\partial \ln M} = \frac{1-\alpha}{a_2\lambda(1-\alpha)+\alpha b_2} < \frac{1}{a_2\lambda}$$

when $b_2 > 0$. Interest-sensitive aggregate demand ($b_2 > 0$, i.e., a flatter *IS* curve) also reduces the volatility of interest rates from changes in M. A full treatment would specify, that is, make endogenous, the determination of inflationary expectations (adaptive, rational, etc.) and real output. However, it is possible to specify the direction of the result of making these adjustments endogenous by inspecting equation (8), which includes them as exogenous. They both enter that equation with the opposite sign from that of money. Therefore, if, as is generally supposed, an increase in money increases either Π or y, the negative impact on i of that increase in M will be smaller than indicated by the above partial derivative.

Inferring interest rate volatility from equation (3) is equivalent to setting α to zero in equation (8), in which case the impact multipliers for M are the same in the two equations. The opposite assumption, namely, that $\alpha = 1$, depicts full, unlagged adjustment (of prices) in the real sector. In this case, M's impact multiplier is zero; a change in M has no effect on i (assuming no change in Π and y), because full and immediate adjustments in P (which leave M/P unchanged) keep the public on its money demand curve without the need for any change in i, as explained earlier in terms of Figure 2.

IV. Shortcomings of the Framework

Empirical estimates based on the foregoing types of equation suggest very high interest rate volatility. Several considerations cast doubts on this finding. In addition to the inadequate treatment of inflationary expectations, the coefficient estimates of previous studies generally suffer other biases. The treatment of the money stock as exogenous in money demand estimates biases the estimated interest elasticity of demand downward (Lombra and Torto, 1975), although the empirical significance of this bias seems to be small (Havrilesky and Boorman, 1978). However, a more serious downward bias is overlooked in the taxonomy of

Lombra and Struble. The opportunity cost of holding money is the difference between money's own rate of interest (i_d) and that on alternative assets. A change in i matched by an equal change in i_d (i.e., no change in $i - i_d$) will have little or no effect on the demand for money. Estimates of specifications like equation (1), which omit money's own rate of return, will reflect the combined impacts of the change in i (i.e., $\partial \ln m^d / \partial \ln i$) and the change in i_d (to the extent i_d moves with i), that is, $(\partial \ln m^d / \partial \ln i_d)(\partial i_d / \partial i)$. If i_d is reasonably constant (or if its movements are independent of i) within the time unit used in estimating a_2, its omission (absorption into the constant term) does not bias the estimate. This assumption is obviously correct for the currency component of M but questionable for the deposit components when using monthly or longer data.

Interpreting the low estimates for a_2 as the impact interest elasticity of demand for money implicitly assumes that the own rate of interest on money is zero or constant, that is, that interest rate controls are fully effective. Klein (1974) has argued that the opposite assumption, that deposits yield a competitive return, is a better approximation of the truth. Using annual data, Klein finds that the estimated coefficient of the interest rate term in a money demand function is increased by a factor of four when i is replaced by $i - i_d$ for the i_d proxy he has constructed.

In estimating the daily or weekly volatility of i, $\partial i_d / \partial i$ is likely to be approximately zero. Therefore, Klein's dramatically higher elasticities, obtained from monthly or quarterly estimates of a_2 that include i_d, are more relevant in the very short run than are the lower elasticities that reflect the offsetting effects of both i and i_d.[6]

Another overstatement results from a misspecification of the stock adjustment process. Equation (2) says that the *supply* of money adjusts to its *demand* with a lag. However, if rapid adjustments in the monetary sector are costly, then it should be the demand for (nominal) money that adjusts gradually to changes in its *supply* rather than the other way around.[7] Equation (2) says that a change in demand affects supply by only λ of the change in demand. Something close to equation (2) results from the assump-

[6]See also Barro and Santomero (1972), Startz (1979), and the criticism of Klein's i_d proxy by Carlson and Frew (1980).

[7]Alternatively, the real supply adjusts gradually to its real demand via price level changes. These implications have been fully explored by Starleaf (1970) and Coats (1982).

tion that the demand for money is a function of permanent rather than current measured income or interest rates. Given that interpretation, an exogenous change in M (or m, given P) will require a larger change in i the smaller is λ, because it takes a larger change in actual i to generate a given change in permanent i. However, this interpretation has nothing to do with adjustment costs.

A gradual adjustment of demand to an exogenous change in supply would dampen rather than multiply the necessary change in i as demonstrated by Starleaf. Treating money balances as a buffer stock and recognizing that adjusting that stock in the face of exogenous disturbances (shocks) requires a change in spending (on goods or bonds, etc.) means that if adjustments are costly it is optimal to adjust (spending on bonds, etc.) gradually. But gradual adjustment means that economic units are willingly (though only temporarily) holding a quantity of money that is not the long-run equilibrium quantity. This willingly held "disequilibrium" money is the extent to which a change in M exerts no market pressure on prices or interest rates. This is seen by replacing equation (2) by Starleaf's specification:

$$\Delta \ln m^d = \lambda(\ln m - \ln m^d{}_{-1}) \tag{9}$$

and solving the monetary sector (the LM relation) for the interest rate. This gives

$$i = \frac{\lambda a_0}{a_2} + \frac{a_1}{a_2}\ln y - \frac{(1-\lambda)a_1}{a_2}\ln y_{-1} + (1-\lambda)i_{-1} - \frac{\lambda}{a_2}\ln m + \frac{1}{a_2}\varepsilon_m - \frac{(1-\lambda)}{a_2}\varepsilon_{m-1} \tag{10}$$

In the generally used stock adjustment of equation (3), a one-unit increase in M immediately decreases i by $1/a_2\lambda$, while in equation (10) the same increase in M decreases i by λ/a_2. An interest elasticity of $a_2 = 0.5$ and a partial adjustment coefficient of $\lambda = 0.2$ imply money impact multipliers of 10 for equation (3) and 0.4 for equation (10).

Combined with the IS sector, Starleaf's version gives

$$i = \frac{\lambda a_0(1-\alpha) + \lambda\alpha b_0}{z} + \frac{a_1(1-\alpha) + \lambda(\alpha b_1 - 1)}{z}\ln y - \frac{a_1(1-\alpha)(1-\lambda) - (1-\alpha)\lambda}{z}\ln y_{-1} + \frac{a_2(1-\alpha)(1-\lambda)}{z}i_{-1}$$

$$+\frac{\lambda(1-\alpha)}{z}\ln P_{-1}-\frac{\lambda(1-\alpha)}{z}\ln M+\frac{\lambda\alpha b_2}{z}\Pi$$

$$+\frac{\lambda\alpha}{z}\varepsilon_I+\frac{1-\alpha}{z}\varepsilon_m-\frac{(1-\alpha)(1-\lambda)}{z}\varepsilon_{m-1} \tag{11}$$

where $z=a_2(1-\alpha)+\lambda\alpha b_2$

and $\dfrac{\partial i}{\partial \ln M}=\dfrac{\lambda(1-\alpha)}{a_2(1-\alpha)+\lambda\alpha b_2}$.

Equations (8) and (11) also allow an examination of the impact multipliers of i from "exogenous" changes in real output (y), inflationary expectations (Π), money demand (ε_m), and aggregate demand (ε_I).

Table 1 dramatizes the considerable differences these considerations make in assessing interest rate volatility. Taking the extreme cases: (a) ignoring the real sector and focusing only on the demand for money with the traditional stock adjustment lags, an interest coefficient for money of 0.2 and a speed of adjustment coefficient of 0.2 gives an impact interest effect of a change in the money stock of −25; (b) making the real sector (i.e., the price

TABLE 1. IMPACT MULTIPLIERS

	$\lambda=0.2$ $\alpha=0.2$ $a_2=0.5$ $b_2=1$	$\lambda=0.5$ $\alpha=0.2$ $a_2=0.5$ $b_2=1$	$\lambda=0.2$ $\alpha=0.5$ $a_2=0.5$ $b_2=1$	$\lambda=0.2$ $\alpha=0.2$ $a_2=0.2$ $b_2=1$	$\lambda=0.2$ $\alpha=0.2$ $a_2=0.5$ $b_2=0.5$	$\lambda=0.2$ $\alpha=0.2$ $a_2=0.2$ $b_2=0.5$
Equation (3)						
$\dfrac{\partial i}{\partial \ln M}=\dfrac{1}{a_2\lambda}=$	−10	−4	−10	−25	−10	−25
Equation (10)						
$\dfrac{\partial i}{\partial \ln M}=\dfrac{\lambda}{a_2}=$	−0.4	−1.0	−0.4	−1.0	−0.4	−1.0
Equation (8)						
$\dfrac{\partial i}{\partial \ln M}=$	−2.857	−2.000	−0.909	−3.448	−4.444	−6.060
$\dfrac{\partial i}{\partial \Pi}=$	0.714	0.500	0.909	0.862	0.555	0.758
Equation (11)						
$\dfrac{\partial i}{\partial \ln M}=$	−0.364	−0.800	−0.286	−0.800	−0.381	−0.888
$\dfrac{\partial i}{\partial \Pi}=$	0.090	0.200	0.286	0.200	0.048	0.111

level) partially endogenous and using the Starleaf stock adjustment formulation, the higher interest coefficient of demand for money of 0.5, the same speed of adjustment in the money market ($\lambda = 0.2$), an adjustment speed in the real sector of 0.5, and a unitary interest coefficient for investment demand gives an impact interest effect of -0.29. However, overwhelmingly the greater part of the difference results from the shift to the Starleaf stock adjustment specification.

It is possible that estimating an equation like (11) rather than (8) will yield different values for the underlying structural coefficient. In fact, Coats's (1982) versions of equations (3) and (10) using quarterly U.S. monetary data (M1–B), gave values of $a_2 = 0.010$ and $\lambda = 0.355$ for equation (3)[8] and of $a_2 = 0.005$ and $\lambda = 0.218$ for equation (10). These values imply money impact multipliers for the interest rate of 281.7 and 43.6 for equations (3) and (10), respectively.

Another overstatement results from ignoring the interest elasticity of the money multiplier. Central banks do not control the money supply directly. A more practical short-run strategy might be the adherence to a bank reserve or monetary base target. The deposit or monetary response to a change in reserves (B) is dampened by the shock absorber roles of banks' excess reserves and nondeposit (managed) liabilities. This dampened monetary response in turn dampens the interest rate response to changes in reserves. For example, adding an interest-sensitive money supply:

$$\ln M = c_o + \ln B + c_2 i$$

to equations (1) and (2) gives

$$i = \frac{\lambda a_o - c_o}{\lambda a_2 + c_2} + \frac{\lambda a_1}{\lambda a_2 + c_2} \ln y - \frac{1}{\lambda a_2 + c_2} \ln B - \frac{1}{\lambda a_2 + c_2} \ln P + \frac{1 - \lambda}{\lambda a_2 + c_2} \ln m_{-1} + \frac{\lambda}{\lambda a_2 + c_2} \varepsilon_m \tag{12}$$

and

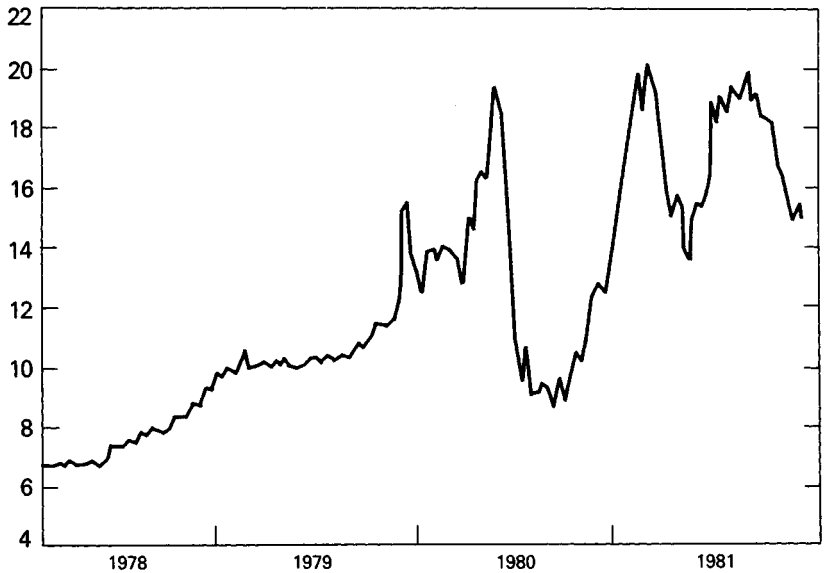
$$\frac{\partial i}{\partial \ln B} = -\frac{1}{\lambda a_2 + c_2} < \frac{1}{\lambda a_2}$$

when $c_2 > 0$.

[8]These estimates for a_2 did not account for money's own rate and are therefore biased toward zero, as explained previously in the text above.

CHART 1. FEDERAL FUNDS RATE, JANUARY 4, 1978–OCTOBER 14, 1981

(Seven-day average for week ended Wednesday)

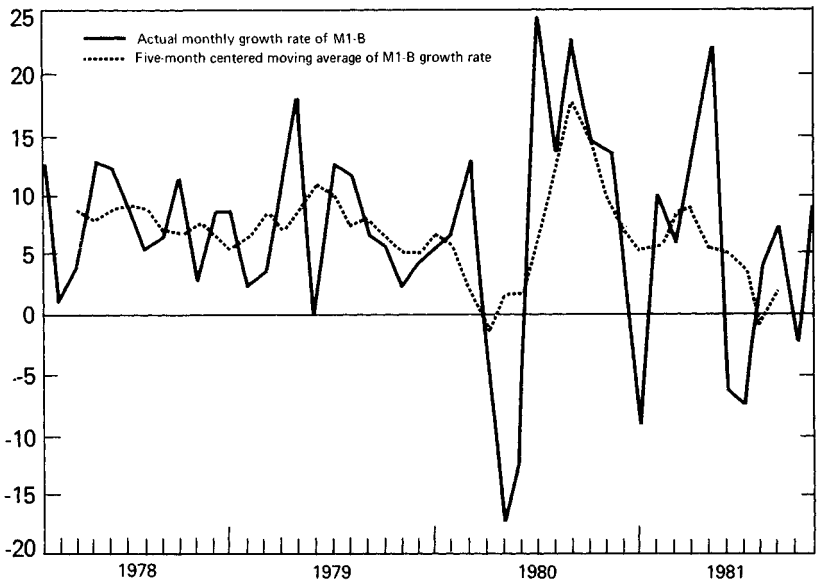


Moreover, the change to a monetary or reserve strategy will itself very likely lead to adaptive changes in the banking sector's behavior. One of the most likely structural changes in response to the adoption of a reserve strategy is the increased use by banks of excess reserves and managed liabilities as reserve shock absorbers. In other words, the adoption of a reserve strategy itself is likely to eventually raise the interest elasticity of the money multiplier, thus further dampening the interest rate response to a change in reserves.

In general, these and other structural adjustments would probably overshadow other factors tending to smooth interest rate behavior, but they are the most difficult to quantify or even foresee. Volatile interest rates contain profitable opportunities to innovate in ways that smooth rates. Given time, the banking system and financial markets and instruments can be expected to respond to these opportunities. However, as shown above, even the existing structure, when properly and fully elaborated, gives hope that increased interest rate volatility from the adoption of a reserve strategy may not be as great as existing estimates seem to suggest.

CHART 2. MONETARY GROWTH TARGET, M1–B

(Percentage annual growth rate of monthly average, seasonally adjusted)



The large increase in interest rate volatility in the United States, following the Federal Reserve System's adoption of a weekly reserve targeting strategy in October 1979, seems to undercut this somewhat cheerful assessment (see Chart 1). However, the more recent period has been a turbulent one for many reasons that would have made interest rates more volatile even without the Federal Reserve's new reserve targeting. Even the money supply itself was more volatile despite intensified efforts to smooth it out (see Chart 2). Monetary shocks to interest rates should fall primarily on very short-term rates, while more permanent and real shocks would affect short-term and long-term rates equally. In fact, both short-term and long-term rates have become considerably more volatile. This question of "whether the observed increase in interest-rate volatility stemmed from the change in monetary policy on October 6, 1979" is addressed by Evans (1981, p. 5).

> [He] finds that this policy change produced only about 30 per cent of the increased volatility in long-term interest rates, and that the rest came from sources not directly under Federal Reserve control.

V. Conclusion

The interest rate consequences of targeting money depend on the economic environment in which the policy is undertaken. The simultaneous pursuit of interest rate and monetary targets (by means of monetary policy alone) is not generally possible except in a limited way even in the most isolated, financially undeveloped economies. For this reason the major interest rate issue associated with targeting money for those countries with developed financial markets is its consequence for the volatility of rates. In examining the underlying relationships that link monetary and interest rate behavior in an effort to assess the magnitude of the impact of monetary targeting on interest rate volatility, several shortcomings of the existing literature are presented. When these shortcomings are taken into account (or are corrected) the earlier assessments that interest rates would be "much" more volatile are "greatly" attenuated.

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Interest Rate Policies in West Africa

SERGIO PEREIRA LEITE*

IT IS BY NOW GENERALLY RECOGNIZED that the existence of externalities and other market imperfections justify government intervention in financial markets. Since in most developing countries the financial system can be broadly characterized as being both underdeveloped and oligopolistic, it is not surprising to find that government intervention in the financial markets of these countries is pervasive. The relevant question to ask in such situations is not whether government intervention should be eliminated altogether but how these intervention policies, imperative as they are, can be made less distortion accentuating or more distortion attenuating. Regarding credit market imperfections, which is the concern of this paper, it has been found that government intervention has often tended to be distortion accentuating (Galbis, 1981; McKinnon, 1981) for two main reasons. First, in less developed countries that are afflicted by low income and investment, low interest rates are considered to be investment inducing and hence justified. Second, deliberate decisions to maintain low and stable interest rates are taken to countervail the perceived baneful effects of the very high interest rates prevailing in the unorganized credit market. However, it is little realized that, in the face of inflationary pressures, low interest rates in nominal terms often culminate in negative real interest rates. Thus, the financial markets, imperfect as they are to begin with, are distorted further, affecting the efficiency and pace of the growth of the economy (McKinnon, 1973; Shaw, 1973; Khatkhate, 1980). The important issue is, therefore, how to prevent government intervention from being distortion accentuating. For this reason, it seems essential to evolve rational criteria by

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recourse to which the authorities can determine the level and structure of money interest rates in the imperfect credit markets of less developed countries. It is true that there is not one single criterion but many alternatives on which they must base their decisions. These decisions depend on the short-term and long-term objectives of economic policy at any given time and the current phase of the economy and its relationship to the outside world. Where there are multiple criteria, the weight to be assigned to each is also important. Such difficulties notwithstanding, it is still essential to search for a set of guidelines that, combined with judgmental considerations, would permit the determination of interest rate levels that would be compatible with the macroeconomic objectives of a given country.

The purpose of this paper is to consider basic criteria for the determination of appropriate interest rate levels in the context of selected West African countries. The countries have been chosen to provide varying institutional and policy frameworks, so that the discussion on interest rate policies should assume a sufficiently general tone. The countries are Ivory Coast and Senegal from the CFA franc area; three former British colonies that were part of the now defunct West African Currency Board—The Gambia, Ghana, and Sierra Leone; two former French colonies that have withdrawn from the CFA franc area—Guinea and Mali; two former Portuguese colonies—Cape Verde and Guinea-Bissau; and Liberia, which is *sui generis,* since it uses a foreign currency, the U.S. dollar, as legal tender. All these countries are basically agricultural and, with the exception of Ivory Coast, have a per capita income of between SDR 107 and SDR 383.

In Section I of the paper the characteristics of the financial systems in West Africa are described; Section II discusses the interest rate policies pursued in those countries over the 1970s; and Section III contains some general considerations relevant to devising appropriate interest rate policies, which are then applied to the interest rate structures in West Africa. The last section contains the conclusions of the paper.

I. Characteristics of Financial Systems

Although the structure and the degree of sophistication of the financial systems vary considerably among the countries in this sample, some basic characteristics are common to most of them.

For example, except for Liberia, government-owned financial institutions have a major role in the financial systems. This is true even in countries such as The Gambia and Ghana, where a majority of deposit money banks are foreign owned because, in these countries, the leading bank is not only government owned but is much larger than the other banks. In Cape Verde, Guinea, and Guinea-Bissau, the whole financial system is government owned.

In most countries, the financial system is relatively limited, typically being composed of a handful of deposit money banks, a few specialized banks, a development bank, a savings institution, and a postal checking accounts system. The exception here is Ivory Coast, with a well-developed financial system consisting, apart from the central bank, of 21 deposit money banks, of which 6 are government-controlled specialized banks and 6 are foreign owned; a national savings bank, a postal checking accounts system, 7 representative offices of foreign banks, and 12 nonbank financial institutions; and a stock exchange. In contrast, both Guinea-Bissau and Cape Verde have a single bank that operates not only as a central bank but also as a commercial and development bank. In all other countries, the number of deposit money banks is small, exceeding four only in Liberia and Senegal. Thus, the financial systems in West Africa can be described generally as both government dominated and oligopolistic.

Another key feature in the financial markets is the borrowing requirements of the public sector. Irrespective of the political system, the public sector tends to be by far the major borrower in the financial sector. Net claims on government exceeded 50 per cent of total credit extended by the banking system in Guinea-Bissau in 1978, in Ghana in fiscal year 1978/79, and in Sierra Leone in 1979 (Table 1). If nonfinancial public enterprises are added to the central government, credit to the public sector also exceeded 50 per cent in Cape Verde, Guinea, and Mali; it was above 40 per cent in The Gambia, Liberia, and Senegal. Although the large credits to government in these countries is a direct consequence of the large proportion of government investment in total investment (Table 2), an important part of these funds also goes to finance current budget deficits.

A further striking characteristic of the financial systems is the importance of the central bank as a primary source of funds to the economy. In seven out of the ten countries in the sample, more than 50 per cent of the credits extended by the banking system were ultimately financed by the central bank either directly (central bank net claims on government) or indirectly through ad-

TABLE 1. SELECTED WEST AFRICAN COUNTRIES: NET CLAIMS ON GOVERNMENT, 1979

(In per cent of total credit extended, end of period)

	Central Bank	Banking System	Domestic Financing as Per Cent of Budget Deficit
Cape Verde	7.6	7.6	4.5
The Gambia	44.3	26.8	30.1[1]
Ghana	79.3	66.2	[2]
Guinea[3]	[4]	[4]	—
Guinea-Bissau[3]	75.6	75.6	23.8
Ivory Coast	6.8	[4]	31.3
Liberia	95.6	25.2	4.5
Mali	51.0	40.1	46.2[3]
Senegal	16.0	10.3	[2]
Sierra Leone	100.0	77.0	68.2

Sources: *International Financial Statistics;* and data provided by the national authorities.

[1]For fiscal year 1978/79.

[2]Foreign financing was negative in 1978/79, which made domestic financing more than 100 per cent of the deficit.

[3]1978 data.

[4]Net claims on government are negative.

vances or rediscounts to deposit money banks (Table 3). In 1979, all the remaining countries (Ivory Coast, Liberia, and Senegal) had a ratio of central bank credit to total banking system credit to the economy greater than one fourth. While in The Gambia and Mali the central bank is a major source of credit both to the government and to the deposit money banks, in Ghana, Liberia, and Sierra Leone the recourse to the central bank by deposit money banks is minimal; in these countries, most central bank credit goes to finance the budget deficit. In contrast, in The Gambia, Guinea, Ivory Coast, Mali, and Senegal, there is substantial recourse to the central bank by deposit money banks. To the extent that these credits are seasonal, such as crop financing, central bank accommodation is no doubt necessary. However, in most of these countries, nonseasonal advances by the central bank have become more and more important in recent years. In The Gambia, for example, nonseasonal credits increased from 6 per cent of total advances to commercial banks in December 1977 to 43 per cent in December 1980.

TABLE 2. SELECTED WEST AFRICAN COUNTRIES: RATIO OF GOVERNMENT INVESTMENT TO TOTAL INVESTMENT, 1976–80

(In per cent)

	1976	1977	1978	1979	1980
Cape Verde	...	92.4	79.2	82.4	...
The Gambia[1]	46.7	76.0	86.2	81.5	65.3
Ghana[2]	66.0	63.5	55.7	58.5	...
Guinea	70.7	58.0	65.6	53.4	60.7
Guinea-Bissau	37.0	47.3	72.5	73.6	...
Ivory Coast	69.8	75.7	77.9	81.2	66.7
Liberia[2]	50.0	41.2	69.4	76.1	48.0
Mali	...	...	...	...	...
Senegal	...	54.7	56.2	58.1	...
Sierra Leone[2]	51.4	43.6	33.0	...	...

Sources: Data provided by the national authorities.
[1]Fiscal year ended in June.
[2]Capital expenditures for the fiscal year as a per cent of the total investment on a calendar year basis.

In most West African countries, traditional moneylenders are an important complement to the organized financial markets. These moneylenders provide financial services to the rural areas and to some segments of the urban population who do not have access to the organized financial system. High administrative costs and risks associated with the handling of the small loans typically required by these sectors make them unprofitable to the organized financial sector. These informal markets charge interest rates substantially in excess of the maximum lending rates allowed on loans by the organized markets. For example, in Sierra Leone, unorganized market interest rates on small loans have been reported to be, on occasion, between 20 and 25 per cent a month, which is far in excess of even annual rates charged by deposit money banks.

In a large number of West African countries where foreign participation in the financial system is important, there is a tendency for the government-owned bank to cater to the nonfinancial public enterprises, while the foreign-owned banks deal with the foreign-owned firms. These foreign-owned banks also tend to concentrate their activities in the financing of export-import operations, while showing only marginal interest in financing other ventures. The reason for this preference is partly historical, since

TABLE 3. SELECTED WEST AFRICAN COUNTRIES: CENTRAL BANK AS PRIMARY SOURCE OF LOANABLE FUNDS, 1979

(In per cent, end of period)

	Change in Central Bank Net Claims on Government[1]	Central Bank Advances and Rediscounts to Deposit Money Banks[2]	Central Bank Credits to Economy[3]
Cape Verde[4]	100.0	...	100.0
The Gambia	149.0	40.6	56.9
Ghana	46.3	—	75.3
Guinea	[5]	21.7	94.3
Guinea-Bissau[4]	100.0	...	100.0
Ivory Coast	23.5	24.6	32.3
Liberia	111.6	0.8	25.1
Mali	50.0	61.9	76.6
Senegal	[6]	32.2	37.0
Sierra Leone	87.7	—	54.7

Sources: *International Financial Statistics;* and data provided by the national authorities.

[1]As a per cent of domestic budget financing.

[2]As a per cent of total credit extended by the deposit money banks.

[3]As a per cent of total credits extended by the banking system.

[4]In Cape Verde and Guinea-Bissau, the central bank also operates as the only deposit money bank.

[5]There is a budgetary surplus.

[6]Negative.

most of these banks were established especially for this purpose, but partly also because these operations tend to carry much less risk than other types of financing. Besides, these operations permit higher effective yields even when there are interest rate ceilings, because fees can be charged on such operations as the opening of letters of credit and foreign exchange conversions.

Finally, domestic savings in general, but financial savings in particular, which are already low, have been declining in most countries in recent years. Although the available data is scanty and not very reliable, gross domestic savings is believed to be negative in Cape Verde, The Gambia, and Guinea-Bissau. It is also below 10 per cent in Ghana, Mali, Senegal, and Sierra Leone. Data on financial savings, defined as change in broad money (M2), are provided in Table 4. During the period 1975–79, the

TABLE 4. SELECTED WEST AFRICAN COUNTRIES: RATIO OF FINANCIAL SAVINGS[1] TO GROSS DOMESTIC PRODUCT, 1975–79

(In per cent)

	1975	1976	1977	1978	1979
Cape Verde	14.1	18.1	26.5	12.8	13.5
The Gambia[2]	6.8	6.0	4.5	5.1	−0.5
Ghana	7.2	7.9	9.9	10.5	2.9
Guinea	...	−1.1	−6.7	−0.8	3.8
Guinea-Bissau	4.6	3.5	5.2	8.5	3.6
Ivory Coast	2.6	9.4	11.4	3.2	2.4
Liberia	−0.1	5.5	2.0	3.4	0.9
Mali	4.1	2.7	3.3	5.1	...
Senegal	1.9	6.1	3.5	5.5	1.9
Sierra Leone	0.6	1.9	3.5	4.8	4.8

Source: *International Financial Statistics.*
[1]Defined as change in broad money (M2).
[2]Year ended in June.

average ratio of financial savings to gross domestic product (GDP) varied between a minimum of 2 per cent for Liberia and a maximum of 17 per cent for Cape Verde, with 50 per cent of the countries below 4 per cent.[1]

II. Interest Rate Policies in the 1970s

The objectives of the low interest rate policies followed by many developing countries, and in particular by the West African countries studied here, although seldom stated clearly, tend to be linked to three considerations: (a) the desire to increase the level of investment; (b) the desire to improve the allocation of investment among sectors; and (c) the desire to keep financial costs down so as to avoid the possible inflationary effects of interest rate liberalization. Before analyzing the interest rate structures that resulted from the interest rate policies followed by the West African countries over the 1970s, it might be useful to examine

[1]The extremely low ratio of financial savings to GDP in Liberia might be due partly to an underestimation of the U.S. banknotes circulating in the country. However, even correcting for that, the ratio of financial savings to GDP would undoubtedly remain low.

whether, on theoretical grounds, one should expect these objectives to be compatible with the policies employed.

The belief that low interest rates stimulate investment and growth has been vigorously attacked in the economic literature (McKinnon, 1973; Shaw, 1973). It has been shown that, if real interest rates are reduced below market equilibrium levels, demand for investment will no doubt increase, but actual investment will, in fact, decrease, since at low interest rates insufficient savings will be generated to finance these investments. Moreover, the excess demand for investment will require the rationing of the available funds among all competing investors who are willing to borrow at the depressed rate. Where there is rationing and controlled lending rates, it is unlikely that financial intermediaries will choose to provide funds according to a ranking of rates of return on investment. Most likely, other factors, such as the capacity to provide collateral and political influence, will also play an important part in the financial intermediaries' decisions. Consequently, a policy of low interest rates will not only inhibit investment but will also reduce the average rate of return on investment to levels below the maximum attainable rate.

Attempts to improve the allocation of resources are also an important factor behind the interest rate policies followed in West Africa. A large proportion of the credit extended to the private sector represents import financing, while only a small portion goes to finance the expansion of the productive capacity of the country. The desire to change the allocation of credit among sectors of the economy has resulted in the introduction of selective credit controls in almost all West African countries (Table 5). Since these allocative changes were implemented, for the most part, by reducing interest rates charged on loans to preferred sectors, they tended to pressure average lending rates downward, sometimes to negative real levels. In many cases, lowered lending rates were made acceptable to the deposit money banks by providing special refinancing at the central bank, which led to money creation and therefore inflation. Moreover, as lending rates were kept stable for extended periods, all real lending rates were reduced below optimum levels by price increases. This is not to imply that the case for the use of interest rate differentials as a means to influence resource allocation is always weak. However, widespread use of this policy might not be advisable, especially because of the difficulties created by the fungibility of money in ensuring that the funds are in fact used for their original purposes (Johnson, 1975; Khatkhate and Villanueva, 1978).

TABLE 5. SELECTED WEST AFRICAN COUNTRIES: SECTORAL CREDIT ALLOCATION MEASURES

	Quantitative Sectoral Limits or Guidelines	Preferential Interest Rates	Special Rediscount Facilities	Specialized Sectoral Banks
Cape Verde	No	Yes	No	No
The Gambia	No	Yes	Yes	No
Ghana	Yes	Yes	No	Yes
Guinea	No	Yes	Yes	Yes
Guinea-Bissau	No	No	No	No
Ivory Coast	No	Yes	Yes	Yes
Liberia	No	No	No	Yes
Mali	Yes	Yes	Yes	No
Senegal	No	Yes	Yes	Yes
Sierra Leone	No	No	No	No

The third objective often mentioned in defense of low interest rate policies is the cost of liberalization. There is no doubt that there will be some short-term costs involved in interest rate liberalization. However, the direction of these effects is a complex empirical issue that cannot be resolved on a priori grounds. Nevertheless, the possible inflationary effects of interest rate liberalization seem to have been overplayed. Available estimates of the ratio between financial costs and total production costs indicate that they seldom exceed 10 per cent. Thus, the direct effect of an increase in interest rates on production costs is likely to be small, and even this small increase cannot be expected to be completely passed on to consumers. Moreover, an increase in interest rates is likely to reduce the hoarding of goods, thus increasing aggregate supply. Finally, the medium-run effect of an interest rate increase will no doubt be a reduction in inflation, since it will tend to depress aggregate demand to the level of aggregate supply by eliminating the excess demand for investment.

In none of the West African countries selected for this study was the interest rate policy actively used as a major instrument of monetary policy. The West African countries have relied primarily on control of rediscounting (Ivory Coast, Mali, and Senegal),

on quantitative credit controls (Cape Verde, Ghana, and Sierra Leone), or on simple moral suasion (The Gambia and Liberia) for control of the money supply. In Guinea, up to 1978, monetary expansion was controlled by fiscal means, since the central government was generating large surpluses that were deposited at the central bank.

Because in the majority of West African countries the public sector was a major borrower during most of the 1970s, monetary policies have in general been accommodating and have only become more restrictive under the pressures from external imbalances and inflationary tendencies, which have required stabilization programs in several of these countries.

In many West African countries, the need to provide for the credit requirements of the public sector while at the same time curtailing, to the greatest extent possible, the increase in the money supply has forced the authorities to crowd out the private sector through the use of selective rediscounting, qualitative credit controls, or moral suasion. This type of crowding out was very clear in Ghana, where, during the period 1970–79, real credit to the private sector declined by about 66 per cent. Such crowding out also took place in other West African countries where net claims on the public sector tended to grow more rapidly than domestic credit. Interest rate increases were not used to provide more incentives to the holding of government debt chiefly because this would imply increases in the servicing of the debt, which most governments felt they could ill afford.

At the beginning of the 1970s, interest rates were controlled in all countries in the sample, although in a number of them the regulations were not effective either because market rates were below the ceiling or because the limits were being circumvented by the commercial banks. Changes in interest rate regulations were infrequent, generally no more than two during the period; only in Sierra Leone were the changes more frequent. Moreover, interest rate changes were always modest in size and often would take place only after the stabilization of the economy had become the overriding concern of the authorities. It is interesting to note that, as a rule, interest rate changes, when introduced, seldom had as their primary objective the correction of possible misallocation of resources or the increase in the average return on investment. Instead, interest rate increases were normally used as an additional measure of monetary control.

Mali, Guinea, and The Gambia had only one interest rate change. Mali altered its interest rates in 1977 to bring them more

in line with the rates prevailing in the member countries of the Banque Centrale des Etats de l'Afrique de l'Ouest (BCEAO). This was viewed as a preparatory step for a possible return of Mali to the BCEAO. Although lending rates became comparable to the prevailing rates in the BCEAO, both rediscount and deposit rates remained below BCEAO levels. Moreover, since 1977 the BCEAO rates have increased, while Malian rates have remained unchanged.

Guinea revised its interest rates in 1978, with the stated objective of using them to control credit and to increase the efficiency of the economy. The rediscount rate is only 2.5 per cent, and in a few instances in the recent past the Banque Guinéenne du Commerce Extérieur has borrowed from its correspondents at rates ranging from 12 to 14 per cent to on-lend to parastatals at no more than 7.5 per cent.

In The Gambia, the primary objective of the 1980 interest rate increase was the need to control credit expansion for balance of payments reasons. However, another important consideration was the existence of large amounts of CFA francs circulating in the economy side by side with the domestic currency, the dalasi. By increasing deposit rates, the authorities also hoped to expand the volume of CFA francs converted into dalasis through the banking system, thus strengthening their control over domestic liquidity and the balance of payments.

Interest rate policies in the BCEAO countries have the added complexity that they have to be identical for all countries in the West African Monetary Union lest there be a substantial switch of funds in response to interest arbitrage among the member countries. This could create problems because different countries might feel differently about the objectives and effects of an interest rate change. This means that the BCEAO could respond through interest rate adjustments only when there were large interest rate differentials between France and the BCEAO that affected all member countries.

Interest rates were increased in the BCEAO countries in 1975 and again in 1980. The 1975 reform included not only interest rate increases but also the establishment of an interbank call market. The main objective of this reform was to prevent excessive interest rate differentials from pulling funds out of the BCEAO area and to provide profitable employment for the banks' surplus funds, which had been previously invested abroad. Even after the 1975 increase, the interest rate differential vis-à-vis France was still

significant. In Ivory Coast, both in 1976 and in 1977, the operations of the deposit money banks resulted in net outflows of funds from the country. Efforts by the BCEAO to limit refinancing resulted in some pressure on the commercial banks at the end of 1978 and again in 1979. To meet their prior commitments to their customers, some banks were forced to borrow abroad. However, due to the interest rate differential, this borrowing abroad had a negative effect on the banks' profit margins, and foreign borrowing by commercial banks was significantly reduced in 1980, exerting pressure on the liquidity position of several banks. Interest rates were increased in 1980 partly to alleviate this problem and partly in response to further interest rate increases in the world markets, particularly in France. On the other hand, in Senegal, despite the interest rate differentials, the deposit money banks as a whole tended to be net borrowers from abroad during the period 1975–80. A possible explanation for the different behavior of banks in Ivory Coast and Senegal was the fact that inflation rates in Senegal had been sufficiently low to produce positive real deposit rates in some years and positive real lending rates in all years. Also, the financial system of Ivory Coast, being more developed than that of Senegal, might react more swiftly to economic signals.

In Liberia, given the use of the U.S. dollar as currency, there is very little scope for monetary policy and even less for an independent interest rate policy. Prior to December 1978, attempts by the Liberian authorities to maintain ceilings on lending rates simply reinforced, for the most part, the already strong risk-averse behavior of the deposit money banks, providing them with an additional incentive to place their funds abroad. Despite these ceilings, Liberian lending rates tended to move in tandem with New York rates, sometimes in defiance of legal limits. Thus, during the period 1976–80, Liberian overdraft rates remained 3–4 percentage points above the New York prime rate. Since 1978, balance of payments problems have forced the Liberian authorities to take measures to increase the inflow of funds. In December 1978, ceilings on lending rates were lifted completely, and floors on deposit rates were increased above the levels prevailing in New York. Moreover, the charge on outward remittances on account of commercial banks was also increased. Finally, in January 1979, the Liberian authorities introduced a credit guarantee scheme under which the National Bank guarantees two thirds of the amount of each eligible loan by financial institutions. These

measures contributed to a decline in the net foreign asset position of the commercial banks from $21 million in December 1976 to minus $32 million in December 1980.

Ghana also changed its interest rates twice: in 1975 and in 1978. The stated objectives of Ghanaian monetary policy in 1975 were to improve the allocation of financial resources, to strengthen the balance of payments, and to mitigate domestic inflation. However, this was to be achieved basically through quantitative credit limits. Thus, the 1975 interest rate change was only a secondary measure taken in the context of a package of monetary measures introduced with the 1975/76 budget. Moreover, since quantitative credit ceilings were also tightened at that time, creating excess liquidity in the banking system, some banks took steps to discourage large time deposits and, thus, to reduce the positive effects of the interest rate increase on savings mobilization. As inflation rates continued to increase in the following years, real interest rates remained substantially negative despite the 1975 adjustment. The combination of a sentiment that the 1975 interest rate change had failed to produce beneficial results and the large financing needs of the public sector became an effective deterrent to further interest rate changes until 1978. Given the highly negative interest rates and the commercial banks' continued reluctance to accept interest-bearing deposits during the period 1975–78, the public increasingly shifted from holding financial assets to holding real assets, especially staple commodities. Partly to reverse this trend and partly as a secondary measure of credit control, the interest rates in Ghana were again raised in September 1978, with results similar to the previous increase. Excess liquidity continued to be important not only because of quantitative credit ceilings but also because the maximum interest rate permitted by law still did not seem to compensate the banking system for the risks involved in expanding its lending operations. As a result, the commercial banks continued to discourage savings deposits by not paying interest on deposits above ₵10,000 and refusing to open new time and savings deposit accounts.

Among West African countries, Sierra Leone is the only one where interest rate changes have occurred with some frequency. This is somewhat surprising, since the monetary policy of the Bank of Sierra Leone was basically passive up to 1979, using mostly moral suasion to attain its objectives. The 1975 and 1976 interest rate increases seemed to have been directed partly at savings mobilization and partly at providing incentives to the commercial banks to borrow abroad and to help redress a deterio-

rating external situation. However, these adjustments were too small, especially because interest rates in the London market had also increased substantially in 1975–76. Thus, real financial savings, defined as changes in M2 deflated by the consumer price index, remained depressed, returning to the 1973 level only by the end of 1977. Also, the commercial banks continued to place their surplus funds abroad, increasing their net foreign assets from minus Le 1.3 million in December 1974 to Le 11.9 million in December 1978. Faced with a deteriorating balance of payments situation and increasing inflation rates, the monetary policies of Sierra Leone became stricter in late 1977. Each bank was given quarterly ceilings on credit expansion, and the minimum liquidity ratio was raised to 40 per cent. Despite this high liquidity requirement, the banking system continued to have excess liquidity, for two reasons: (1) A large portion of commercial bank credit to the private sector went for the financing of imports. Lack of foreign exchange caused payments arrears, which both decreased the use of import financing and left the banks with large deposits which corresponded to the domestic counterpart of foreign import payments. (2) To the extent that commercial banks were not able to increase their lending to the private sector because of quantitative credit ceilings, they were forced to purchase treasury bills to invest their surplus funds. Since these bills were counted as liquid assets, they increased the liquidity of the banking system. The interest rate adjustment of 1979, as those in Ghana, was basically a second line of defense against credit expansion and not an attempt to correct financial repression. The same could not be said of the 1980 adjustment, which finally freed domestic lending rates from all regulations and made deposit rates just barely negative.

Finally, in Cape Verde and Guinea-Bissau, no interest rate adjustment has taken place since independence. In both these countries, the fact that the public sector is by far the major borrower has inhibited the use of interest rate policies.

III. Considerations for Appropriate Interest Rate Policies

The real interest rate is the reward for the sacrifice involved in holding rather than consuming wealth. If individuals optimize a stream of real consumption over time, and assuming the existence of only two periods, "future" and "present," the real interest rate can be defined as the relative price between future and present real consumption. In the absence of externalities, market imper-

fections, and government intervention, these relative prices will be determined in the financial markets as a function of time preferences, the real rate of return over costs, and the level of real income. Moreover, this equilibrium rate would be Pareto optimal. Consequently, policies aimed at creating a wedge between the prevailing real rate and the equilibrium market rate can be justified only as a means of correcting divergences from socially optimum rates arising from the existence of externalities, market imperfections, and so forth.

In many countries, open market operations are conducted so as to fix the nominal interest rate in order to control the rate of monetary expansion and, through changes in the growth of the money supply, to influence output, prices, and the balance of payments. This type of intervention is typically geared to short-term fine tuning of the economy. However, it generally results in temporary differentials between the prevailing real interest rates and the long-run equilibrium rate because prices adjust gradually to changes in the money supply. Thus, the macroeconomic objectives of interest rate policies can be long term or short term. While long-term objectives could include correcting the market interest rates for the existence of externalities and market imperfections, the short-term objectives relate to changes in economic activity and inflation, as well as control of capital flows.

In fully competitive financial markets with no externalities or distortions, the market interest rate ensures the optimality of the allocation of resources. However, in less developed countries, such markets are seldom found, and in consequence government intervention to guide interest rates to socially optimum levels is both justifiable and necessary. In less developed countries, the financial market distortions are often accentuated by intervention policies directed toward keeping the nominal interest rates unduly low and by the enlargement of government budget deficits financed by recourse to the banking system. For the latter, the central bank either accommodates the government's credit needs directly, or special incentives, such as tax incentives, are given to holders of government debt; at times, demand for government debt is created through the imposition of liquidity requirements on the financial institutions. If the central bank provides the required credit accommodation, there is a redistribution of the purchasing power in favor of the government, which, added to the concomitant increase in prices, tends to crowd out the private

sector. This is even more so when quantitative credit limits on private sector borrowing are simultaneously imposed to contain existing inflationary tendencies.[2]

Thus, the government should aim at reducing the imbalances resulting from recurrent operations and gradually move to limit its borrowing in financial markets to the financing of projects with rates of return greater or equal to the economywise social rate of return. To obtain these funds, the government should use instruments providing yields that are slightly lower than the economywise social rate of return. Although this basic rule is conceptually unambiguous, it has a limited practical relevance because the authorities do not normally know what the socially optimum interest rate is. It has been suggested that, since the economywise social rate of return is unknown, one should proceed to estimate the internal (social) rate of return on each proposed project, hoping that, over the years, the accumulated experience of comparing the internal rates of return on investments, and having to choose among them, will slowly evolve into a basic agreement among policymakers regarding the level of the cutoff internal rate of return (Dasgupta, Sen, and Marglin, 1972). This rate, when a consensus is finally developed, would be indicative of the socially optimum interest rate.

In the meantime, the government should gradually reduce its borrowings to a level that would permit it to borrow directly from the financial markets in competition with the private sector. Moreover, the government should ensure that the projects financed by these resources have rates of return at least comparable to those obtained on projects in the private sector.

Although the optimality of a given set of interest rates is difficult to determine, a preliminary assessment of the adequacy of these rates can be obtained by the use of a set of indicators. These indicators are given below, together with their relevance for selected West African countries.

POSITIVE REAL RATES, 1976–80

An important benchmark to be used in evaluating the adequacy of a given level of interest rates is to check whether these rates are

[2]Nevertheless, to the extent that the resources provided to the government finance expenditures with higher social rates of return than the crowded-out private sector expenditures, the substitution is clearly beneficial to the economy.

TABLE 6. SELECTED WEST AFRICAN COUNTRIES: REAL CENTRAL BANK DISCOUNT RATE, 1976–80

(In per cent, end of year)

	1976	1977	1978	1979	1980
Cape Verde	−1.8	−5.2	−7.3	−0.9	−4.0
The Gambia	−11.1	−6.4	−2.8	−0.1	−0.07
Ghana	−48.1	−108.4	−59.6	−40.9	−36.6
Guinea[1]	...	...	...	...	...
Guinea-Bissau	5.5	−11.5	−17.4	−22.5	...
Ivory Coast	−4.1	−19.4	−5.0	−8.6	−4.1
Liberia	...	...	...	...	...
Mali	−4.6	−19.0	−27.2	...	...
Senegal	6.9	−3.3	4.5	−1.6	1.7
Sierra Leone	−9.2	−0.4	−2.9	−11.2	0.9

Sources: Data provided by the national authorities.
[1]There is no price data for Guinea. However, the national discount rate is low (2.5 per cent).

positive in real terms, where the relevant real rates are the ones obtained by using expected inflation rates (Chandavarkar, 1971; Khatkhate, 1972; Galbis, 1977). In equilibrium under perfect competition, one should expect the real interest rate on savings instruments to be positive; otherwise, there would be a tendency to substitute the hoarding of goods and self-investment for financial savings. Clearly, not all real interest rates on financial instruments need to be positive. In most countries, demand deposits (and currency holdings) do not pay interest. However, up to a point, the services and convenience resulting from the use of these deposits make the subjective return on these assets positive. Nevertheless, it is highly unlikely that a market-determined average real rate of return on savings instruments will remain negative for long periods. Thus, if the average real rate of return on savings instruments is negative, it creates prima facie evidence of financial repression. This obtains even more when real lending rates are negative.

During the 1970s negative interest rates were prevalent in West Africa (Tables 6, 7, and 8), and, despite the recent interest rate increases, they continue to be so.[3] Only Senegal, in certain years,

[3]Throughout this paper, real interest rates were obtained by subtracting the inflation rate, as given by the consumer price index, from the nominal interest rate. This can only be considered as a first approximation of the expected real rate.

TABLE 7. SELECTED WEST AFRICAN COUNTRIES: REAL SAVINGS DEPOSIT RATE, 1976–80

(In per cent, end of period)

	1976	1977	1978	1979	1980
Cape Verde[1]	−1.3	−4.7	−6.8	−0.4	−3.5
The Gambia	−13.8	−8.9	−5.2	−2.6	−1.8
Ghana	−48.6	−108.9	−61.1	−42.4	−38.1
Guinea[2]	...	...	...	...	...
Guinea-Bissau[3]	...	...	...	...	...
Ivory Coast	−6.6	−21.9	−7.5	−11.1	−7.1
Liberia	−0.6	−1.3	−0.3	−3.6	−5.8
Mali	−4.8	−21.0	−29.2	...	...
Senegal	4.4	−5.8	2.0	−4.1	−1.3
Sierra Leone	−10.2	−1.4	−3.9	−13.2	−1.1

Sources: Data provided by the national authorities.
[1]Time deposits; more than 12 months.
[2]There is no price data for Guinea.
[3]No interest is paid on deposits in Guinea-Bissau.

TABLE 8. SELECTED WEST AFRICAN COUNTRIES: REAL LENDING RATES, 1976–80

(In per cent, end of period)

	1976	1977	1978	1979	1980
Cape Verde[1]	−1.8	−5.2	−7.3	−0.9	−4.0
The Gambia[2]	−8.8	−3.6	0.4	3.2	4.8
Ghana	−43.6	−103.9	−54.6	−35.9	−31.6
Guinea[3]	...	...	...	...	...
Guinea-Bissau	5.5	−11.5	−17.4	−22.5	...
Ivory Coast[4]	0.9	−14.4	—	−3.6	−1.6
Liberia[5]	5.4	3.4	...	4.9	4.6
Mali[6]	4.9	−10.0	−18.2	...	...
Senegal[4]	11.9	1.7	9.5	3.4	6.7
Sierra Leone[7]	−2.2	6.6	4.1	−5.2	...

Sources: Data provided by the national authorities.
[1]Basic rate.
[2]Average lending rate.
[3]There is no price data for Guinea.
[4]Nonpriority sector (maximum).
[5]Overdrafts.
[6]Private enterprise, nonpriority sector.
[7]Maximum.

showed positive real rates for savings deposits and central bank discounts. Positive real lending rates were more common, but they tended to occur only in certain years and for particular types of loan. For example, real lending rates on loans to nonpriority sectors in Senegal were positive during the period 1976–80. However, interest rates on credits for crop and export financing, as well as for the storage of agricultural products, were negative in 1977 and 1979. Given the stability of the nominal rates, real rates tended to fluctuate with inflation. Countries with high inflation rates, such as Ghana, Guinea-Bissau, and Mali, have had negative real rates more frequently. It is necessary, however, to add a few caveats when using real positive rates as a guide for interest rate policies. First, when there are price controls, the calculated inflation rates, when used as guide for the setting of interest rates, are likely to result in unduly low nominal rates, with the consequent misallocation of resources. Second, the difference between expected and actual interest rates might be large when the economy is oscillating around its long-run growth path. Calculations of expected interest rates are difficult without long, consistent time series and even then are not always reliable. Third, the appropriate deflator of the interest rate is a broad-based price index that takes into account the prices of current consumption goods as well as the prices of assets that would produce future consumption goods (capital goods). The use of the more readily available consumer price index or GDP deflator might introduce biases in the calculation of the appropriate expected inflation rate (Brown and Santoni, 1981). Finally, taxation should also be taken into account when calculating expected real inflation rates (Tanzi, 1980). However, to the extent that information is limited, inflation rates derived on the basis of consumer price indices will give at least an approximate idea of the floor for nominal interest rates. In any case, other indicators will have to be used to better determine the appropriate interest rate level.

WORLD INTEREST RATES

It is often argued that interest rates, corrected for exchange rate expectations, should be higher in developing countries than in developed countries, since the latter have a more abundant supply of capital. Thus, interest rates in developing countries should be at least as high as those in the world markets. Unfortunately, the link between real interest rates and capital scarcity is much more

complex than is implicit in this argument. For one thing, real interest rates in the developed countries have failed to show a secular downward trend as a result of the growth of their capital stock. Second, "whatever empirical evidence there is also does not bear out that the rate of return to capital in less developed countries is higher on an average than in developed countries" (Khatkhate, 1980, p. 208).

Even if real interest rates in developing countries cannot be expected to always exceed those in developed countries, it is true that some consideration has to be given to world interest rates when assessing the appropriateness of interest rate levels in a given country. Although most developing countries have some form of control on capital movements, these capital controls are not always effective, resulting in different degrees of openness to capital movements. Consequently, a country's freedom to impose any given interest rate becomes somewhat limited, since the failure to take foreign interest rates into account is likely to result in destabilizing capital movements. The seriousness of this limitation varies with the degree of openness of the economy and with the type of exchange rate regimes followed by the authorities. Attention should be given to international flows of funds if (a) there are no capital controls, or if they are ineffective; (b) the currency is freely convertible; (c) the currency is widely accepted outside the country; (d) there is a thriving black market for foreign exchange; and (e) foreign firms have a large role in the domestic economy. The existence of any one of these factors or a combination thereof indicates a substantial degree of *de facto* openness in the economy. In these cases, the interest rate differential, after allowance is made for exchange rate expectations, should not be too large so as to avoid destabilizing capital movements. For this purpose, the relevant "world" interest rates are those of the countries to and from which capital movements are more likely to take place or with which the country concerned has close banking connections. Note also that if a country is hoping to attract foreign private capital flows, domestic rates should exceed world rates in order to provide incentives for the domestic borrowers to go abroad for funds. It is further worth noting that short-term differences of interest rates between the economy and the rest of the world are likely to be of substantially less importance than sustained differences over a number of years.

A number of the West African countries chosen in this study have open economies. This is clearly the case in Ivory Coast, Mali,

Liberia, and Senegal, where the institutional framework is such that the effectiveness of capital controls is substantially reduced. However, to a lesser extent, the same is true in other West African countries. In The Gambia, for example, close trade links with neighboring countries make it possible for large amounts of CFA francs to circulate side by side with the domestic currency, the dalasi. Since the CFA franc is widely accepted internationally because of its link to the French franc, this allows for a considerable degree of openness in the Gambian economy, even in the presence of capital controls.

In Liberia, the interest rate differential vis-à-vis New York seems to have been maintained relatively constant despite attempts by the Liberian authorities to place ceilings on lending rates. Given that since 1978 lending rates were freed while deposit rates were raised above the New York rates, interest rate differentials have now been neutralized as a source of capital outflows.

In contrast, both in the BCEAO countries and, even more seriously, in Mali, interest rate differentials vis-à-vis France point to the fact that West African interest rates remain excessively low. International comparisons of interest rates are difficult not only because of exchange rate expectations but also because it is not easy to find comparable rates in different countries. However, since the BCEAO countries have their exchange rates firmly pegged to the French franc, and since there is freedom of capital movement in the French franc area, a rough comparison of interest rates is presented in Table 9. The available evidence indicates that not only is there an interest rate differential against the BCEAO countries (and Mali) but that this differential tended to widen in 1979, requiring an adjustment in 1980. It is also important to note that in countries like Ivory Coast, which have a large expatriate population, the interest rate differentials affect the timing of salary transfers. Although a substantial part of these transfers will sooner or later take place irrespective of the interest rate differential, it might be advantageous to the exporting country to retain these "foreign savings" for as long as possible. The fact that the BCEAO savings rate has tended to lag behind the French rate has contributed to undesirable early remittances.

RATES OF RETURN ON INVESTMENTS

Rates of return on realized investments, if they are not self-investments, are generally expected to exceed the lending rate.

TABLE 9. INTEREST RATE COMPARISONS, 1976–80

(In per cent, end of period)

	1976	1977	1978	1979	1980
Lending rate[1]					
BCEAO countries	7.0	7.0	7.0	7.0	9.5
France	9.6	9.3	8.8	11.5	12.3
Mali	5.0	7.5	7.5	...	...
Central bank discount rate					
BCEAO countries	8.0	8.0	8.0	8.0	10.5
France	10.5	9.5	9.5	9.5	9.5
Mali	3.5	6.0	6.0	...	...
Savings rate					
BCEAO countries	5.5	5.5	5.5	5.5	7.5
France	6.5	6.5	6.5	7.5	7.5
Mali	2.9	4.0	4.0	...	...

Sources: Organization for Economic Cooperation and Development, *Financial Statistics;* and data provided by the national authorities.

[1]For the BCEAO and Mali, crop financing rate; for France, prime lending rate.

Thus, these rates of return can be used as a guide to determine the adequacy of the interest rate levels. The difficulty with this approach is that, since in most countries perfect mobility of factors of production does not exist and there are special constraints on new entries into the high-return sectors, there is not one economy-wise rate of return on investment but a spectrum of rates of return. Moreover, to the extent that there has been financial repression—real interest rates below equilibrium levels under perfect competition—some of the projects undertaken, although having rates of return above the actual lending rate, have rates of return below the competitive equilibrium rate. These facts have led to the suggestion that the lending interest rate be guided by the rate of return on the modern sector of the economy (Khatkhate, 1980). The problem with this approach is the definition of "modern" sector. The only definition consistent with the objective of setting real interest rates at levels close to socially optimum rates is one that defines a sector as being modern if the rate of return on investments in this sector exceeds the socially optimum rate, which is itself not known. Nevertheless, some guidance can be

TABLE 10. THE GAMBIA:
REPRESENTATIVE RATES OF RETURN, 1979

(In per cent)

Agriculture	16–19
Airport	12–15
Banjul-Serrekunda highway	40
Barrage	8
Distributive trade	20–30
Fisheries	18–20
Hotels	18–20
River wharves	25
Average lending rate	9.3

Source: Data provided by the Gambian authorities.

obtained by ranking the rates of return of different sectors and trying to infer which lending rate would cut off all clearly inefficient investment projects. This is equivalent to the procedure suggested for the government and can be used to help the authorities in their judgment of the socially optimum cutoff rate.[4] Perhaps more interesting is the comparison of the rate of return on potential investments with the lending rate. If a lack of financial resources seems to hamper the chances of the project's being implemented even if its rate of return substantially exceeds the prevailing lending rate, one should suspect that the lending rate is artificially low and is resulting in credit rationing. This is especially true if the rate of return on these potential projects also exceeds the rates of return on a number of the realized projects.

Comprehensive and well-ordered data on the rate of return on investment in West African countries are lacking, although there is some stray information for a few countries. In countries like The Gambia, Mali, and Senegal, rates of return on investment appear to be substantially higher than the maximum lending rates. Livestock, which is a traditional form of wealth holding in West Africa, is estimated to yield a return on capital in the 10–12 per cent range. Investment in real estate is also said to have high yields. Table 10 provides a few representative rates of return in The Gambia for 1979. As these rates tend to exceed lending rates,

[4]However, one should take into account short-term difficulties in given sectors that might temporarily depress the rates of return, even in the more efficient sectors.

moderate increases in lending rates are not likely to curtail investment but to lead to a shift from lower-yielding to higher-yielding projects. However, given the limited nature of the statistical information on internal rates of return on projects in West Africa, it is not possible to rely heavily on money rates of return on investment as a guide to the appropriate interest rate levels.

BORROWING AND LENDING RATES

In perfect competition equilibrium, the spread between lending rates and the average cost of loanable funds (that is, funds obtained by the financial intermediaries to on-lend) should be just enough to cover costs, risks, and "normal" profits. Large spreads, common in many developing countries, indicate a lack of competitiveness or government intervention in the financial markets. Assuming no government intervention, the market equilibrium rate will be somewhere between the borrowing rate and the lending rate. Government intervention in financial markets includes not only direct interest rate regulations but all regulations that affect the operating costs of the financial intermediaries, such as liquidity ratios, reserve requirements, and access to the rediscount window. These regulations may cause marked divergences between borrowing and lending rates far in excess of those that would have prevailed under a less regulated environment (Galbis, 1981; McKinnon, 1981). However, this is not to say that all regulations should be abolished. Some of these regulations fulfill perfectly legitimate objectives, such as avoiding failures of financial intermediaries. Nevertheless, the cost of regulations to the financial intermediaries is likely to be reflected in a larger spread between borrowing and lending rates and therefore should be taken into account when assessing the appropriateness of a given interest rate regime.

Despite interest rate regulations, spreads between average costs of funds and average lending rates are high in West Africa. For example, in The Gambia, the difference between the average lending rate and the average deposit rate is between 6 and 8 percentage points. Even in Guinea-Bissau, where lending rates are as low as 6.5 per cent, the bank spread is large because no interest is paid on deposits. These large spreads are due partly to the oligopolistic structure of the banking system. However, they also reflect the fact that interest rate regulation in West Africa favors large spreads because of the relative inefficiency of the domestic banks, which to a certain extent is a consequence of

the need to fill the vacuum created by the risk-averse behavior of the foreign-owned banks. Thus, oligopolistic profits by the foreign banks are tolerated to permit "normal" profits by the domestic banks. In all likelihood, straight liberalization, with the possible exception of Ivory Coast, is not likely to generate enough competition in the banking industry to force a narrowing down of the spreads. Thus, regulation of the spread between borrowing and lending rates is likely to be necessary to avoid bank-induced financial repression, as opposed to government-induced financial repression. Except for Liberia since 1978 and Sierra Leone since 1980, both lending and borrowing rates have been controlled in West African countries, and thus the interest rate spread cannot be used to gauge the adequacy of interest rates. In Liberia, although the spread is large and bank profits are high, the existing institutional setup precludes corrective actions by the authorities because they are bound to increase the incentives for the banks to invest abroad, defeating the basic objective of developing the domestic financial market. In Sierra Leone, it is still too early to know whether simple interest rate liberalization provides an acceptable structure of interest rates or if corrective measures will be necessary to control the borrowing-lending spread.

INTEREST RATES IN "INFORMAL" MARKETS

In many countries, interest rates in informal markets are substantially in excess of the rates prevalent in the organized financial system. It is sometimes suggested that this indicates the existence of financial repression and that as a consequence lending rates in the organized markets should be raised. It is doubtful, however, that interest rates prevailing in the informal markets could be used as a guide for the determination of the interest rate level in the organized market. Although by their intrinsic nature informal markets are unregulated, there is no evidence that they are more competitive than the organized market. Also, informal markets do handle high-risk loans and consequently require a higher premium to cover their expected losses by default (Wai, 1956; Bottomley, 1963; and Bhaduri, 1977). The fact that borrowers can be found at these high rates might mean that there are investment opportunities with high rates of return that have been rationed out by the organized financial system. However, it might also mean that rates of time preference in certain sectors of the population are extremely high, resulting in a strong credit demand for consumption purposes that in a thin market might result in unreason-

ably high interest rates. This second hypothesis is not an unlikely event in countries where income is very low and uncertain. For all these reasons, interest rates in informal markets would tend to indicate an approximate upper bound for interest rates in the organized market.

In summary, the appropriate interest rate level is likely to be in a range that has as its floor the expected inflation rate and as its ceiling the interest rate in the informal market. In most cases, this range can be further narrowed by using as the ceiling the rate of return on realized investment in the average-to-high-yield sectors of the economy.

If it is found on the basis of the criteria referred to in the foregoing that in any particular country the prevailing level of interest rates is inappropriate, then the question is how to attain the appropriate level of interest rates. Freeing the financial markets from all regulations is obviously not justified where externalities and an oligopolistic banking structure exist. It has been suggested that the savings deposit rate be used as the minimum basic rate and that all other rates be tied to it. The government would then intervene in the financial market by increasing the savings deposit rate and assessing its effects on the basis of criteria similar to those mentioned above (Galbis, 1981). However, the appropriateness of this and other possible management rules would depend on the institutional characteristics of each country.[5] For the purposes of this paper, it is sufficient to state that the results of the management rule chosen should be judged on the basis of the guidelines mentioned above.

III. Some Broad Conclusions

Although definitive conclusions in any single West African country should await a specific study of that country, there are

[5]An alternative, more market-oriented approach is for the government to fix the maximum spread between the average cost of funds to the financial intermediaries and their average earnings, while allowing them to set both lending and deposit rates. If the spread allowed by the authorities takes into account "normal" intermediation costs, risks, and profits (but not excessive monopolistic profits), the optimizing behavior of the financial intermediaries, even where there are oligopolistic structures, would tend to ensure an interest rate structure similar to the equilibrium rates under perfect competition. In principle, international comparisons could provide an initial idea of "normal" spreads. However, one should be careful when making international comparisons, since reserve requirements, portfolio regulation, and so forth, may vary from country to country.

strong indications from the foregoing general overview of a sample of ten countries that the prevailing policies of low and stable interest rates have resulted in an inappropriate structure of interest rates. Both in market economies and in centrally planned economies, it is extremely important to avoid distortions of relative prices, if only to ensure the optimum allocation of resources. For this, the interest rate reform will have to constitute an important component of any package of policy measures aimed at improving the performance of these economies. First, it should be well understood that lower interest rates do not provide any incentive for investment unless domestic savings are forthcoming. Second, real interest rates can hardly remain at negative levels if unproductive hoarding of goods is to be avoided. Third, interest rates, after allowing for exchange rate expectations, should not be set without due consideration of interest rate differentials vis-à-vis world financial markets. Fourth, whenever public sector dependence on the financial market is due largely to fiscal imbalance, the servicing requirements of the government debt become a major stumbling block in the path of interest rate reform. Thus, interest rate liberalization will have to go hand in hand with an improvement in the financial position of the government. Only after its borrowing requirements are reduced to manageable levels will the government be able to engage in a meaningful interest rate policy. This is especially true because of inflationary pressures that tend to result from fiscal imbalances. Fifth, in centrally planned economies, as well as in countries where the public sector is a major borrower, it is important that government projects funded by recourse to financial markets be made to pay interest rates commensurate with the social rates of return. In these countries, the calculation of internal rates of return for each project seems to be imperative if the policymakers are to make rational choices among competing projects. In market economies, the socially optimum rate might be assumed, as a first approximation, to be equal to the perfect competition equilibrium rate. However, given the oligopolistic structure of the banking system in most West African countries, one should not expect that by simply liberalizing interest rates optimum rates will be produced. Thus, interest rates will have to be managed so as to reduce the spread between borrowing and lending rates to "normal" levels while at the same time producing positive real interest rates.

Finally, external shocks as well as internal developments affect the conditions in which the economy is operating. This is particularly true in agricultural countries such as the West African coun-

tries, where climatic factors might be the main determinant of economic activity. Under those circumstances, and given that foreign interest rates also fluctuate considerably, it is desirable that interest rate management techniques be kept flexible.

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Potential of External Financial Markets to Create Money, Credit, and Inflation

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ONE OF THE MOST SIGNIFICANT institutional developments in financial intermediation during the past ten years has been the growth of external financial markets for intermediated credit. (See Table 1, which reproduces estimates by the Bank for International Settlements of the sources and uses of Eurocurrency funds from 1973 to 1980.) Notwithstanding initial attempts by national monetary authorities to discourage and regulate the growth of financial markets external to their jurisdiction, the past decade has been dominated by periods of rapid growth of these markets, interrupted only by short periods of consolidation. The primary incentive for the expansion of external financial markets has come from the increase in the opportunity cost of the noninterest-bearing reserves domestic banks are required to hold against their deposit liabilities, as well as from the reduction in the risk and cost of long-distance financial transactions.

There is little disagreement that the services provided by the external financial markets in the form of risk, maturity, and currency transformation, together with such financial innovations as syndication and floating rate credits, have resulted in international financial widening and deepening and have thereby enhanced the efficiency of the allocation of credit, domestically as well as internationally.[1] Doubts remain, however, as to whether the benefits generated by the continued growth of the external

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[1]See Gurley and Shaw (1960), Shaw (1973), and Kindleberger (1974).

markets are offset by the problems this growth creates. Two themes dominate among the various criticisms. First, national monetary authorities are uneasy about a presumed loss of autonomous control of monetary and credit aggregates and about the implied inflationary potential. Second, there are concerns about the prudential aspects of the growth of external depository financial intermediaries and the implications for the soundness of the international financial intermediation industry. In this paper, the inflationary potential of external financial markets is assessed and the existing empirical and theoretical literature that addresses this issue is reviewed.[2]

Section I examines the direct contribution to domestic inflation of money and credit created in external financial markets. The money and credit creating potential of external financial markets arises with the economies in base money that a transfer of reservable domestic deposits toward the nonreservable liabilities of external banks affords the banking system. The extent of such a potential is commonly thought to be determined by the magnitude of the equilibrium increase in the total external and domestic money or credit aggregates made possible by an initial shift of deposits to the external location, that is, the so-called multiplier effect.

In this paper, it is argued that neither the earlier Phillips (1920, Part IV) type of fixed coefficient or temporary equilibrium models[3] nor the Tobin (1963) type of portfolio equilibrium models of the money supply process[4] capture the money and credit creating potential of external financial markets. A partial equilibrium nature confines both types of model to an analysis of the effects of an exogenous transfer of domestic deposits to an external bank intermediary on money and credit aggregates.

However, domestic deposits are transferred to external banking intermediaries in response to reductions in the risk and transaction costs associated with external financial transactions.[5] While the literature on external financial markets has successfully ex-

[2]For a discussion of the prudential issues of external financial markets, see Folkerts-Landau (1982).

[3]Swoboda (1968), Friedman (1969), Carli (1971), Mayer (1971), and Willms (1976).

[4]Hewson and Sakakibara (1975), Crockett (1976), Freedman (1977), Swoboda (1980), and Johnston (1981).

[5]In addition, domestic monetary policy has altered the opportunity cost of domestic reserve requirements through variations in the nominal deposit rates.

plored the money and credit creating potential of a transfer of a $1 domestic deposit to an external financial market, it offers no insight into the determination of the rate or volume at which deposits are transferred, that is, the quantity to which the multiplier is to be applied. Particularly, since it can be shown that an initial shift of deposits to an external location will not result in a multiple expansion of money and credit, i.e., the external money multiplier is less than unity, we conclude that the rate at which the liabilities of domestic banks are shifted toward external financial markets is the more important determinant of the money and credit creating potential of external financial markets.[6]

While it can be shown that the external money multiplier is less than unity, it is not possible to derive similar quantitative bounds for the rate at which deposits are shifted toward external financial markets. Innovations in the technology of external financial transactions have contributed to a reduction in transaction costs, while extended lender-of-last-resort facilities and a better definition of the legal responsibilities of domestic banks toward their external subsidiaries have reduced the risk of externally issued deposit liabilities. Both developments have resulted in a sustained secular growth of external financial markets.

The contribution of the expansion in the liabilities of external depository intermediaries to domestic price inflation is determined by the growth of the portion of their monetary liabilities that is readily substitutable for the monetary liabilities of domestic intermediaries and is used in domestic transactions. Since the growth rates of the variously defined external monetary aggregates have exceeded the growth rates of their domestic counterparts, the combined total of a domestic and external aggregate has grown faster than the domestic aggregate. Under the assumption that the marginal velocities of the total monetary aggregate did not exceed the marginal velocity of the domestic monetary aggregate, one can arrive at an *ex post* estimate of the direct contribution of external financial markets to domestic inflation.

Section II evaluates the indirect inflationary potential of external financial markets, which arises from the possibility that the growth of external markets has made some types of monetary policy more inflationary. In particular, the choice of a growth rate for the monetary aggregate used as an intermediate target of

[6]The same criticism applies to the Tobin-Brainard (1963) analysis of the role of nonbank financial intermediaries.

monetary policy will be inflationary if it does not appropriately account for the monetary liabilities of external intermediaries. However, the growth of external financial markets has made the definition and measurement of the relevant money and credit aggregates much more difficult.

Furthermore, the external financial markets are presumed to have increased the mobility of international capital movements, as well as the substitutability of assets denominated in different currencies. This in turn will have resulted in increased exchange market intervention or increased exchange rate variability. In the presence of asymmetries in the attempts to sterilize the monetary effects of exchange market intervention or of asymmetries in the dynamics of domestic prices, increases in capital mobility will exert inflationary pressures.

I. Direct Contribution of External Financial Markets to Domestic Price Inflation

The external depository financial intermediary in the form of branches and wholly or partially owned subsidiaries of major national banks has emerged as the dominant institution, with time deposits and syndicated loans as the most popular financial instruments. The offshore bond market and the other direct offshore markets, such as the commercial paper market, are of little more importance now than they were ten years ago. Concerns about the inflationary potential of external financial markets had their origins in the disequilibrium models of the money and credit supply process, in which the growth and the composition of the liabilities of banks are constrained by the growth of the stock of base or reserve money. Since external depository financial intermediaries hold only minimal reserve balances with their domestic correspondents, their potential to increase the money and credit aggregates in external financial markets, through the creation of external substitutes for reservable domestic liabilities, appeared to be limitless.[7] The fact that periods of rapid growth of external financial markets tended to coincide with periods of high rates of price inflation provided the empirical evidence for such views. The more recent attempts at modeling the interactions between exter-

[7]Friedman (1969) and Carli (1971).

nal and domestic financial markets differ in such details as the number of different types of transactor and financial instrument and assumptions about exchange rate determination. Nevertheless, they are akin in spirit and yield similar conclusions. The structure of these models consists of the portfolio preferences of the nonbank public, domestic and external banks, and of the central banks in the domestic and external regions; wealth and balance sheet constraints; and asymmetric financial regulation in the form of reserve requirements on some classes of deposit in the regulated region. The quantities of central bank liabilities (i.e., high-powered money), together with a reserve requirement on domestic deposit liabilities, determine the size of the monetary aggregates and the price level. The essential factors that determine the equilibrium distribution of assets over the two regions and the equilibrium interest rates are the gross-substitute asset demand and supply functions and the asymmetric financial regulations.

The differences in the conclusions concerning the money and credit creating potential of the external financial markets, which emerge from these models, can be explained fully by the differences in the assumptions about the adjustment behavior of interest rates and quantities in the relevant financial markets. In particular, market disequilibrium models give rise to multiplier effects if the speed of adjustment of interest rates is lower than the speed of adjustment of quantities.[8] In the case at hand, the assumption of fixed or slowly adjusting interest rates in financial markets leads to the fixed-coefficient money and credit multipliers obtained in the analysis of an exogenous shift of domestic bank liabilities to an external market.

A review follows of the money and credit creating potential of external financial intermediaries in the temporary equilibrium models in which interest rates adjust slowly relative to the speed of adjustment of the quantities of financial assets demanded and supplied. In particular, the early literature on offshore financial markets assumed that asset demand and supply functions are infinitely elastic.[9] In this case, the amount of deposit liabilities is determined entirely by the reserve requirement and the volume of

[8]In aggregative Keynesian models, for example, the assumption of a fixed price level gives rise to income and employment multipliers. See Barro and Grossman (1971) and Benassy (1975).

[9]See Willms (1976) for a complete treatment of models of this type.

central bank liabilities. The uncontrolled external intermediary holds reserves in the form of demand deposits with a domestic correspondent bank in the amount of $k_e(ED)$, where k_e is the ratio of the reserves *(ER)* held by the external intermediary against its nonbank deposits *(ED)*. Only a fraction of the loans made by external intermediaries is redeposited with external intermediaries; the remainder is leaked back to the domestic intermediaries. This fraction is assumed to be approximated by the ratio of external deposits to the sum total of external and domestic demand deposit liabilities, that is, $g = \frac{ED}{DD + ED}$. An exogenous shift of domestic demand deposits in the amount of $\overline{\Delta ED}$ to the external intermediaries leads then to an expansion in external deposits of $\Delta ED = \frac{1}{1-(1-k_e)g}\overline{\Delta ED}$. The multiplier $m_e = \frac{1}{1-(1-k_e)g}$ can assume a minimum value of unity and has no extremum. Such an exogenous shift of deposits can originate from a change in depositors' evaluations of the risk associated with the liabilities of external intermediaries, as might occur when the intervention rules of the lenders of last resort change. A decrease in the transaction costs of international financial transactions also will produce a shift of deposits toward external intermediaries. Empirical investigations have sought to obtain estimates for g and k_e and thereby obtain values for m_e. Such calculations produced values for m_e ranging from 1.02 to 2.0, depending on the definition of reserves and the size of the Eurodollar market.[10]

A second method for estimating m_e attempts to identify *ex post* a reserve base for the Eurodollar market and to compare it with the total outstanding external liabilities to obtain a multiplier. The estimates obtained in this manner range from 2 to 18, depending on the definition of a reserve base and the size of the external market.[11] Since it is not possible to identify empirically the initial deposit shift to which to apply this multiplier, this method is not very useful.

[10]Swoboda (1968) and (1980), Klopstock (1968), Mayer (1971), and Lee (1973).

[11]Carli (1971) produced estimates of 2.3 to 5.5 for the period 1964–70; Fratianni and Savona (1973) estimate the multiplier to be 3.7; Makin (1972) obtained estimates ranging from 10.3 to 18.5.

It is possible to determine similar multipliers for other classes of deposit liability, once the ratios among other items in the external balance sheet and the equilibrium reserves applicable to such items are specified.

In the disequilibrium quantity-adjustment models, the exogenous shift of deposits from domestic to external intermediaries results in excess reserves onshore if the shifted deposits are reservable. The domestic intermediaries will expand loans and deposits until excess reserves are again fully utilized. Since the total stock of high-powered money is unchanged, the stock of onshore monetary liabilities will contract only by the amount of the correspondent balances held domestically by external intermediaries, that is, by $k_e(\Delta ED)$. Hence, the exogenous shift of reservable domestic deposits to external intermediaries will result in an expansion of total deposits (i.e., monetary assets) held by the nonbank public of $(1 - k_e)m_e ED = \Delta M$. Thus, the money creating potential of an exogenous shift of deposits from onshore to offshore intermediaries can be measured by M in the expression above.

The total amount of onshore and offshore deposits supported by the predetermined stock of central bank liabilities is then given by

$$M = DD + ED = \frac{1}{k_d(1 - g + k_e g)}R$$

where DD and ED are onshore and offshore demand deposits, k_d and k_e are onshore and offshore reserve ratios, and R is the amount of high-powered money.[12] The multiplier $m_T = \frac{1}{k_d(1 - (1 - k_e)g)}$ has a minimum value of unity and is unbounded. Since the deposit expansion multiplier in the absence of an offshore market is given by $m_d = \frac{1}{k_d}$, that is, $DD = \frac{1}{k_d}R$, it is observed that $m_T = m_d m_e$ and hence $\frac{m_T R - m_d R}{m_d R} = (m_e - 1)$ represents a once-and-for-all percentage increase of $m_d R$ in the monetary aggregate $M = DD + ED$ that can be achieved by economiz-

[12]This multiplier can be derived from the relations $M = DD + ED$; $r = k_d(DD + ER)$; $ER = k_e(ED)$; and $ED = g(DD + ED)$. It can be extended to include time deposits, leakages into currency, and differing reserve requirements for the different classes of deposit; all of these leakages would tend to reduce the money stock multiplier.

ing on high-powered money. Thus, (m_e-1) is a second measure of the money creating potential of the offshore markets. With the empirically plausible range of 0.02 to 0.08 for g and 0.01 for k_e, the external financial markets can bring about a 2 to 9 per cent once-and-for-all increase in the monetary aggregate consisting of domestic and external deposit liabilities.[13]

The disequilibrium analysis of the inflationary potential of external financial markets, described above, thus yields unambiguous analytical results under the assumption that in-period interest rate changes are absent, that is, demand and supply functions of financial assets are infinitely elastic.[14] However, the assumptions concerning the relative speed of adjustment of prices and quantities in financial markets, which define this adjustment process, are subject to doubt. The assumption that interest rates remain fixed or change more slowly than the quantities of financial assets demanded and supplied prevents offsetting changes in the composition of portfolios. For example, the domestic intermediaries are assumed to be able to lend the excess reserves that result from a shift of reservable deposits to an external location without inducing a change in loan and deposit rates. Such assumptions are justified only by the presence of imperfections in capital markets in the form of interest rate ceilings, imperfect information, or other price-adjustment costs. With the exception of interest rate ceilings, it is hard to find empirical evidence that supports the existence of such imperfections.

If interest rates vary so as to equate the supply and demand of financial assets, then it becomes necessary to determine the effects of interest rate changes on the composition of the portfolios of wealthowners and intermediaries. In the portfolio models that seek to incorporate such general equilibrium consideration, the portfolio behavior of wealthowners is captured in their demand for loans and supply of deposits functions. The demand for loans and the supply of deposits depend on market interest rates in the onshore and offshore markets and are now assumed to possess finite interest rate elasticities, and deposits as well as loans are assumed to be gross substitutes. All credit is intermediated, and the portfolio behavior of intermediaries is passive in the sense that

[13]See Mayer (1979) and Swoboda (1980). Willms (1976) estimates m_T to be 6 for the Eurodollar market.

[14]See Grandmont (1977) for a general discussion of this type of temporary-equilibrium methodology.

it is determined by their balance sheet constraint. Desired reserves, then, are a constant fraction of deposits, and the markup of loan rates over deposit rates is assumed to be constant.[15]

By applying comparative static methods, it is again possible to derive the equilibrium effect of an exogenous shift of reservable domestic deposits to an external region on the volume of deposit liabilities of external intermediaries. In particular, a shift of ΔED from onshore to offshore deposits will raise the equilibrium level of the offshore deposits by less than ΔED, that is, the initial deposit multiplier is less than unity. In the disequilibrium quantity-adjustment model, the offshore intermediaries were constrained from expanding deposits only by their desired reserve ratios and a fixed stock of base money. A flow of domestic deposits to an external region at constant interest rates led to a multiple expansion of external deposits. In the equilibrium model, the exogenous flow of domestic deposits to external intermediaries results in higher domestic market interest rates and lower interest rates in the external market. Hence, a fraction of ΔED returns to the onshore market.[16] Thus, the equilibrium increase in ED, the stock of offshore deposits, is less than ΔED, while the decrease in DD, the stock of onshore deposits, is also less than ΔED; onshore interest rates increase and offshore interest rates decrease. The total money stock, $M = DD + ED$, increases at most by ΔED. The money creating potential of the offshore markets in such general equilibrium models is, therefore, much less than in the disequilibrium models. As before, however, this expansion in M is due to the economies in high-powered money that the multitier banking system affords intermediaries.[17] Empirical estimates for the initial deposit multiplier in the equilibrium model range from 0.6 to 1.0,[18] and hence they are in accord with the upper bound derived analytically.

However, while the general equilibrium multistage banking models represent an improvement over the temporary equilibrium fixed-coefficient multiplier models, they still only characterize the money and credit potential of a one-time exogenous shift

[15]See Freedman (1977) and Henderson and Waldo (1980) for a typical specification of this type of financial equilibrium model.

[16]The size of this fraction depends on the interest elasticity of deposits and loans.

[17]The multitier banking model in the context of an equilibrium model of financial markets was first developed by Tobin and Brainard (1963).

[18]Hewson and Sakakibara (1975).

of deposits of a given size to an external intermediary. In the models described above, the size of the initial shift of deposits to external financial markets is given exogenously or is determined by the exogenously given interest elasticity parameters of the asset demand functions of nonbank wealthholders. To obtain an adequate assessment of the money and credit creating potential of external financial markets, it is necessary to investigate the determinants of the magnitude of the flow of domestic deposits to external locations. The possibility that an initial shift of deposits to an external location results in a multiple expansion of money and credit aggregates has been ruled out by the analyses reviewed above. Hence, the volume of domestic deposit liabilities that is moved to an external location in response to changes in incentives is much more important in determining the money and credit creating potential of external financial markets than the size of any external money or credit multiplier. It is, therefore, necessary to explore the portfolio adjustments of nonbank wealthholders and external intermediaries in response to changes in the transaction and risk costs of external transactions.

The set of financial instruments available to private wealthowners consists of the liabilities of domestic and external depository intermediaries and of the directly issued liabilities of domestic and external borrowers. Similarly, the financial deficit unit can borrow from domestic and external depository intermediaries and directly from domestic and external lenders. The risk and return characteristics of any particular financial asset are then dependent on the type of issuer (direct or intermediary), the location of the issuer (domestic or external), and the currency of denomination.

In particular, the depository intermediary will arrange its balance sheet so as to maximize its own market value subject to its investment opportunity set and its production technology. The risk and return characteristics of its deposit liabilities are then endogenously determined by the default risk of the intermediary and its expected profits. The default risk in turn is determined by the investment decisions of the intermediary, the extent of its open position on the term structure of interest rates (its maturity transformation), and by the possibility of lender-of-last-resort protection from a central bank.[19] The characteristics of the joint distribution of the return on the liabilities of the financial inter-

[19]Folkerts-Landau (1981 a).

mediaries and direct borrowers define the opportunity set for nonbank financial surplus units, and private wealthowners will select a portfolio that is mean-variance efficient with respect to opportunity set. Such a general equilibrium asset-pricing model will then yield equilibrium prices and quantities under the assumption that individuals select a mean-variance efficient portfolio and have the same *ex ante* beliefs about the expected returns and covariance structure of the assets in the opportunity set.[20] It is conjectured that such models generate an explicit equilibrium valuation formula in which the market value of financial assets is approximately equal to its expected return less a correction for its nondiversifiable risk and discounted by a risk-free interest rate.[21]

External intermediation and direct external investment can be included in such models of asset pricing by including the liabilities of external intermediaries and the liabilities of external direct borrowers in the portfolio opportunity set available to the individual lender. An external intermediary can offer a higher expected return on some types of asset, owing to net savings in production costs in international financial centers and to savings in regulatory costs. The risk characteristics of liabilities issued externally are affected by the possibility of access to a lender of last resort and the legal connection of the external intermediary to a domestic intermediary.[22]

The possibility of denominating the return on financial assets in different currencies introduces an important complication in asset market models. Returns on assets are measured in nominal accounting units, while preferences are defined over bundles of real goods. Hence, nominal returns must be deflated by a price index, and the holder of a nominal asset must be compensated for any uncertainty in the price index, that is, for purchasing power risk.[23] When the rates of exchange of various currencies are flexible, the change in the purchasing power of these currencies may differ. In this world, purchasing power parity and unencumbered capital flows are sufficient for the real commodity returns on a particular security to be the same for all residents in all countries. The nominal return on a given security will vary across countries because of changes in exchange rates, but these changes offset ex-

[20]Merton (1973), Mossin (1973), and Folkerts-Landau (1981 a).
[21]Mayshar (1979).
[22]Folkerts-Landau (1981 a).
[23]Fama and Farber (1979).

actly any changes in the purchasing power of different monies.[24] If the purchasing power parity condition does not hold, there is exchange rate uncertainty in addition to purchasing power uncertainty. Once the joint distribution of the changes in the exchange rate and the purchasing power is known, it is possible to derive an international portfolio opportunity set, and equilibrium prices of the available financial assets will take the same form as in the model restricted to domestically issued financial instruments. This type of asset-pricing model of international financial markets outlined above would have to be modified when restrictions on international investment are present. Such a model would, however, indicate approximately how the equilibrium price and the currency composition of a domestic or external financial asset are determined by the asset's expected rate of return and its nondiversifiable risk from various sources; and it also would reveal the amounts of funds invested in each asset.

Any changes in the determinants of the risk and return characteristics of domestic and external financial instruments, such as a reduction in the cost of some types of financial transaction, increased lender-of-last-resort protection, increases in default risk of borrowers, changes in purchasing power risk, and redistribution of financial wealth, will alter the domestic and external financial market equilibrium in accordance with the portfolio preference of nonbank wealthholders.

The past decade, for example, has witnessed secular changes in financial transaction technology and in the default risk of external depository intermediaries. The decline in the cost of long-distance financial transactions has permitted external depository intermediaries to offer a higher rate of return on their deposit liabilities. Increased lender-of-last-resort protection and a better definition of the legal responsibilities of domestic parents toward their external subsidiaries have lowered the risk associated with external deposit liabilities with more favorable risk-return characteristics,[25] resulting in a sustained secular growth of external deposits. Furthermore, the subsidy to external intermediaries that is implicit in

[24]Grauer, Litzenberger, and Stehle (1976).

[25]In Folkerts-Landau (1981 b), the size, risk, and allocation of liabilities to domestic and external markets of the depository intermediaries' balance sheet have been determined as a function of given rates of return in domestic and external markets, financial regulations, production costs, and the covariance characteristics of the joint distribution of returns on the assets in its choice set.

the extended lender-of-last-resort protection has given external banks a competitive advantage over directly issued external debt, resulting in a slower growth of the external bond markets. Also, the pattern of trade flows among oil exporting countries and the developed oil importing countries during the past decade has resulted in a redistribution of financial wealth toward oil exporting countries. The political risk associated with the liabilities of external intermediaries is presumed to be lower for nonresidents than for residents.

Thus, the secular changes in risk and transaction costs, and the redistribution of financial wealth, have caused adjustments in the portfolios of nonbank wealthowners and in the portfolios of domestic and external financial intermediaries that have resulted in a secular growth of the liabilities of external financial intermediaries. The equilibrium increase in the stock of liabilities of external intermediaries and the changes in their composition are determined along the lines of the general equilibrium financial markets model described above.

While it is possible to establish analytical limits on the expansion possibility of the external financial markets owing to an exogenous shift of deposits, as in the portfolio equilibrium banking model, it is not possible to establish similar bounds on the rate at which deposits move toward external intermediaries. This movement is determined by the rate of technological innovations in the financial transaction technology, the reduction in risk of external liabilities, and by the way in which the general financial market equilibrium is established. Consequently, the implied money and credit potential of external financial markets that arises from the possibility of economizing on base money may be quite large. Recent developments such as the introduction of same-day settlement and international banking facilities in the United States are likely to contribute substantially to the flow of deposits to unreservable balance sheets, with an accompanying expansion of the total domestic and external monetary aggregates.

In addition to such secular changes in the stock of external deposits, there are cyclical changes brought about by changes in domestic monetary policy. The short-run increase in domestic interest rates arising from a restrictive monetary policy increases the opportunity cost of noninterest-bearing reserves held against domestic bank deposits. External intermediaries are thus able to offer liabilities with more favorable risk-return characteristics, and the equilibrium stock of external liabilities will increase.

However, when exchange rates are flexible or when the effects of exchange market intervention on the domestic money stock are offset by changes in the currency composition of the central bank assets, residents cannot directly evade a restrictive domestic monetary policy by increasing their net borrowing from external financial intermediaries.[26] The balance of payments constraint implies that any increase in net foreign borrowing has to be met by an increase in the deficit on the current account. But in the short run the current account is unresponsive to a restrictive monetary policy, and in the longer run a reduction in economic activity will reduce the deficit, forcing a reduction in net borrowing from abroad. Hence, the balance of payments constraint implies that a restrictive domestic monetary policy can be thwarted only if residents are willing to hold more liabilities of external banks, thereby increasing the ability of external banks to exploit the money and credit creating potential of base-money economies.

The conclusion that the possibility of economizing on high-powered money endowed the external financial markets with a significant inflationary potential is undermined by doubts about the appropriateness of including all or even some external liabilities in the domestic monetary aggregates. In the literature reviewed above, the inflationary potential of a shift of domestic deposits to external intermediaries is approximated by the increase in the total of domestic and external deposits. Since the returns on onshore and offshore deposits have different mean-variance and maturity characteristics, it is not immediately apparent how one would construct an appropriate monetary aggregate that would best measure the inflationary potential. As an extreme example, if it is found that all liabilities of external banks are to be excluded from domestic monetary aggregates, then the growth of external financial markets has no inflationary potential, while a maximum inflationary potential exists when all external deposits are to be counted as part of the domestic monetary aggregates.

The possibility of constructing an appropriate monetary aggregate from the liabilities of domestic and external banks remains largely unexplored.[27] It is nevertheless possible to use *ex post* data on domestic and external monetary aggregates to establish bounds on the potential contribution of the growth of external

[26]Dooley (1981) and (1982).
[27]Bryant (1980).

money and credit aggregates to domestic price inflation. A very narrow definition of a total monetary aggregate is arrived at by including only that part of the liabilities of external intermediaries that matures in less than eight days and that represents transactions among residents only (see Tables 2 and 3). For example, from 1975 to 1980, the growth of this portion of the Eurodollar balance sheet has been about twice as high as the growth in the U.S. monetary aggregate M1-B, the growth rate of which is used as an intermediate target of monetary policy. In particular, M1-B grew by 35 per cent during this period, while round-trip external liabilities of less than eight days' maturity grew by 74 per cent. However, since this class of external liability constituted less than 3 per cent of the total monetary aggregate, the growth in the total monetary aggregate exceeded the growth of M1-B by only 0.3 percentage point during 1975–80. The liabilities of external intermediaries that mature in less than eight days and that represent transactions among residents and of residents with nonresidents grew by 44 per cent over the period 1975–80. The growth of the corresponding total monetary aggregate exceeded the growth of M1-B by 2 percentage points.

Under the additional assumption that the marginal velocity of the combined monetary aggregate has not exceeded the marginal velocity of the narrow domestic monetary aggregate,[28] one can conclude that the potential direct contribution[29] by the external financial markets to the U.S. rate of inflation has been between 0.06 and 0.4 percentage points per annum during the period 1975–80. The relative insignificance of the direct contribution of the growth of external monetary aggregates to domestic price inflation has been due to the low ratio of external to domestic monetary aggregates. Further increases in this ratio will increase the direct contribution to domestic price inflation of a growth rate of external monetary aggregates in excess of the growth rate of domestic monetary aggregates.

It is frequently claimed that the inflationary potential of external financial markets may have been enhanced by the extensive

[28]For some empirical justification of this assumption, see Laidler (1980) and Dotsey, Englander, and Partland (1981–82).

[29]Similar estimates can be obtained under the same assumption for other countries. In each case, the direct contribution of the external financial markets to domestic rates of inflation was between 0.05 per cent and 0.6 per cent per annum during the period 1975–80.

maturity transformation in the balance sheets of external depository intermediaries (see Table 2). Net liquidity creation occurs when the intermediary's stock of liabilities of a given maturity exceeds its stock of assets of the same maturity. In particular, net liquidity creation is positive if the intermediary borrows short and lends long. The maturity transformation by external intermediaries became more pronounced in the latter half of the 1970s. There is, however, no analytical or empirical evidence that maturity transformation is in fact inflationary in the absence of changes in the size of monetary aggregates. Furthermore, by including gross liabilities of external banks,[30] instead of net liquidity creation, in the appropriate monetary aggregates, we obtained estimates of the inflationary contribution of the external markets that include the effects of a 100 per cent maturity transformation and hence overstate the true inflationary contribution of external financial markets.[31]

II. Indirect Inflationary Potential of External Financial Markets

It is recognized that external financial markets possess an important indirect inflationary potential through their effects on domestic monetary and exchange rate policies, in addition to the direct inflationary potential of base-money economies afforded by bank liabilities issued externally.

First, the internationalization of markets for bank liabilities has greatly increased the difficulties of defining and interpreting money and credit aggregates.[32] In such an environment, the choice of a narrow domestic monetary aggregate as the instrument of monetary policy may prove to be inflationary. During the past decade, it has been increasingly recognized that appropriately conducted monetary policy should seek to attain an intermediate target in the form of a predetermined rate of growth of some monetary aggregate, using bank reserves as the instrument of monetary policy. For example, the central banks of the Federal Republic of Germany, the United States, the United Kingdom,

[30]Gross liquidity creation is measured as the increase in banks' total liabilities.
[31]See Niehans and Hewson (1976).
[32]Dooley (1981).

and Canada have moved in this direction.[33] Such a monetary policy paradigm, however, requires a reliable definition of monetary aggregates that is empirically measurable. The internationalization of banking has made it necessary to decide whether the geographical location of bank liabilities should affect their inclusion in the monetary aggregate to be targeted.[34] The measurement problems encountered with a more comprehensive definition of the money stock, rather than analytical or empirical evidence, are responsible for the narrow definition.[35] Since a proportion of the balance sheet of external depository intermediaries constitutes a substitution of external for domestic financial intermediation, that is, it represents round-trip transactions among nonbank domestic transactors (see Table 3), such an exclusion results in an underestimation of the relevant money and credit aggregates to be targeted. A comprehensive measure of money and credit aggregates should not be affected by shifts of liabilities among different geographical locations, but only by risk, maturity, liquidity, and transaction characteristics of the financial asset included in the aggregate.

Moreover, the narrow domestic aggregates are not reliable proxies for the appropriate aggregates. The secular rate of growth of external financial markets, which has been due to the reduction in the risk associated with the deposits of external financial intermediaries and to the reduction in the transaction costs of international financial transactions,[36] has been in excess of the growth of the narrowly defined domestic aggregates. In addition, changes in monetary policy itself alter the relationship among domestic and external money and credit aggregates. The short-term increase in domestic deposit rates accompanying a restrictive monetary pol-

[33]See Organization for Economic Cooperation and Development (1979) for a survey of this trend. See also Bryant (1980).

[34]In addition to the geographical location of bank liabilities, it is necessary to decide on the type, currency of denomination, geographical location of owners, and issuing institution of the liabilities to be included in the appropriate monetary aggregates; but these decisions are independent of the location of bank liabilities.

[35]The measurement problem facing national monetary authorities is aggravated by the changes in the nationality of the banks issuing external liabilities denominated in a particular currency which occur owing to changes in relative competitiveness. For example, the imposition of a reserve requirement on dollar liabilities issued by external U.S. banks will result in an increase in dollar liabilities of external banks of other nationalities.

[36]Folkerts-Landau (1981 b).

icy increases the opportunity cost of reserve requirements against domestic bank liabilities. As a result, externally issued liabilities are substituted for domestic liabilities. Thus, secular growth and cyclical variation in the size of external financial markets change the ratio of domestic to externally issued bank liabilities. The secular growth of external markets in excess of the growth in domestic financial markets imparts an inflationary bias in monetary policies targeting narrowly defined domestic aggregates. This bias is strengthened by the cyclical variations of the size of external financial markets caused by changes in domestic monetary policy. The expansion of external financial markets during periods of restrictive monetary policy undermines the deflationary potential of such a policy. By issuing deposit liabilities externally, the domestic banking sector can exploit the base-money economies and is thus able to evade partially the effects of a monetary restriction. This effect is at least partly offset, however, by the decrease in the growth of external financial markets during periods of domestic monetary expansion.

Second, the external financial markets possess a significant inflationary potential when monetary authorities choose a domestic interest rate as an intermediate target of domestic monetary policy.[37] Under such a policy regime, the effect on domestic interest rates of a shift of domestic bank liabilities toward external depository intermediaries will be counteracted by the monetary authority, with an expansion in domestic base money. Consequently, any reduction in the risk, transaction, or regulation costs associated with the liabilities of external financial markets not only produces an increase in external money and credit aggregates but also results in an increase in domestic base money and hence an increase in domestic money and credit aggregates over their original level. The growth of domestic monetary aggregates is thus partly determined by the growth of the external financial markets. Hence, such a policy regime does not satisfy the necessary conditions for long-run stability in the expansion of domestic and external money and credit aggregates.[38]

Third, it is frequently presumed that the inflationary potential of the external financial markets is enhanced by the redepositing

[37]For example, U.S. monetary authorities set the federal funds rate as an intermediate target until 1979.

[38]The available empirical evidence to support this contention presumably is responsible for a shift in policy toward targeting monetary aggregates.

of dollar reserves in external markets by foreign central banks.[39] This presumption led in 1971 to an agreement among the central banks of eleven major countries to refrain from such practices.[40] It was argued that the deficits in the U.S. balance of payments caused foreign central banks to acquire dollar reserves, which were re-lent to the rest of the world when deposited in the external currency markets, thus requiring further intervention in the exchange markets by foreign central banks. Therefore, a deficit in the U.S. official settlements balance results in a multiple increase in the official settlements balance of the rest of the world, as well as a multiple increase in reserves. The monetary base of the rest of the world increases by the same multiple unless the effects of exchange market intervention in the monetary base is sterilized. This analysis depends crucially on the assumption that the external banks relend the newly deposited dollar reserves of foreign central banks to the rest of the world and on the assumption that the initial shift of official reserves from U.S. financial markets to the external market does not induce offsetting flows of deposits, such as might arise with the increase in domestic deposit rates and the decrease in external deposit rates accompanying the shift of official reserves. Such assumptions are, however, not warranted, since the external and domestic financial markets for dollar-denominated instruments are closely linked. Hence, the redepositing of official reserves by foreign central banks can be dismissed as a factor contributing to the inflationary potential of external financial markets.

Fourth, it has been argued that the increase in the mobility and volume of international capital flows, as well as the increase in the substitutability of similar financial assets denominated in different currencies, induced by the growth of the external financial markets, has exerted significant inflationary pressures on the affected economies.[41] The presence of asymmetries in the balance of payments policies of the capital importing and capital exporting countries or asymmetries in the response of domestic prices to exchange rate changes is a necessary condition for capital flows to be inflationary.

[39]This issue received widespread attention in the discussion of the inflationary potential of an increase in world reserves. See Heller (1976) and Dufey and Giddy (1978 a). See also Table 3.

[40]The Group of Ten countries and Switzerland.

[41]Mayer (1979), Stern, Makin, and Logue (1976), Brillembourg and Schadler (1979), and Miles (1978).

An increase in the volume of international capital flows that adds to external settlement imbalances implies that a larger change in the exchange rate or a larger volume of exchange market intervention is needed to restore equilibrium. The devaluation of the exchange rate in the capital exporting country will exert an expansionary effect, while the revaluation of the exchange rate in the capital importing country will exert a contractionary effect. The presence of downward rigidity in the price level of the capital exporting country, owing to long-term contracts, implies, then, that increased variability in the exchange rate may be inflationary. This argument is correct in the short run only; in the long run, such an inflationary tendency can be sustained only by such increases in the monetary aggregates as validate the price increase.

While there is ample casual empirical evidence that various countries have adopted an accommodating monetary policy in the presence of downwardly rigid prices, there is little or no econometric evidence to quantify this contention. More importantly, there is no substantive empirical evidence to support the hypothesis that the external financial markets have notably increased the mobility of international capital or the substitutability of financial assets in different currencies.[42]

Alternatively, asymmetries in the ability of national policy authorities to sterilize the effects of the increased exchange market intervention on the monetary aggregates can be inflationary. If, for example, the decrease in the monetary base of the capital exporting country is compensated, while the increase in the monetary base of the capital importing country is only partially sterilized, then any increase in capital flows will exert inflationary pressures. In particular, before the change in U.S. policy in November 1978, capital flows from the United States added to the official reserves of the receiving countries, which then reinvested these reserves in U.S. financial markets; that is, foreign central banks acquired the U.S. assets sold by U.S. residents in exchange for foreign currency assets. Hence, the U.S. monetary base remained unchanged. Since the increase in the monetary base of the receiving country was frequently not fully sterilized, such capital outflows may have been inflationary.

On the other hand, an increase in the volume of international capital flows that offsets external settlements imbalances implies that a smaller change in the exchange rate or a smaller volume of

[42]Stern, Makin, and Logue (1976) and Goldstein (1977).

exchange market intervention is required to restore equilibrium. It is argued, however, that it is more likely for deficit countries to employ contractionary policies to restore balance of payments equilibrium than it is for surplus countries to employ expansionary policies. In this case, increases in capital flows, which lessen the deflationary tendency of the adjustment process, are viewed as inflationary.[43]

III. Conclusions and Some General Observations

The synthesis and assessment of the existing theoretical and empirical literature on the money and credit creating potential of external financial markets and the inflationary implication of this potential, as presented above, permit some general conclusions.

Despite their popularity in the literature, one is forced to reject the early disequilibrium fixed-coefficient models of multistage banking systems, as well as their later extensions to general equilibrium portfolio models, as inadequate for an analysis of the money and credit creating potential of external financial markets. Models of this type are by design restricted to a partial equilibrium analysis of the expansion in money and credit aggregates made possible by the economies in base money that an exogenous initial shift of a given amount of reservable deposits to an external location affords the banking system.[44]

The money and credit creating potential of external financial markets attributable to base-money economies is, however, determined not so much by the size of the various multipliers, but more importantly by the magnitude of the deposit shifts toward external markets, that is, the quantity to which the multiplier is applied. In fact, the main conclusion that emerges from the existing literature is that the ultimate expansion in the total of domestic and external money and credit aggregates caused by an initial exogenous shift of bank liabilities to an unregulated region is smaller than the size of the initial shift of deposits. Hence, the volume of the initial deposit outflow, in response to a favorable change in the incentives to hold and issue external deposits, is the more important

[43]Mayer (1979).

[44]The equilibrium increase in a money or credit aggregate divided by the exogenous initial shift of bank liabilities yields the so-called Eurodollar multipliers.

determinant of the money and credit creating potential of external financial markets.

The volume of the initial deposit shifts is governed by the changes in the relative returns of domestic and external financial instruments. Such changes in relative yields in turn are due to the secular reduction in the risk associated with the liabilities of external intermediaries and the reduction in the cost of international financial transactions. Furthermore, changes in domestic monetary policy result in a cyclical variation in deposit rates, which alters the opportunity cost of holding noninterest-bearing required reserves against domestic bank liabilities and so contributes to variations in the relative yields of external and domestic bank liabilities.

The absence of analytical models of the secular and cyclical changes in the incentives to hold and issue external deposits, that is, models of the changes in risk and transaction costs of external deposits, and the lack of models of international financial market equilibrium capable of relating such changes to equilibrium market returns and quantities make it difficult to determine accurately the money and credit creating potential of the external financial market.

It is likely, however, that a better definition of the lender-of-last-resort role of central banks and of the legal responsibilities of a domestic parent bank toward its external subsidiary will result in a rapid reduction in the risk associated with external deposits. Also, the competitive reduction of financial regulations applicable to external banks, such as the establishment of the international banking facilities in the United States and of offshore centers in many other locations, may significantly reduce the cost of external banking. In either case, the growth of external intermediation is likely to accelerate further.

The implications of the money and credit creating potential of external financial markets for domestic price inflation have remained largely unexplored in the literature. The contribution of the expansion in the liabilities of external depository intermediaries to domestic price inflation is determined by the fraction of their monetary liabilities that is to be included in the domestic monetary aggregates. It is concluded here that at least that part of the monetary liabilities of external intermediaries that represents round-trip transactions among domestic residents should be included. If one assumes, in addition, that the marginal velocity of the combined monetary aggregate did not exceed the marginal

velocity of the narrow domestic monetary aggregate, then it is possible to obtain some upper bounds for the potential contribution of external financial markets to domestic price inflation. Historically, the growth rates of external money and credit aggregates have exceeded those of their domestic counterparts. As a result, the combined domestic and external aggregates have grown faster than the domestic aggregates. By assuming that the marginal velocity of the combined aggregates did not exceed that of the domestic aggregates, one can obtain some *ex post* estimates of the direct contribution of external financial markets to domestic inflation. For example, from 1975 to 1980, the growth rate of this portion of the Eurodollar balance sheet has been twice the growth rate in the U.S. monetary aggregate M1-B, which is used as an intermediate target of monetary policy. In accordance with this definition of a total monetary aggregate, it is concluded that the external financial markets have at most contributed directly 0.3 percentage point to domestic price inflation in the United States over the period 1975–80. If, however, the definition of a total monetary aggregate is extended to include that fraction of external monetary liabilities that represents transactions among residents and nonresidents, then the growth of the external monetary aggregate exceeded the growth of M1-B by 2 percentage points during the period 1975–80. Such an assumption about the relation between domestic and external monetary aggregates implies, then, that the contribution of the growth of external monetary aggregates to domestic price inflation in the United States may have been as high as 0.4 percentage point per annum from 1975 to 1980. Similar estimates can be obtained for other countries. Further increases in the ratio of external to domestic monetary aggregates could increase the direct contribution to domestic price inflation of a growth rate of external monetary aggregates in excess of the growth rate of domestic monetary aggregates.

The inflationary potential of the money and credit creating activities in the external financial markets is enhanced by the external depository financial intermediaries' practice of sustaining a greater degree of maturity transformation in their balance sheets than do the domestic depository financial intermediaries. While the maturity transformation in external balance sheets became more pronounced in the last half of the 1970s, there is no empirical evidence on its inflationary effect. However, by including the gross liabilities of external banks in the appropriate monetary aggregates, as was done above, instead of net external liquidity

creation, one obtains estimates of the inflationary potential of base-money economies inclusive of maturity transformation.

It is concluded, further, that the increase in the volume of international financial intermediation attributable to the more efficient matching of borrowing and lending units achieved in the external financial markets is by itself not inflationary. Under a flexible exchange rate regime, variations in the exchange rates and interest rates will ensure that the excess of the domestically originating aggregate supply over domestic absorption in the capital exporting countries is matched by an excess of investment over saving in the capital importing countries. In a fixed exchange rate regime, the central banks will alter the currency composition of their liabilities to offset any increases in private capital movements that are inconsistent with the given exchange rate.

The conclusion here is somewhat less sanguine with respect to the potential of external financial markets to add to domestic price inflation indirectly by influencing the conduct and effectiveness of domestic monetary policy. In particular, the growth of external financial intermediation has made the definition and interpretation of money and credit aggregates much more difficult. The questions concerning the inclusion of the liabilities of external intermediaries and the liabilities of resident foreign banks in the appropriate domestic money and credit aggregates remain largely unanswered. Furthermore, even if such questions can be resolved satisfactorily, the difficulties encountered in measuring the liabilities of external intermediaries, in particular of foreign intermediaries, remain.

The observed secular growth of the liabilities of external banks at a rate in excess of the rate of growth of domestic bank liabilities and the cyclical fluctuations in the volume of external liabilities caused by changes in domestic monetary policy together rule out the possibility of a stable quantitative relationship among the domestic and external money and credit aggregates. The failure to include external aggregates in the appropriate domestic money and credit aggregates thus implies that the traditional domestic money and credit aggregates are less reliable as intermediate targets of monetary policy. For example, any particular target rate of expansion of a domestic monetary aggregate will be more inflationary the greater the rate of growth of the appropriate external monetary liabilities. Since an increasing number of countries have adopted such a method of conducting monetary policy, this problem is of some importance.

Furthermore, it is concluded that an increase in the mobility of international capital flows or an increase in the substitutability of financial assets across currencies attributable to the growth in external financial markets may exert inflationary pressures. Any increase in international capital flows that increases external payments imbalances must be met by exchange market intervention or exchange rate changes. The source of the inflationary potential of increased capital flows is seen to originate from an asymmetry in the ability or willingness of monetary authorities to sterilize the changes in monetary aggregates brought about by exchange market intervention, as well as from the asymmetry in the contribution of exchange rate changes to domestic price inflation when prices are downwardly rigid. In particular, the proportion of the decrease in monetary aggregates that is sterilized in periods of net capital outflows is assumed to exceed the proportion of the increase in monetary aggregates that is sterilized in periods of net capital inflows. Alternatively, the exchange rate depreciation in the net capital exporting country is assumed to induce monetary authorities to expand monetary aggregates by more than they contract the aggregates during an exchange rate appreciation in periods of net capital inflows. Similarly, in the presence of downwardly rigid prices, the monetary authority is assumed to validate the price increases in the traded goods sector that arise with changes in the exchange rate.

While there is a good deal of casual empirical evidence that supports such assumptions about the conduct of monetary policy, there is little or no empirical evidence that the growth of external financial markets has notably increased the mobility of international capital or the substitutability of financial assets denominated in different currencies.

TABLE 1. ESTIMATED SOURCES AND USES OF EUROCURRENCY FUNDS[1]

(In billions of U.S. dollars)

End of Month	Reporting European Area		United States	Canada and Japan	Other Developed Countries	Eastern Europe[4]	Offshore Banking Centers[5]	OPEC Countries[6]	Other Developing Countries	Unallocated[7]	Total
	Total[2]	Of which nonbank[3]									
					USES						
1973 December	49.0	29.5	13.5	12.7	14.7	7.4	18.7	3.3	11.0	1.7	132.0
1974 December	61.5	41.3	18.2	18.2	20.4	10.1	26.7	3.5	15.7	2.7	177.0
1975 December	63.0	43.6	16.5	20.2	25.8	15.9	35.6	5.3	19.5	3.2	205.0
1976 December	74.4	51.5	18.2	21.6	33.0	20.8	40.8	9.6	24.7	3.9	247.0
1977 December	110.4	77.3	21.3	18.7	30.8	25.7	43.9	15.7	30.3	3.2	300.0
1978 December	139.5	94.5	24.6	24.6	34.7	31.4	55.0	24.3	40.1	2.8	377.0
1979 December	171.3	111.3	36.7	33.0	40.5	36.0	67.5	30.4	55.1	4.5	475.0
1980 December	216.4	143.7	39.7	45.1	52.1	38.9	73.0	33.8	71.0	5.0	575.0
					SOURCES						
1973 December	50.8	27.5	9.5	9.8	17.7	3.7	12.5	10.0	14.6	3.4	132.0
1974 December	67.8	37.1	11.9	8.7	18.5	5.1	17.8	29.1	15.5	2.6	177.0
1975 December	79.5	39.2	15.4	8.3	19.9	5.4	21.8	34.6	16.2	3.9	205.0
1976 December	86.7	45.5	18.8	10.5	21.3	6.4	30.1	45.2	21.3	6.7	247.0
1977 December	117.3	56.0	25.4	8.4	18.8	7.0	33.4	54.5	29.6	5.6	300.0
1978 December	144.5	70.1	37.0	13.0	26.2	8.8	45.4	54.7	39.8	7.6	377.0
1979 December	174.0	93.0	50.5	15.2	31.7	13.0	52.8	81.0	47.8	9.0	475.0
1980 December	211.0	124.3	59.7	22.1	33.5	12.8	68.0	109.8	46.6	11.5	575.0

Sources: Bank for International Settlements, *Annual Reports, 1973–80.*

[1]As from June 1979 a change has been made in estimating procedures, insofar as the partial netting out of interbank assets and liabilities, previously limited to the growth of reporting European banks' positions within their own area, has been extended to cover their positions vis-à-vis the United States, Canada, Japan, and the offshore centers. This change has become necessary as a result of the rapid growth of such positions, which suggests that the figures have been inflated to a substantial extent by circular flows of interbank funds between the reporting European area and these other market centers.

[2]Includes (a) under "Uses," the banks' conversions from foreign currency into domestic currency and foreign currency funds supplied by the reporting banks to the commercial banks of the country of issue of the currency in question (such as funds in deutsche mark deposited with German banks) and (b) under "Sources," deposits by official monetary institutions of the reporting area, the banks' conversions from domestic into foreign currency, and foreign currency funds obtained by the reporting banks from the banks in the country of issue of the currency in question (such as funds received in deusche mark from German banks).

[3]On the sources side, includes trustee funds to the extent that they are not reported as liabilities vis-à-vis nonbanks outside the reporting area by the Swiss banks themselves.

[4]Excluding positions of banks located in the Federal Republic of Germany vis-à-vis the German Democratic Republic.

[5]Bahamas, Barbados, Bermuda, Cayman Islands, Hong Kong, Lebanon, Liberia, Netherlands Antilles, Panama, Singapore, Vanuatu (formerly New Hebrides), and other British West Indies.

[6]Includes, in addition, Bahrain, Brunei, Oman, and Trinidad and Tobago.

[7]Including positions via-à-vis international institutions other than the Bank for International Settlements.

TABLE 2. MATURITY TRANSFORMATION IN EXTERNAL FINANCIAL MARKETS, NOVEMBER 1980

(In per cent)

	Assets	Liabilities
Less than eight days	9.6	37.8
Eight days to one month	9.4	22.9
One month to six months	17.2	33.6
Longer than six months	63.8	5.7
	100.0	100.0

Sources: Bank of England, *Quarterly Bulletin* (various issues); and data from U.K. and U.S. banks.

TABLE 3. TYPE OF DOLLAR-DENOMINATED TRANSACTION IN EXTERNAL FINANCIAL MARKETS

(In billions of U.S. dollars)

	Assets		Liabilities	
	1975	1980	1975	1980
Central banks	5.1	17.8	30.4	78.0
U.S. residents	6.7	11.7	8.3	42.0
Rest-of-world residents	78.6	189.1	41.3	90.8
	90.4	218.6	80.0	210.8

Source: Bank for International Settlements.

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Islam and Financial Intermediation

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THE PURPOSE OF THIS PAPER is to describe certain steps that have been taken toward the Islamization of the financial systems in Middle Eastern and Asian countries. It should be emphasized at the outset that conclusions based on such a study must of necessity be preliminary in nature. Theoretical discussion of the issues involved is at a relatively early stage among Islamic economists, and practical steps to change institutional structures have only just begun to be taken. Moreover, in preparing this paper, the author has used only English language sources.

In order to reconcile their financial systems with Islamic principles, a number of Moslem countries have undertaken efforts to abolish *Riba,*[1] which is the Arabic word for usury and interest. More precisely, *Riba* is defined as the *fixed* return for the use of money.[2] This paper begins with a brief description of the Islamic attitude toward interest and profit (Section I) and proceeds to analyze the workings of an Islamic banking system based on the profit-and-loss-sharing (PLS) principle (Section II). Section III discusses the possible impacts of such a system on the mobilization of savings, on the allocation of scarce resources through banks, on investments, and on the effectiveness of monetary policy. Some tentative conclusions are offered in Section IV.

The Islamization of the financial sector has to be seen as an integral part of an attempt to establish an ideal Islamic society based on the principle of social justice.[3] However, this paper will

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[1]Where Islamic terminology is employed in this paper, the terms are taken from the sources used. While many of these words are of Arabic origin, some may be from other languages (e.g., Urdu).

[2]See Ahmad (1952), p. 32.

[3]See Naqvi and others (1980). Another measure designed to achieve a more egalitarian economic order is the introduction of *Zakat,* a form of wealth tax.

be confined to a discussion of *Riba* and the impact of its abolition on the financial system. The issue of abolishing fixed interest rates was brought up at the Islamic Conference held in Jidda in 1973. Measures to Islamize the financial system have been introduced in such countries as Saudi Arabia, Kuwait, Sudan, the United Arab Emirates (U.A.E.), Bahrain, Jordan, Malaysia, and most notably Pakistan. Iran, though it apparently follows Islamic principles closely in other areas, has taken only limited steps toward Islamization of the financial sector.[4] In general, Islamization has consisted mainly in founding "Islamic banks," which operate without charging or paying fixed interest rates on loans or deposits. Islamic banks are usually exempt from taxation, but they have to pay *Zakat*, or wealth tax, in the form of a levy on capital. Assets of Islamic banks are immune from confiscation and nationalization. A list of Islamic institutions working on the PLS principle is given in Table 1 in the Appendix.

The most far-reaching experiments with the PLS system have been carried out in Pakistan, where the abolition of *Riba* is an objective of the State's constitution. The objective of the process under way in that country is not only gradually to phase out fixed interest payments but also to replace interest with equity participation arrangements that will allow incentives for savings and efficient resource allocation to be retained in a manner consistent with Islamic principles. Since January 1981, "interest-free counters" have been established in almost 6,600 branches of the five nationalized banks. Depositors still have the option of choosing between interest-bearing deposits and "interest-free" accounts. If they opt for the latter, depositors are entitled to share in the profits and losses of the investments financed by the banks. Because of the leading role of the Pakistani model in the Islamization of the financial system, this paper puts particular emphasis on the functioning of the "new" Pakistan banking system, although the experience of Islamic banks in other states will also be reviewed.

I. Islamic Attitude Toward Interest and Profit

Although the analysis of the Islamization of the financial system will focus on the economic, rather than on the religious, aspects, it is necessary to present a survey of Islamic views on interest and

[4]See Ali (1981 b), p. 86.

profits. One important Islamic commitment is the condemnation of usury. In various verses, the Holy Quran prohibits *al-Riba,* which can be translated as usury or interest.[5] However, the interpretation of the Quranic prohibition of *Riba* is controversial. *Riba* literally means an excess or addition.[6] In the pre-Islamic era, *Riba* referred to the then-prevailing practice of lending. The debtor had to pay a fixed amount above the principal to the creditor for the use of money loaned for a certain period. This additional amount, which could be more than double the principal sum due, was called *al-Riba.*[7]

The main controversy revolves around the question of whether the Quran prohibits usury but not interest or whether it prohibits the charging of interest altogether. The former, modernist view regards interest as legally prohibited when money is lent at exorbitantly high interest rates and thereby exploits the borrower.[8] According to this view, interest charges are permitted where they are used: (1) by the government to induce savings; (2) to finance trade; (3) as a form of punishment for debtors who have not fulfilled their obligations; and (4) for loans made to finance productive investments. It has also been suggested[9] that, in an inflationary environment, a system of indexing financial liabilities and claims to a price index need not be considered true interest, as this would not necessarily add to the real value of financial assets.

As opposed to this rather pragmatic viewpoint, the conservative view forbids every form of fixed interest.[10] It regards the levy of any fixed amount in excess of the principal lent as prohibited by the Quran. Since interest, however exorbitant or reasonable, is additional to the capital borrowed, it is a form of *Riba* and therefore does not comply with the Quran. Thus, *Riba,* or interest, is

[5]"Those that live on usury shall rise up before Allah like men whom Satan has demented by his touch; for they claim that usury is like trading. But Allah has permitted trading and forbidden usury," *The Koran,* translated by N. J. Dawood (Baltimore, Penguin Books, 3rd rev. ed., 1968), p. 354. Besides the Holy Quran, other religious sources prohibit usury. See Qureshi (1967), p. 42.

[6]Ahmad (1952), p. 24.

[7]Qureshi (1967), p. 44.

[8]For the modernist view, see Shawky El-Fangari (1979). This view is not greatly different from that held in western societies.

[9]Naqvi and others (1980).

[10]Orthodox views are expressed by Ahmad (1952), p. 24; Qureshi (1967), p. 100; Mannan (1970), p. 218.

defined as any predetermined fixed return for the use of money.[11] Therefore, it is irrelevant whether *Riba* relates to loans for consumption or productive purposes; whether the loans are personal or commercial; whether the borrower is the government, a private individual, or a company; and whether the rate of interest is high or low. Three main reasons are stated for this strict condemnation of *Riba* in Islam:[12]

(1) Interest or usury reinforces the tendency for wealth to accumulate in the hands of a few, and thereby diminishes man's concern for his fellow men.

(2) Islam does not allow gain from financial activity unless the beneficiary is also subject to the risk of potential loss; the legal guarantee of at least nominal interest would be viewed as guaranteed gain.

(3) Islam regards the accumulation of wealth through interest as selfish compared with accumulation through hard work and personal activity.

A fourth reason based on economic grounds rather than on the Quran is that interest rates hamper investment and employment.[13]

To date, specific measures taken toward the development of an Islamic financial system have generally aimed at the abolition of all forms of fixed nominal interest and have thus sidestepped possible questions about how to define acceptable levels of interest or systems of price indexation.[14] Although fixed rates are to be abolished, this does not mean that there will be no remuneration paid on capital. Profit making is generally accepted in an Islamic society unless such profits are unrestricted and abnormal[15]—that is, are derived from monopolies or cartels.

A major difference between profit sharing and lending at interest is that, in the latter case, the lender is less concerned with how

[11]Ahmad (1952), p. 32.

[12]See Cummings and others (1980), p. 32.

[13]See Ahmad (1952), p. 34. It may be noted that, in an economic sense, these objections to interest are directed against positive *real* rates of interest, rather than against nominal rates that simply compensate for price changes. Not surprisingly, religious texts rarely address this distinction directly.

[14]In the following discussion, the term Islamic banking system refers to one based on the orthodox view of *Riba*. The terms traditional banking system or non-Islamic banking system refer to western-style systems.

[15]Mannan (1970), p. 34.

the loan is used once it is authorized.[16] So long as the loan is secured and interest payments are made, the lender has no direct financial interest in whether the loan is used to yield revenues or for consumption. This contradicts the Islamic ideal of social justice, since the entrepreneur is forced to bear the uncertainties of profit and loss alone, even though he uses funds borrowed from others. Similarly, it would be regarded as unjust for the recipient of a loan to use borrowed capital to make disproportionately large returns.

In contrast to interest, profit is not predetermined and fixed, but is uncertain and variable, and may even be negative. Profits are residuals that reward entrepreneurs for undertaking risky investments. If the owner of capital participates in a venture by providing credit to the entrepreneur on a profit-and-loss-sharing basis, it is to be expected that he will be much more concerned with the use of his funds than if he lends them at fixed interest rates.[17]

This positive attitude toward profit makes possible a financial system that allows each participant to play an active role in the economic process. As long as profits and losses are shared among savers, investors, and financial institutions, such a financial system would comply with the Islamic principle of *Shirakat,* which means partnership or cooperation.[18] In Islamic finance, the technical name of partnership between the supplier and the user of capital is *Modaraba.* One or more subscribers of funds participate in a business with another individual or company that provides entrepreneurial skills.[19] Two conditions must be fulfilled for a joint venture to be a *Modaraba:* (1) the gross or net return on capital or entrepreneurship should not be predetermined, and (2) the partners should share not only profits but also losses in proportion to their shares in the enterprise.[20]

[16]This argument is put forward by Islamic theologians and economists. See Ahmad (1952), p. 197. However, it must be recognized that when a traditional bank provides finance to a borrower, it invariably inquires into the viability of the client and is concerned with how the loan proceeds will be used and whether the loan is secured adequately.

[17]Ahmad (1952), p. 197. Land rents are not forbidden by the Quran as long as tenants are not forced to pay fixed rents to the landlords. If the landowner and the tenant share the yield of land in "certain proportion," then this complies with Islamic principles (see Ahmad (1952), p. 33, and Mannan (1970), p. 153).

[18]Mannan (1970), p. 22.

[19]Uzair (1956), p. 49, footnote 2.

[20]Ali (1981 b), p. 83.

Revenues can be shared on a pro rata basis among the various units of production after deducting incurred expenses. The distribution of profit shares is determined by a bargaining process between the investor (borrower) and the bank and between the saver and the bank. In the juristic literature (*Fiqh*), various percentage distribution formulas are offered, ranging from 50 per cent of the profits for each party to 25 per cent for the supplier and 75 per cent for the user of capital.[21]

Summarizing the previous discussion, interest and profits as they are set forth in Islamic literature may be formalized as follows. Let P_0 denote the amount of principal lent to the borrower in period t_0 and P_1 the agreed amount of capital that has to be returned in t_1. If $P_1 > P_0$, then the difference between P_1 and P_0 is the additional amount (*Riba*), or interest in the orthodox Islamic sense

$$r = P_1 - P_0 \tag{1}$$

Profits and losses (PL) involve an element of uncertainty. Each partner in a *Modaraba* business is sharing an agreed proportion Φ of the expected difference between total revenues R and total cost C. Expected profits for a participant in a joint venture are thus:

$$\pi = \Phi E(R - C) = \Phi E(PL) \tag{2}$$

where E denotes expected value.

II. Methods of Islamic Financial Intermediation

In this section, practical issues raised by an Islamic banking system (with particular emphasis on the Pakistani model) will be dealt with. The implementation of the PLS system raises problems mainly with respect to various forms of Islamic banks' lending operations. Banks and other financial institutions provide finance on the basis of participation in profits and losses using instruments and techniques such as *Modaraba* (partnership) companies, participation term certificates (PTCs), leasing, markups in price, and hire-purchase. The principle of profit-and-loss sharing is also ap-

[21]Uzair (1980), p. 6. The Investment Corporation of Pakistan (ICP) distributes its profits 60:40 in favor of depositors of funds, whereas any loss is shared in the reverse proportion (see "ICP Wins More Investors" (1981), pp. 6–7).

plied to the liability side of financial intermediaries. The various forms of deposit accounts—such as investment and current accounts—at the disposal of an Islamic bank are set forth first.

FUNDING OPERATIONS OF ISLAMIC BANKS

"Investment" deposits

Investment deposits correspond to fixed deposit or time deposit accounts and to savings accounts. Depositors in the first category are concerned with earning profits rather than holding funds for precautionary or transactions purposes. The funds raised in "investment" accounts are invested by banks on the basis of the PLS principle. The banks share the amount of profits resulting from their investments with depositors. The basis of distribution is a bank's overall profit-and-loss position (in the case of unconditional long-term investment deposits).[22]

The calculation of profits and losses and a dividend declaration can be undertaken annually or every six months. Depositing funds in "investment accounts," however, may lead not only to the earning of profits but also to the incurring of losses. Depositors are liable to bear losses in the same proportion they share profits. In some years, then, savers have to forgo earnings on their savings. It might even be possible for savers to lose part of their deposited amounts.[23]

In Pakistan, the PLS principle is applied to the fixed deposit accounts of banks that issue fixed deposit receipts (FDRs). These deposits are only accepted in amounts that are multiples of one thousand rupees (approximately US$100). Fixed deposits range from one to five years and can be withdrawn if advance notice to that effect is given to the bank. The deposits mobilized at "interest-free" counters are invested mainly in long-term and medium-term loans, government commodity operations, letters of credit, and inland bills. Profits earned by all branches of each

[22]See Uzair (1956), p. 53. The Kuwait Finance House offers conditional deposits linked to a particular project. See "Banks for the Faithful" (1978). Specified accounts have also been introduced by the Jordan Islamic Bank. Profits and losses for these deposits are calculated only on the performance of the project (see Khouri (1981)).

[23]Moreover, there is the theoretical chance that depositors might have to pay an additional sum to cover losses exceeding the initial amounts they deposited if the companies to which the bank lends incur losses larger than the amounts of the loans they received from the bank.

bank are pooled before they are distributed. This reduces the possibility that depositors will incur losses on their deposits. Moreover, a certain percentage of profits (5–10 per cent) is kept for a reserve fund to offset a cumulative loss, if one occurs.[24] An incentive for savers is the income tax exemptions for all profits of up to PRs 15,000 per annum earned by depositors on PLS accounts. While the ultimate objective in Pakistan is to transform the financial system so that it completely conforms with Islamic principles, this transformation is being carried out gradually. Depositors, therefore, will retain the option of choosing fixed-interest-bearing deposits for the time being.

Money is deposited in a savings account partly to earn income and partly to provide protection against unexpected future expenditures. Therefore, a savings account has to fulfill the functions of an investment account as well as a current account. Since, however, funds deposited in savings accounts will be invested on a profit-and-loss-sharing basis like fixed deposits, they are viewed as part of the investment account.[25] In Pakistan, savings accounts (so-called Savings Banks accounts) are treated in the same way as fixed deposit accounts; both types of account work on the PLS principle, though there are differences in the conditions of savings deposits and fixed deposits. For example, the minimum amount required to open a PLS account is, at PRs 100, less than that required for fixed-term deposits.

Current account deposits

Current account deposits are held for transaction and contingency motives. The investment motive plays a strictly secondary role. Services that banks render to current account holders include the provision of checking facilities, overdrafts, and the like. For these services, banks may levy service charges to cover the costs incurred. The depositor does not receive any remuneration for depositing funds in current accounts because, it is argued, these funds will not be used for profitable investment. Funds mobilized in current accounts can legally only be used to meet short-term financial needs, such as balancing the liquidity

[24]"The Interest-Free Is Coming?" (1980), p. 6.

[25]See Uzair (1980), p. 8. Uzair changed his attitude of 1956, when he regarded savings deposits as nonproductive and therefore not apt for productive purposes, but only for appropriate consumption loans. See Uzair (1956), p. 50.

position of companies.[26] Funds deposited in current PLS accounts cannot, therefore, be used for long-term finance.

LENDING OPERATIONS OF ISLAMIC BANKS

Long-term and short-term finance for industry and commerce

In traditional, or western-type, financial systems, companies raise funds mainly through the issuance of equity shares or bonds or through medium-term and long-term borrowing from banks at fixed interest. The latter two financing possibilities are, however, not in accordance with Islamic principles.

Islamic countries are taking various steps to bring their existing financial systems into conformity with Islamic tenets. The Government of Pakistan, for example, passed the *Modaraba* law to base financial transactions on the PLS principle. Moreover, it introduced participation term certificates to replace interest-bearing bonds. Banks and other financial institutions are asked to grant long-term loans on a PLS basis to provide long-term finance to industry and commerce.

Under the *Modaraba* law,[27] management companies, banks, and financial institutions can register themselves as *Modaraba* companies. Legally, *Modaraba* means a business in which one person participates with his money and another with his efforts and skills. It can be of two types: (1) a multipurpose *Modaraba* with more than one specific objective, and (2) a specific-purpose *Modaraba* (e.g., for raising housing finance).[28] *Modaraba* companies may only engage in business that is permitted under the *Shariah* (Islamic religious law). A religious board ensures that the firm's activities are not opposed to the injunctions of Islam. Funds collected in a *Modaraba* business can be used, on a PLS basis, for most types of investment, including project financing, leasing industrial equipment, financing real estate, and commodity trading (a short-term activity), though not of course for certain religiously proscribed activities such as trade in alcohol or for ventures such as nightclubs or gambling halls. Other provisions of the *Modaraba*

[26]See Uzair (1980), p. 9.

[27]"Modaraba Companies and Modaraba (Flotation and Control) Ordinance, 1980 (Ordinance No. XXXI of 1980)" (1980), p. 388.

[28]The Bankers Equity, Ltd. in Pakistan is a multipurpose *Modaraba*. It mobilizes funds and channels them into various ventures (e.g., into the Twin Tower Modaraba—a specific-purpose *Modaraba*) to provide capital for the construction of a housing complex. See Shah (1981).

law are very similar to company laws in western countries. The company, its officers, and their relatives are not permitted to borrow from the company. Not less than 10 per cent of the total amount of capital the *Modaraba* company offers for public subscription must be fully paid up. Annual reports must be submitted that include a balance sheet, a profit-and-loss account, and a statement of financial changes.

Banks and other financial institutions are able to provide risk capital to a *Modaraba* business in the form of equity and loans with equity features. For the amount of capital provided, banks receive *Modaraba* certificates, which are transferable certificates with a specific face value. Before profits are distributed among *Modaraba* certificate holders, the board of the *Modaraba* company decides which part of them should be kept back as reserves for meeting contingencies or for equalizing distributions of profit. No explicit statements are given about the distribution of losses. However, the PLS principle suggests that losses would be shared among *Modaraba* fund subscribers after free reserves and unappropriated profits of the company were exhausted. If accumulated losses exceed 50 per cent of the subscribed capital, the *Modaraba* company is liquidated.

Another means of channeling long-term bank funds to industry and commerce is the participation term certificate,[29] which was developed to replace fixed-interest-bearing bonds. PTCs are transferable corporate instruments based on the principle of profit-and-loss sharing. They have a specified maturity period that may not exceed ten years, excluding the grace period, and are secured by a legal mortgage on the fixed assets of the company. The proceeds of the PTC are exclusively used for implementing the project intended. In order to control the use of funds, a trustee is appointed who has wide-ranging auditing rights. The PTC holders share in profits of the company on a basis determined by mutual agreement between themselves and the company's manager. For the purpose of determining return to PTC holders, profits are defined as pretax profits before appropriations. If losses occur, first recourse is made to the free reserves, including the credit balance in the profit-and-loss accounts of PTC issuers. When no reserves are available, losses are shared between PTC holders and other providers of funds in proportion to the funds they have

[29]See "The Modaraba Companies and Modaraba Rules, 1981" (1981), p. 204.

subscribed. Options exist for PTC holders to convert a certain portion of outstanding PTCs into ordinary shares, and conversely stockholders may subscribe to new issues of PTCs. There are no special legal provisions concerning the relation of PTCs to *Modaraba* certificates, especially with respect to liability in case of losses and to priority of distribution of profits and losses.

In Pakistan, the National Investment Trust (NIT) and the Investment Corporation of Pakistan issue PTCs instead of bonds to raise funds. Apart from acquiring PTCs, banks and other financial institutions can grant medium-term and long-term loans on a PLS basis instead of demanding a fixed interest rate on the principal. Institutions that make long-term PLS loans share in the overall profits and losses with holders of *Modaraba* certificates and PTCs. The share of profits that accrues to the banks and other financial institutions should correspond to the share of long-term PLS loans in the total funds provided by all suppliers. If banks grant long-term PLS loans only for special investment purposes, care must be taken to ensure that profits resulting from these specific uses of funds are clearly imputed to these loans. Otherwise, profits earned on funds provided by holders of *Modaraba* certificates and PTCs might be transferred to banks providing long-term loans.

Since there is no detailed description of how to distribute losses on PLS loans, it is assumed that losses are negative profits and are handled analogously. At first, losses could be covered by accumulated reserves or by the credit balance in the profit-and-loss account. If reserves are not available, banks have to sustain losses on long-term PLS loans proportionate to the percentage of PLS loans in total capital and borrowed funds.[30] Serious difficulties will not arise as long as losses are small or occur only in some business years. On the balance sheet, losses could be carried forward as debit balances of the profit-and-loss account and reduced or eliminated with future profits. If borrowers default, losses may affect traditional banks charging fixed interest rates as well as banks granting loans on a PLS basis. However, the rate of return depends more on the performance of the borrower in the Islamic banking system than in the traditional banking system. Therefore,

[30]A proposal that the loss be borne exclusively by the bank except in case of detrimental acts by the entrepreneurs (see Mannan (1970), p. 226) is not in accordance with the PLS principle. It would also shift all of the risk of losses onto the suppliers of loan funds.

long-term PLS loans are subject to greater variability in their nominal return than loans made on a fixed-interest basis.[31]

Another way to enable banks and other financial institutions to provide medium-term and long-term finance is the leasing system (*Baj Muajjal*). Banks acquire certain fixed assets like machinery and lease them for a specified period to their customers for a hire fee. The main feature of such arrangements is that the lessor (bank) retains the ownership of the asset, while the lessee (the entrepreneur) has the possession and use of it. Banks and their leasing subsidiaries are sharing in the profits and risks of the entrepreneur's business as long as the rent for the leased assets is not fixed in advance, but related to financial success.[32] A problem that has not yet been fully resolved is how to tie the rentals to the profits and losses of the lessee to bring the leasing system into accord with the partnership principle. One possibility would be to make lease or rental payments a certain percentage of annual profits that were assigned to the assets leased. Such a profit-related leasing system, however, could become very complex if the number of assets leased were high and the value of single items were low relative to the total amount of funds provided. A more tractable solution, therefore, might be to relate rentals to the output of an asset.

An important part of modern banking business is the provision of short-term loans or overdrafts to industry and commerce. Typically, banks provide trade finance and working capital. Short-term loans are usually granted for a period of three months or less. Where fixed interest charges are not permitted, a problem arises concerning how banks can be remunerated for the services they provide. One proposal is that banks should provide short-term funds free of charge.[33] In case of excess demand for short-term funds, Ahmad (1952) suggests that bills of exchange could be cashed only up to a certain percentage (of less than 100 per cent) of current deposits the trader holds at the banks.[34] According to this proposal, banks would have to determine what percentage of current deposits would be appropriate in order to equalize the demand for short-term funds with the supply of resources avail-

[31]However, as in the traditional banking system, Islamic banks are able to reduce risk by securing their PLS loans.

[32]The Islamic Development Bank practices this financial technique. However, no details are available. See Islamic Development Bank, *Fourth Annual Report: 1399 H. (1979)* (Jidda, 1980), p. 49.

[33]Ahmad (1952), p. 200.

[34]*Ibid.*

able to the bank for this special purpose. However, it is not clear what incentive this proposal would offer for financial intermediation (as opposed to simple deposit-holding), since depositors could only borrow up to the limit of their deposits.

Providing short-term finance without explicitly charging interest involves costs for the banks. Expenses arise for banking personnel and equipment, as well as the maintenance of the money transmission mechanism, and these costs have to be borne either by banks or their customers. If banks are profit-oriented business institutions, then they should be rewarded for their short-term lending as well as for their long-term lending. This can also be justified by the fact that the borrower derives a return on the use of these funds.

If it is accepted that banks should be remunerated for providing short-term financing without using fixed interest rates, then the issue arises of how short-term loans can be granted on a PLS basis as demanded by Islamic tenets. Profits could be imputed to loans that have maturities of less than a year by calculating the profits for each respective period. This is done by some enterprises that draw up quarterly accounts for internal purposes of budget control and management support.[35] A certain percentage of quarterly or monthly profits corresponding to the share of short-term finance to overall funds could then be attributed to short-term PLS loans.

Although this method of distributing profits to short-term finance is possible in principle, there are a number of practical difficulties to overcome. First, the company or the entrepreneur would need a rather efficient bookkeeping system (e.g., the necessary computerized accounting systems) that could quickly provide statements on the profit-and-loss situation for periods of less than a business year. Second, since current-period profits are not usually known when a short-term loan is repaid, some method of approximating current returns would have to be found. Lenders could be remunerated retroactively, but in this case the bank would have to wait for its remuneration until profits were determined. The forecasting of future profits does not seem to be a reliable alternative because of the difficulties involved. If, however, some known past rate of profitability were used as the criterion to determine the remuneration paid to banks for short-term loans,[36] this would not be in accordance with Islamic principles, since this rate would be predetermined and fixed.

[35]See Uzair (1980), p. 18.
[36]As suggested by Uzair (1980), p. 18.

As an alternative to computing periodic profits, a more direct method of determining the specific rate of return on short-term loans has been proposed.[37] Since these funds are usually obtained for the classical type of self-liquidating bills of exchange, it is argued that profitability can be computed without serious difficulties by deducting the purchase cost from the sale price. While this can be used for certain types of transactions (e.g., pure trade financing), it is less appropriate in cases where the physical character of the goods being financed is transformed as they pass through the production process. In such cases, it is necessary to assign an arbitrary cost to the factor services used to transform raw materials into intermediate and finished goods, in order for the difference between sale price and purchase price to be calculated on a net basis.

A particular problem is the remuneration of short-term loans with maturities of less than 30 days. These funds are usually provided in the form of credit lines or overdrafts for short-term liquidity requirements. The application of the PLS system is likely to be even more difficult in such cases, since funds are typically not attributable to specific items of inventory or work in progress. Although such short-term loans are not used for direct investment, they yield implicit returns, since they facilitate the synchronization of inflows and outflows and thereby secure the liquidity position of a company. Banks could be compensated for the cost incurred on these credit lines by means of a service charge levied on a per transaction basis (not related to the duration of the loan or to the amount borrowed) as suggested by Uzair.[38] The Islamic Development Bank determines service fees solely on the basis of its administrative expenses.[39] Although this service charge can be applied without practical problems, it does not reflect the scarcity of funds unless it reflects changing market conditions. If this service charge is a fixed amount, it will correspond to some interest rate on the short-term loan even if the service charge is not explicitly tied to the duration of the loan or to the amount borrowed. There is an inverse relationship between the size of the loan and the effective fixed rate of interest on it. The service charge is not in accordance with the PLS principle because the charge is not related to the profits and losses of the borrower. The only solution

[37]*Ibid.*, p. 19.
[38]*Ibid.*, p. 20.
[39]Islamic Development Bank, *Fourth Annual Report: 1399 H. (1979)* (Jidda, 1980), p. 49.

that would seem to be both practical and in accordance with the PLS principle would be to calculate a return related *ex post* to the level of output or to some general measure of profitability of the enterprise concerned.

Another possible method of compensating providers of short-term financing of input requirements and trade is the "markup" technique *(Murabaha)*.[40] It involves a sale in which the profit margin, or markup, of the seller has been mutually agreed upon between the seller and the buyer in advance. Bankers act as merchants by acquiring domestic or foreign inputs or commodities for their clients, who pay the banks for these goods either in a lump sum or in installments. The markup differs from interest in that it is not explicitly related to the duration of the loan but instead is computed on a per transaction basis.[41] The markup technique has been used in Pakistan since January 1, 1981 for all bank financing of commodity operations of the Government, its agencies, and certain other Government-run organizations and for import bills drawn under letters of credit. Export bills purchased or negotiated under letters of credit denominated in foreign currency are provided for the exchange rate differentials (which correspond to markups). On rupee bills, a commission fee is imposed.[42] The Islamic Development Bank in Jidda has been using the markup technique, especially for foreign trade financing. If the markup is fixed in nominal terms before the transaction takes place and the time period between acquisition and sale of the commodities is known, then this method of lending would, in practice, involve a fixed return. If this was felt to be objectionable, a possible solution might be to tie the markup amount to factors that are not known in advance, such as world prices or current holding costs of the commodity.

Finance for agricultural sector

The need for finance in the agricultural sector arises mainly from the seasonal nature of farming. Most credit extended to farmers consists of short-term loans made for periods ranging

[40]Uzair (1980), p. 13.

[41]*Ibid.* However, it must be seen that the markup technique involves a time dimension because commodity financing transactions are usually settled within a certain time period.

[42]State Bank of Pakistan (1980), BCD Circular No. 26.

from one season (e.g., for a planting cycle) to one or two years. Some medium-term and long-term loans are used for purchasing livestock or equipment. In rural societies, noninstitutional moneylenders usually meet the financial needs of peasants. The access of conventional commercial banks to the rural population is sometimes rather limited, particularly if peasants are skeptical about modern banking techniques and if—because of maximum lending rate limitations, high administrative costs (especially for small, short-term loans), and excessive default risks—banks find such activities unprofitable.

The introduction of a banking system that works on principles endorsed by religious leaders could be helpful in reducing peasants' reluctance to use the services of banks. The PLS principle could be applied to agricultural lending by sharing output or net profits according to an agreed percentage formula between the bank and the farmer. Part of the profits could be used to build up reserves as a buffer against possible future losses. In order to link farmers more closely to their banks, a certain part of the farmers' profits could also be used to acquire bank shares.[43] This more direct involvement of banks in agricultural activity could be further enhanced if the banks also acted as traders in both inputs (such as pesticides and fertilizers) and outputs. Such a development would be more likely to occur if input and crop financing were conducted on the markup basis described previously. It is to be hoped that this sort of credit cooperative arrangement incorporating a distribution network would result in higher net revenues. A further improvement of the profit situation could be achieved if banks provided some technical assistance to farmers on methods that could improve agricultural production. Profits would also be increased if the participation of banks in the PLS system enabled them to monitor more carefully the uses made of funds they have lent.

Consumer credit

For commercial banks in developed countries, consumer credit has become a very important business activity. Consumer loans are granted not only to enable borrowers to deal with personal or family emergencies but also to help them raise their living standards by purchasing durable consumer goods or houses.

[43]Ahmad (1952), p. 208.

Islam does not absolutely forbid lending for consumption purposes. In former times—and even today—in some Moslem countries, special consumption loans, the so-called "worthy credit" or welfare loans *(Quarz-i-Hasana),* were made.[44] These loans were made in hardship cases by neighbors or friends without any financial consideration. The debtor had to repay the principal at his convenience. Religious laws demanded that the borrower clear all his debts before his death; otherwise, he would be regarded as a sinner.[45] This form of charitable assistance cannot, however, become the basis for consumption lending of profit-oriented commercial banks, except in extraordinary cases. Therefore, if lending to finance consumption is to take place, banks will have to be remunerated for it just as for any other service.

The application of the partnership principle to consumption loans does not seem to be an acceptable solution. Consumption loans are usually not directly productive in terms of yielding profits that could be shared by lender and borrower. They may be productive in the sense that they enable the debtor to improve his physical working ability or that they raise aggregate demand and income. Moreover, they can increase welfare by changing the time distribution of a given total of expenditures. However, these returns cannot easily be calculated and attributed to consumption loans. The profit-and-loss-sharing principle cannot, therefore, be applied to consumer credit extended by banks.

Because of the difficulty banks have in deriving profits from their consumption lending, it has been proposed that such loans be granted either through some government agency or through people's cooperative societies.[46] However, simply changing the lender would not solve the problem of obtaining the necessary remuneration on such loans. A governmental credit agency could grant interest-free consumption loans (or charge only moderate service fees) in order to provide some sort of social security system, but then all, or at least a large part of, the costs of this "interest-free" lending would have to be borne by taxpayers. The alternative proposal, which entails the founding of credit cooperatives, might provide a solution to the problem of remunerating consumption loans. Such cooperatives would initially require

[44]*Ibid.;* Mannan (1970), p. 224; Uzair (1980), p. 17.
[45]Mannan (1970), p. 224.
[46]*Ibid.*

members to purchase a certain amount of shares. Out of the funds raised, loans would be granted to the shareholders, who would repay them in installments. Expenses would be covered by a "tax" on every loan application.[47] Funds not used for consumption loans would be invested in profit-yielding deposit accounts of Islamic banks. This system might work if steps were taken to ensure that the repayment ratio of loans was kept high, administration costs were kept low, and the funds invested (and not used for consumption loans) yielded revenues to cover expenditures. There would remain, however, two questions to be solved: (1) Would savers have enough incentives to deposit part of their savings in a credit society without receiving any financial yield or benefit apart from the right to borrow money at some future date? (2) How would the cooperative allocate its funds if there was excess demand for loans? Such a situation is likely to occur when money is being lent at interest rates close to zero (including the tax as a sort of service charge).

A third way of providing consumer credit is the hire-purchase *(Bai Salam)* arrangement, under which banks and other financial institutions acquire certain assets and then sell them to their clients. Under this arrangement, ownership gradually passes to the customers with the payment of installments.[48] Although the hire-purchase technique may be used for financing of industry, commerce, and agriculture, it is particularly apt for certain forms of consumer lending, such as the financing of housing or durable consumer goods.[49]

In Pakistan, the House Building Finance Corporation (HBFC) advances loans for housing on a hire-purchase basis. The HBFC jointly owns each property it finances with the purchaser for a specified time period. The purchaser pays installments until the entire principal is repaid. The corporation assesses both the total value of the house to be built and its rental value. The HBFC is entitled to a share of the rent, from which its profits are derived. If the purchaser sells his house before the loan is fully repaid, he has to repay the entire principal and share the capital gain or loss accrued on the property with the HBFC. However, by using this formula for an "interest-free" housing loan, the HBFC in effect

[47]Ahmad (1952), p. 209.

[48]In the case of the leasing arrangement, the lessor (the bank) remains the owner of the assets leased.

[49]Uzair (1980), p. 16.

receives the same rate of interest it would have received on a straight loan.[50]

Lending to the government

The PLS system cannot be applied directly to government borrowing since revenues resulting from investments can usually be assigned only very roughly to the uses made of borrowed funds. Direct income can only be determined in circumstances where people deriving benefits from the government's spending can be required to pay for them. If it is not possible to exclude people unwilling to pay for governmental services they benefit from, then direct revenues cannot be generated.

Three broad categories of government expenditures can be distinguished. For expenditures in the first category—which includes general administration, defense, and police—specific user fees cannot be levied. A second category consists of expenditures for projects from which direct revenues can be obtained, in principle, but, in practice, usually are not collected because administrative costs would be very high. Canals or irrigation facilities fall into this category. Collecting directly for the use of roads can be done to some extent, though it is not easy to do on a sufficiently general basis. A third category consists of expenditures for various government-run enterprises (e.g., steel mills and power plants) that are mainly profit-oriented but may also pursue political or social goals. The operating expenses of these enterprises are covered, in whole or in part, by the proceeds from the sale of the goods and services they produce. Borrowing for government investments in such income-earning projects could therefore be treated similarly to borrowing for privately run ventures. The first two categories of government spending, however, have to be financed through taxation or credit.[51] Since the direct application of the PLS system is not suitable for the financing of budget deficits, a more general way of determining the returns from such expenditures should be considered.

One possibility that, to the author's knowledge, has not been

[50]Before converting to Islamic financing techniques, the HBFC advanced loans at an annual interest rate of 12 per cent. Under the new system, house builders can use an "interest-free" *Modaraba* house building loan, which also costs them 12 per cent a year. See Ali (1981 b), p. 86.

[51]Ahmad (1952), p. 193, proposes that budget deficits be financed by the monetary authorities.

suggested by writers on Islamic financial systems would be for the government to issue bonds that did not offer fixed rates of interest but instead offered returns tied to the annual rate of nominal gross domestic product (GDP) growth (either in absolute or per capita terms). In this case, the rate of remuneration for providing capital would not be fixed and predetermined, but variable, as Islamic principles require. Moreover, this financing method would avoid the difficulties involved in determining the rate of return on various government outlays. Admittedly, the GDP growth rate is only a very rough proxy for the return on capital, since such other factors as the supply of labor and the sectoral structure of the economy influence the latter rate, but the GDP growth rate would nevertheless be an indicator of the state's activities, especially in countries where the government sector plays an important role in the economy. An advantage for savers purchasing these bonds would be that they might yield positive real rates of return, thereby probably increasing the savings rate. An advantage for the government would be that it could raise noninflationary funds without aggravating the budget situation, since income taxes would rise by about as much[52] as the variable payments on bonds. This financing method would also serve social and economic purposes in involving government debt holders in the performance of the economy.

ALTERNATIVES TO A PROFIT-AND-LOSS-SHARING SYSTEM

Providing finance on a PLS basis requires constant vigilance by the banks over the utilization of funds. This can provide benefits (as conventional banking systems have also come to realize) in the form of improved financial control. However, for the reasons that have been discussed previously, shifting all lending to a PLS basis involves numerous practical problems. These problems can be partially solved by introducing techniques—such as leasing, markup, and hire-purchase—that have already been discussed as alternatives to a pure PLS system. Nevertheless, banks are still likely to have to increase their staffs by employing engineering and management experts to evaluate projects more thoroughly than they can using traditional lending techniques. This will result in increased costs that bankers will have to balance against prospec-

[52]Or even more if the income elasticity were greater than one.

tive increases in rates of return that could be earned by making more efficient use of funds.[53]

Because it is aware of the practical difficulties of Islamizing the financial system, the Government of Pakistan has also considered possible alternatives to the PLS system that would not rely on fixed predetermined interest rates.[54] One proposal is to introduce a system of indexing bank deposits and advances. The indexation would be related to some multiple of the rate of inflation.[55] The rate of indexation could be higher than, equal to, or lower than the rate of change of the price level. The central bank would decide each year in what proportion bank deposits and advances should be indexed and could thereby take into consideration the size of the required return on savings and the cost of borrowing.[56]

Although the proposed system does not include the PLS principle, it could be considered to be in accordance with Islam because the indexation rate is tied to the variable and uncertain inflation rate.[57] Economically, the indexation offers the chance for savers to receive a positive real rate of return on their deposits if the multiple for the indexation rate is greater than one. This could encourage them to save more of their incomes. On the borrowers' side, the indexing system would reduce the demand for investment funds for projects that do not yield a return compatible with the economy's capital endowment. Therefore, the gap between desired savings and investments could be closed, or at least narrowed, if an appropriate rate of indexation were chosen—that is, one corresponding to the rate of inflation. Two other advantages are the relative ease with which this indexing system can be handled and its low administrative costs compared with those of the PLS system. However, it would be advisable for the commercial banks to determine the indexation rate, rather than the central bank. Such a practice would be particularly helpful to the banks in making advances because they could vary the indexation rate according to the creditworthiness of the borrower. Choosing a multiple for the indexation rate that was unequal to the inflation rate would, however, lead to shifts of wealth between lenders and borrowers. The higher the inflation rate was, the larger would be the wealth transfer.

[53]Uzair (1980), p. 11.
[54]Naqvi and others (1980), p. 21.
[55]It is not specified which price indices should be used.
[56]Naqvi and others (1980), p. 23.
[57]*Ibid.*

Another proposal aimed at long-run loan financing is the Investment Auctioning System.[58] Under this system, financial institutions would auction investment authorizations to investors. Supply of, and demand for, investable funds would determine the scarcity price of available capital. This Investment Auctioning System would take into account the resource endowment of the economy. In order to ensure that the system reflected social investment priorities, the government would specify several categories of investment and would set maximum monetary limits on them. If a limit were reached, investment auctioning in that category would stop. Within the framework of an Investment Auctioning System, entrepreneurs would remain solely responsible for their investment decisions, whereas banks would serve only as financial intermediaries. Scarce capital resources would flow into those investments with the highest expected rates of return. The optimal allocation of capital, however, could be biased by the limits placed on certain investment categories. The administrative costs of the Investment Auctioning System are difficult to evaluate because these details are not included in the proposal.

III. Effects of a Profit-and-Loss-Sharing Financial System on Economic Development and Stability

This section analyzes the impact of the abolition of fixed interest rates and their replacement by the PLS system on broader macroeconomic questions of development and financial stability. First, the role of interest in savings and investment will be discussed briefly. Then, the significance of the financial system for economic development will be set forth. Within this framework, the effects of a PLS-based financial system on savers, financial intermediaries, and investors are dealt with. Finally, some aspects of implementing monetary policy in such a system will be pointed out.

EFFECTS OF AN ISLAMIC FINANCIAL SYSTEM ON SAVINGS AND INVESTMENT

Islam prohibits fixed interest mainly on the ground that it represents a rentier income. Since the lender of money gets back

[58]*Ibid.*

more than he supplied to the borrower, this is seen as an exchange of assets of unequal value and therefore as exploitative.

In conventional economic theory, interest is simply the return received by savers for abstinence or waiting and the price paid by borrowers for the earlier availability of resources.[59] It measures the rate at which people exchange the use of goods today for their use at some future time. The rate of interest strongly influences savings and investment decisions of individuals over time and is generally positive, for two reasons. First, people in the aggregate have a positive time preference, which means that at the margin they prefer consuming goods now to consuming goods in the future. Second, resources can be used for productive investments that increase in value over time. Since present resources can be turned into future goods at a profit, the investor is willing to pay a positive interest rate to the supplier of resources.

Within the framework of neoclassical theory, the rate of interest balances desired saving against planned investment. An increase in the interest rate induces savers to save more and causes investors to refrain from making investments that have a rate of return lower than the current interest rate.[60]

The decision to save or to invest depends on the *expected* or *ex ante* rate of interest and not on the *ex post* rate of interest, because it is the anticipated return that influences economic decisions about the allocation of resources.[61] A wealth owner will shift his assets (and liabilities) until the expected return on each asset has been equalized at the margin. Differences in the returns on various assets—such as fixed-interest bonds, shares, or loans—reflect, therefore, differences in risk (and, of course, institutional factors such as liability to tax). Setting a fixed interest rate in a contract between lender and borrower is simply a means of reducing uncertainty concerning the nominal return to be paid and received.[62]

Banks and other financial institutions can contribute to the economic development of a country by providing a market in which the complex needs of savers and investors are matched. Savers keep their wealth in various forms of real and financial

[59]See Santoni and Stone (1981), p. 13.

[60]However, the interest elasticities of savings and investment are ambiguous. For a discussion, see Khatkhate (1972), p. 539, and Crockett (1973), p. 58.

[61]For a clear explanation of this distinction, see Santoni and Stone (1981), p. 15.

[62]The nature of uncertainty in traditional and Islamic banking systems will be dealt with later.

assets. Depending on the individual's preferences, assets (and liabilities) must have certain features of safety, liquidity, and yield. In developing countries, savers usually hold a large part of their nonfinancial wealth in the form of land, livestock, inventories (e.g., foodstuffs), and to a certain extent in durable consumer goods. Wealthier individuals, and sometimes poor people as well, hold valuables such as gold and jewelry. The share of productive capital goods is relatively small in comparison with the share of nonproductive assets in total wealth.

Financial institutions can change the composition (and also the desired aggregate level) of savers' wealth by offering certain financial assets that correspond better to the needs of savers in terms of liquidity, security, and yield than existing assets. It may be less risky and may cost less to hold savings in monetary form than in the form of real goods. Banks transfer the financial assets they attract to investors, who then use the funds for income-yielding investments. Because of savers' preference for safe and liquid assets, a *smaller* volume of funds is likely to be channeled to investors when financial intermediation *does not* take place than when it does. Financial institutions can reconcile the needs of savers and investors through the transmutation of relatively safe and liquid short-term financial claims into riskier, less liquid, long-term real assets. The financial system thereby improves the allocation of scarce resources and makes possible a faster development of the economy.[63]

The introduction of financial intermediation based on the PLS principle may have impacts on the behavior of savers, banks, and investors. The PLS system turns savers into entrepreneurs, at least to some extent, by encouraging them to participate directly in the financial success of the investor's business, thereby sharing the risks involved. Savers then face a different type of uncertainty in an Islamic financial system than that faced by savers in a traditional banking system. In the latter system, the expected yield depends on the nominal rate of interest banks offer on various forms of time deposits and on the expected rate of inflation. While the nominal rate of interest is fixed, uncertainty arises from the fact that the actual inflation rate may differ from the rate expected when the act of saving took place.

In an Islamic banking system, not only is the expected rate of inflation a risky variable, but the nominal yield on investment

[63]Gurley and Shaw (1956); Patrick (1966); Bhatia and Khatkhate (1975).

deposits as well. Therefore the riskiness of the expected real yield on investment deposits consists of two components: uncertainty concerning the *ex post* nominal return that will be received and uncertainty concerning the inflation rate. If these two sources of uncertainty are independent (in a statistical sense), then it is clear that the aggregate uncertainty (in the sense of statistical variability) of the real yield on bank deposits will be greater under a PLS system than under a fixed-interest system. However, it is possible that the two sources of uncertainty may not be independent, in which case this conclusion would not be valid. Increases in the nominal price level may tend to be associated with increases in the nominal return on investment; if so, unexpected variations in the nominal yield of PLS deposits might tend to offset unexpected variations in the inflation rate and could even reduce the variability of the real yield on savings.

If a country's entire financial system were to be altered so that it was based on the PLS principle, the effect of this alteration on savings incentives would depend on the extent to which the two kinds of uncertainty were offsetting. Since it is safe to assume that savers are, in the aggregate, risk averse, it would be important to determine whether the two sources of variability in returns on investment deposits were (or were perceived to be) additive.

Where an Islamic banking system works side by side with traditionally operating banks, the effects on savings are unambiguously positive, since the menu of savings instruments is expanded and no existing savings outlet is eliminated. Savings attracted into PLS accounts will include not only existing savings in the form of other assets but also savings of individuals who either have a religious inhibition concerning the use of the traditional banking system or consider the economic characteristics (risk, return) of the new assets sufficiently superior to the old ones to induce them to increase their savings.

The analysis has so far assumed that rates of return are the same when a country is switching from a traditional to an Islamic banking system or when both systems are operating competitively. The reasoning behind this assumption is that both banking systems are confronted with the same investment opportunities and use them in equally efficient ways. Proponents of the PLS system might argue, however, that its yields to depositors could be higher than those offered by the conventional system and that PLS offers a better chance of compensating depositors for an unexpected acceleration in the rate of inflation. These factors would tend to

enhance the attractiveness of PLS accounts and therefore to limit, or even to eliminate, the system's possible adverse consequences for financial savings mobilization that were noted previously. It could also be argued that banks working on a PLS basis are more concerned with the use of mobilized funds than traditional banks. Since the former share in the profits and losses of investors, they would be more likely to direct their resources to more productive and profitable investment opportunities.[64] Investments yielding higher expected rates of return usually involve greater potential variability in their rates of return, however. Islamic banks would presumably be willing to bear greater risks only if they were compensated by high enough returns. Nevertheless, Islamic banks might accept investments with greater variability in the expected rate of return because part of the increased risk would be borne by the depositors. Moreover, it is possible that Islamic banks require less collateral for loans because they monitor them more closely than traditional banks. This reduced requirement could especially favor new entrepreneurs who have not yet established their creditworthiness but might be very innovative.

The process of financial intermediation could be affected if Islamic banks were somehow constrained in carrying out the task of transforming short-term liabilities into long-term advances. As was related earlier, it has been suggested that only investment deposits be used for long-term investments and that current account deposits be used for short-term lending—for example, for trade financing. If the uses of funds are strictly separated according to their origin, then loans for long-term investments will be limited by the volume of investment deposits. This would not be the case if funds originating from current account deposits were at the free disposal of the banks. If longer-term investments were linked to a particular project (so-called conditional certificates of deposit), then the process of financial intermediation would be constrained in another way.

In terms of banks' relations with borrowers, a PLS system clearly fosters more direct involvement than a traditional system. Banks would require more information about the business activities they financed and would be more likely to seek to influence the business decisions of borrowers. On the one hand, this heightened involvement might discourage entrepreneurs who sought

[64]Ahmad (1952), p. 197.

maximum freedom of maneuver in the use of the funds they borrowed. On the other hand, the enhanced role of the banks could bring about improvements in the skills of investors. Especially in small business and agriculture, banks could provide information and expertise that could increase the profitability of investments. They could also support entrepreneurs by providing them with technical and managerial assistance. Moreover, banks within the framework of the PLS system are themselves entrepreneurs who can influence business decisions positively. Therefore, the negative effects on investor's willingness to accept risks caused by thorough credit supervision might be counterbalanced by the positive effects that the comprehensive support services provided by Islamic banks had on borrowers' businesses. Finally, by sharing losses as well as profits, banks could function as absorbers of shocks stemming from the real sector and could thereby reduce the cost of adjustment.[65] Since local entrepreneurs are hardly able to meet even temporary losses owing to their lack of resources, they may be overcautious in the implementation of projects that have a high expected return but high variability.

For the reasons given previously, it seems likely that greater administrative resources would be required to operate a PLS system effectively than would be required for the effective operation of a traditional system, though it is to be hoped that the resulting higher costs could be offset, or more than offset, by improved allocation of investment. Greater involvement by institutional providers of funds in determining the uses to which such funds are put should have a positive effect (as the experience of western financial institutions seems to show). Still, the difficulties already alluded to in finding a suitable means of providing and charging for short-term lending will need to be overcome if inflexibilities are not to hamper the smooth working of the financial system.

The limited evidence available demonstrates that Islamic banks have operated quite successfully during the past year. In Pakistan, the commercial banks have declared dividends on PLS savings accounts and PLS time deposits for the first half of 1981. A 9 per cent annual rate was paid on the former, whereas the latter yielded 11.5 per cent (for corresponding regular deposits, the yield was 9.5 per cent) for 6 months–1 year, 12.75 per cent (10.5 per cent) for 1–2 years, 13.25 per cent (11.0 per cent) for

[65]See Khatkhate and Riechel (1980), p. 509.

2–3 years,14.25 per cent (11.75 per cent) for 3–4 years, 14.75 per cent (12.25 per cent) for 4–5 years, and 15.25 per cent (12.75 per cent) for more than 5 years.[66] The Jordan Islamic Bank registered an overall profit of 8.2 per cent on investment accounts for 1980.[67] One-year deposits yielded 7.4 per cent, 3-months-notice accounts 5.8 per cent, and 7-days-notice accounts 4.1 per cent. In 1980, traditional banks in Jordan paid between 7 per cent and 7.5 per cent on 1-year accounts. In 1980, depositors with the Bahrain Islamic Bank received dividends of 9–9.5 per cent on deposit accounts and 5.25 per cent on savings accounts.[68] Interest rates for the same period on deposits in traditional Bahraini banks held up to 3 months were 7.5–8.0 per cent, and 8.5–9.5 per cent for deposits held 6–15 months. This evidence, however, cannot be regarded as conclusive, as rates paid on both conventional and PLS accounts were often controlled or influenced by the monetary authorities, who may have made special efforts to enhance the attractiveness of the new financial assets in the early stages of their introduction.

A further benefit could result from the introduction of PLS deposits if, for political and institutional reasons, interest rates on conventional financial instruments were "sticky," particularly in the upward direction. It has been observed that in a number of countries with traditional banking systems, rates on deposits have been kept artificially low (i.e., below what market clearing rates would be in an unregulated environment).[69] In such a situation, a PLS system without ceilings on rates of return could attract relatively more resources than a traditional banking system, especially where part of investors' windfall profits were distributed to savers. However, this does not mean that a banking system based on the PLS principle is inherently more efficient than a traditional one, but rather that a PLS system is less vulnerable to outside pressures to fix rates of return.

A strong case can be made on religious grounds for the argument that an Islamic banking system could attract resources from devout savers. In a traditional banking system, they are not willing to accept fixed interest payments on their deposits, since they

[66]These figures are the yields paid by the Habib Bank. See "8.5 to 9 P.C. Profit on PLS Accounts" (1981), pp. 1,7. Yields on PLS deposits in other banks have differed slightly.

[67]See Khouri (1981).

[68]See Bahrain Islamic Bank (1980), p. 13.

[69]This has been the case for several years in Pakistan for most types of deposits.

respect Quranic injunctions. The percentage of savers that rejects the traditional banking system on religious grounds is rather difficult to estimate. It might be higher in rural areas than in urban areas because religious laws are likely to be more strictly observed in the former. If the PLS system is introduced as a complement to the traditional banking system, overall savings held within the financial system may increase. Islamic banks would not only offer savers a variable pecuniary yield on investment deposits but also a nonpecuniary return in the form of religious satisfaction.

MONETARY POLICY IN AN ISLAMIC FINANCIAL SYSTEM

During the times of the Islamic Empire, there was a "central national finance house" called a *Bait-ul-Mal*,[70] that served as a sort of state bank. The central *Bait-ul-Mal* was always headed by the caliph and was located in the capital of the Empire, and the provincial *Bait-ul-Mals* were administered by the governors of the respective provinces. In contrast to central banks of today, the central *Bait-ul-Mal* did not have the right to issue currency. This responsibility was entrusted to the state. This function might, however, easily be transferred to a modern-day *Bait-ul-Mal* without changing its nature. The proponents of an Islamic financial system propose that an Islamic central bank provide credit to the member banks on a PLS basis.[71] Monetary policy instruments that involve the application of fixed interest rates would not be used. Consequently, instruments such as open market operations and rediscounting of bills and securities would not be allowed. Instead, moral suasion supported by prescribed asset ratios would be emphasized as a method of credit control.[72]

IV. Conclusions and Outlook

The description of an Islamic financial system based on the PLS principle has revealed a number of unresolved issues in the practical handling of banking operations. In particular, full application of the PLS system would present problems in remunerating short-

[70]See Qureshi (1967), p. 130, and Mannan (1970), p. 236.
[71]See Mannan (1970), p. 238.
[72]*Ibid.*

term loans for industry and commerce as well as consumer credit. Even if it were possible to compute profits and losses for very short periods by using sophisticated equipment and accounting systems, it is doubtful whether the variable return on loans would accurately reflect the scarcity price of financial capital. The remuneration paid on loans does not necessarily correspond to the opportunity cost of capital. Since profits are earned by all factors of production, the assignment of a residual to borrowed funds might be incorrect.

Another problem that has not been dealt with explicitly would be posed by foreign activities of Islamic banks. In Islamic jurisprudence, transactions between Islamic countries and those between Islamic and non-Islamic countries have to be treated differently.[73] Investments abroad by the Islamic Development Bank yielding fixed rates of interest are in conformity with Islamic principles. Interest earnings, however, have been kept in a special account outside the Bank's general account. In recent months, there has been a movement under way to adapt even transactions with non-Islamic foreign banks to the PLS system.[74]

The analysis of the effects of the PLS system on savers, banks, and investors has revealed that the system's impact depends on the nature of the new financial instruments devised and the manner in which the system develops. If the PLS system is introduced on an optional basis, it seems likely that the enlargement of choice will have generally beneficial consequences, particularly for savings. Furthermore, increased investment could result from the role played by Islamic banks in the promotion of entrepreneurship. A complete conversion to a PLS system, however, would require satisfactory handling of several issues that are as yet unresolved, particularly those concerning the allocation and remuneration of short-term financing.

It is difficult to make any assessment of the prospects for the financial success of Islamic banks working on a PLS basis, since information on their performance is rather sparse. The limited evidence demonstrates that Islamic banks are able to compete with traditional banks. However, it appears that adequate solutions to a number of problems that would be presented by a complete conversion of the financial system have yet to be found.

[73]Fakhrul Ahsan (1978), p. 6.
[74]"Bankers Discuss Islamic Principles" (1981), p. 21.

APPENDIX

TABLE 1. ISLAMIC FINANCIAL INSTITUTIONS[1]

Institution[2]	Capital	Shareholders	Main Operations
Abu Dhabi Islamic Bank (ADIB)			
Bahrain Islamic Bank (BIB), 1979	BD 23 million	Bahraini individuals and state organizations Kuwait Finance House and Kuwaiti state institutions Islamic Development Bank Dubai Islamic Bank	
Bahrain Islamic Investment Company (BIIC), 1980	BD 5 million	Bahrain Islamic Bank, 20 per cent Other Bahraini institutions, 31 per cent Kuwait Finance House, 20 per cent Other Kuwaiti institutions, 14 per cent Dubai Islamic Bank, 15 per cent	Trading in gold and commodities; dealing in real estate.
Bankers Equity, Ltd. Pakistan			
Banque Misr, Egypt, 1920			Islamic banking operations (since 1980) in addition to traditional banking, investment, and insurance activities.
Dubai Islamic Bank, United Arab Emirates, 1975		Rulers of Dubai and Kuwait, 20 per cent Private citizens, 80 per cent	

Faisal Islamic Bank of Egypt, 1977		Egyptians, 51 per cent Saudi Arabians and others, 49 per cent	
Faisal Islamic Bank of the Sudan (FIBS), 1978		Middle Eastern nationals	All national and international banking operations (3 per cent of the Sudanese banking system's deposits and claims).
House Building Finance Corporation (HBFC), Pakistan			Constructing and purchasing houses.
International Islamic Bank of Investment and Development, Egypt, 1980		Reisdent and nonresident Egyptians	
Investment Corporation of Pakistan (ICP)			Underwriting and arranging new capital issues; floating mutual funds; managing investment portfolios of individual investors.
Islamic Development Bank (IDB), Saudi Arabia, 1975	ID 2 billion[3]	Saudi Arabia, 26.22 per cent United Arab Emirates, 14.42 per cent Kuwait, 13.11 per cent Libya, 16.38 per cent Other 29 member states of the Islamic Conference, 29.87 per cent	Financing of international development, mainly in Moslem countries; trade financing; joint financing.
Islamic Finance House (IFH), Bahamas, 1981	US$1 billion	Kuwait, 25 per cent Islamic Investment Company Other Arabs	Lending in Arab, Islamic, and other developing countries.
Islamic International Bank for Investment and Development, Egypt, 1980	US$12 million	Egyptians	Financing development projects in Egypt.

TABLE 1 (*concluded*). ISLAMIC FINANCIAL INSTITUTIONS[1]

Institution[2]	Capital	Shareholders	Main Operations
Islamic Investment Company, Ltd., United Arab Emirates, 1978			All investment operations complying with Islamic principles.
Jordan Islamic Bank for Finance and Investment, 1978	JD 18.5 million[4]	Jordanians, 98.7 per cent Housing Bank of Jordan, 1.3 per cent	Financing trade, mainly imports.
Kuwait Finance House (KFH), 1979		Kuwaiti government agencies, 49 per cent Kuwaiti nationals, 51 per cent	All banking operations.
Nasser Social Bank, Egypt, 1971		Egyptian Government	All banking operations.
National Investment Trust (NIT), Pakistan			Investing in the corporate sector.
Qatar Islamic Bank			
Sipah Islamic Bank of Iran, 1979			
Small Business Finance Corporation (SBFC), Pakistan			Financing purchases of equipment.

[1]Information not included in the table was not available.
[2]Years following the names of institutions are those in which they were founded.
[3]Figure is in Islamic Dinars.
[4]Total balance sheet.

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SUMMARIES

Exchange Rate Dynamics and the Overshooting Hypothesis—JACOB A. FRENKEL and CARLOS A. RODRIGUEZ (pages 1–30)

This paper analyzes the determinants of the evolution of exchange rates within the context of alternative models of exchange rate dynamics. The overshooting hypothesis is examined in models that emphasize differential speeds of adjustment in asset and goods markets as well as in models that emphasize portfolio-balance considerations. It is shown that exchange rate overshooting *is not* an intrinsic characteristic of the foreign exchange market and that it depends on a set of specific assumptions. It is also shown that the overshooting *is not* a characteristic of the assumption of perfect foresight, nor does it depend in general on the assumption that goods and asset markets clear at different speeds. As long as the speeds of adjustment in the various markets are less than infinite, the key factor determining the short-run effects of a monetary expansion is the degree of capital mobility. When capital is highly mobile, the exchange rate overshoots its long-run value, and when capital is relatively immobile, the exchange rate undershoots its long-run value. Within the context of the portfolio-balance model, it is shown that the effects of a monetary expansion on the dynamics of exchange rates, and in particular on whether exchange rates overshoot or undershoot their equilibrium path, depend critically on the specification of asset choice, on the degree of substitution among assets, and on the quality of the various assets as hedges against inflation. Specifically, when internationally traded goods are a better hedge against inflation than nontraded goods, the nominal exchange rate overshoots the domestic price level, and conversely.

Interest Rate Consequences of Targeting Money—WARREN L. COATS, JR. (pages 31–47)

This paper examines the implications of pursuing monetary targets for the behavior of interest rates in the vastly differing economic and political environments found among countries. This behavior depends on the economic environment in which the policy is undertaken. The simultaneous pursuit of interest rate and monetary targets (by means of monetary policy alone) is not generally possible, except in a limited way, even in the most isolated, financially undeveloped economies. For this reason the major interest rate issue associated with targeting money for those countries with developed financial markets is its consequence for the volatility of rates. In examining the underlying relationships that link monetary and interest rate behavior in an effort to assess the magnitude of the impact of monetary targeting on interest rate volatility, several shortcomings of the existing literature are presented. When these shortcomings are taken into account (or are corrected), the earlier assessments that interest rates

would be "much" more volatile are "greatly" attentuated. The paper concludes that while monetary targets may increase interest rate volatility somewhat, that increase should be modest.

Interest Rate Policies in West Africa—SERGIO PEREIRA LEITE (pages 48–76)

Formulation and implementation of interest rate policies are extremely important in less developed countries from the point of view of promotion of savings, allocation of resources, and the control of inflationary pressures. The crucial question is how to ensure realistic interest rate policies in less developed countries where market imperfections and oligopolistic banking structures are dominant. Admittedly, leaving determination of interest rates to market forces in such conditions is not practical, and government intervention of some sort is unavoidable. However, it is important that this intervention be distortion attenuating instead of distortion accentuating. For this reason, it seems essential to devise a set of criteria that could be used by the authorities in less developed countries to determine the level and structure of interest rates. Four main criteria are suggested as guidelines for determining adequate interest rates: (a) positive real rates of interest; (b) world interest rates corrected for exchange rate expectations; (c) rates of return on investment; and (d) the spread between borrowing and lending rates. However, the importance of these criteria may vary somewhat from country to country, and the weight attached to each of them is judgmental. The relevance of the central government budget and the public sector investment policy is also highlighted. The interest rate structures in ten West African countries chosen to provide varying institutional and policy frameworks are examined in light of the analytical considerations mentioned above.

Potential of External Financial Markets to Create Money, Credit, and Inflation—D.F.I. FOLKERTS-LANDAU (pages 77–107)

In this paper it is argued that neither the earlier Phillips type of fixed-coefficient or temporary equilibrium models nor the recent Tobin type of portfolio equilibrium models of the money supply process capture the money and credit creating potential of external financial markets. A partial equilibrium nature confines both types of model to an analysis of the effects on money and credit aggregates of an exogenous transfer of domestic deposits to an external bank intermediary. This literature thus offers no insight into the determination of the rate or volume at which deposits are transferred.

While it can be shown that the external money multiplier is less than unity, it is not possible to derive similar quantitative bounds for the rate at which deposits are shifted toward external financial markets. Innovations in the technology of external financial transactions, extended lender-of-last-resort facilities, and a better definition of the legal responsibilities of domestic banks toward external subsidiaries have reduced the transaction and risk costs of externally issued deposit liabilities. We outline a general equilibrium model of an international financial markets equilibrium in which such developments can be analyzed.

The contribution of the expansion in the liabilities of external depository intermediaries to domestic price inflation is determined by the growth of the

portion of their monetary liabilities that is readily substitutable for the monetary liabilities of domestic intermediaries and is used in domestic transactions. Some numerical estimates for the United States are derived. The indirect inflationary potential of external financial markets, which arises from the possibility that the growth of external markets has made some types of monetary policy more inflationary, is then evaluated. In particular, the definition and measurement of the relevant money and credit aggregates has become much more difficult. Increased international mobility of capital, as well as the substitutability of assets denominated in different currencies, may have resulted in increased exchange market intervention or increased exchange rate variability. In the presence of asymmetries in the efforts to sterilize the monetary effects of exchange market intervention or asymmetries in the dynamics of domestic prices, increases in capital mobility will exert inflationary pressures.

Islam and Financial Intermediation—INGO KARSTEN (pages 108–42)

This paper describes a number of steps that have been taken toward the Islamization of the financial system in Moslem countries; reviews some of the practical issues that have to be resolved; and analyzes the implications for savings, investment, and the development process. Particular attention is paid to the Pakistani model.

The main focus of the paper is on the abolition of *Riba*—the payment of fixed interest. Consideration is given to the social reasons for the abolition of *Riba* and the alternative forms of financial return, such as profit-and-loss sharing (PLS), that are consistent with Islamic injunctions. A description is provided of the new financial instruments that have been developed in Pakistan and the problems that arise in converting various banking sector assets and liabilities to a PLS basis.

In analyzing the implications of shifting the basis of banking sector operations to PLS, the paper notes the important distinction between a system in which profit-and-loss-sharing operations are optional and one in which all banking sector transactions are on this basis. Possible advantages of increased availability of profit-and-loss-sharing operations are, under certain circumstances, greater protection of *ex post* real rates of return against the effects of unexpected changes in the rate of inflation; greater *de facto* rate flexibility in circumstances where nominal yields are "sticky"; greater involvement of financial intermediaries in the financial performance of borrowers; and the attractiveness of new financial instruments to savers who have religious inhibitions concerning conventional interest-bearing assets.

Problems that have yet to be resolved include how to attribute the profits and losses of borrowers to individual sources of borrowed funds (particularly of short-term loans) and how to ensure that the uncertainties implicit in a PLS system do not undermine savings incentives.

RESUMES

La dynamique des taux de change et l'hypothèse du surajustement — JACOB A. FRENKEL et CARLOS A. RODRIGUEZ (pages 1–30)

La présente étude analyse les déterminants de l'évolution des taux de change dans le cadre de nouveaux modèles de la dynamique des taux de change. L'hypothèse du surajustement est examinée dans des modèles qui mettent l'accent sur les vitesses d'adaptation différentes observées pour les marchés des biens et les marchés des actifs financiers ainsi que dans des modèles qui font appel à des considérations relatives à l'équilibre de protefeuille. Il est montré que le surajustement du taux de change *n'est pas* une caractéristique intrinsèque du marché des devises et qu'il dépend d'une série d'hypothèses spécifiques. Il ressort aussi que le surajustement *n'est pas* une caractéristique de l'hypothèse de la prévision parfaite et ne dépend généralement pas de l'hypothèse selon laquelle l'ajustement des marchés des biens et celui des marchés des actifs financiers se font à des vitesses différentes. Tant que les vitesses d'ajustement des différents marchés sont inférieures à l'infini, le facteur clé qui détermine les effets dans le court terme d'une expansion monétaire est le degré de mobilité des capitaux. Lorsque les capitaux sont extrêmement mobiles, il se produit un surajustement du taux de change par rapport à sa valeur à long terme et lorsque les capitaux sont relativement peu mobiles, il se produit un ajustement insuffisant du taux de change par rapport à sa valeur à long terme. Dans le cadre du modèle d'équilibre de portefeuille, on constate que les effets d'une expansion monétaire sur la dynamique des taux de change et en particulier sur la possibilité d'un surajustement ou d'un ajustement insuffisant des taux de change par rapport à leur niveau d'équilibre, dépendent essentiellement de la spécification du choix de l'actif financier, du degré de substitution qui existe entre les actifs et de la qualité des différents actifs en tant que protection contre l'inflation. En particulier, lorsque les biens faisant l'objet d'échanges internationaux offrent une meilleure protection contre l'inflation que les biens non échangés, il se produit un surajustement du taux de change nominal par rapport au niveau des prix intérieurs et inversement.

Conséquences de la fixation d'objectifs monétaires sur les taux d'intérêt — WARREN L. COATS, JR. (pages 31–47)

La présente étude examine les implications que peut avoir la fixation d'objectifs monétaires quantitatifs sur le comportement des taux d'intérêt compte tenu des conditions économiques et politiques extrêmement différentes qui existent d'un pays à l'autre. Ce comportement dépend de la situation économique dans laquelle se trouve le pays lorsque les autorités appliquent leur politique. La poursuite simultanée d'objectifs en matière de taux d'intérêt et d'objectifs monétaires (seulement au moyen de la politique monétaire) n'est

généralement pas possible, excepté de façon limitée, même dans les économies les plus isolées et financièrement peu développées. C'est pourquoi, le problème majeur que pose pour les taux d'intérêt la fixation d'objectifs monétaires dans les pays pourvus de marchés financiers développés est l'incidence de ces objectifs sur la stabilité des taux d'intérêt. L'examen des relations fondamentales entre l'évolution des agrégats monétaires et le comportement des taux d'intérêt entrepris dans le souci d'évaluer l'ampleur des effets de la fixation d'objectifs monétaires sur la stabilité des taux d'intérêt, fait apparaître plusieurs lacunes dans les travaux consacrés à ce sujet. Si l'on tient compte de ces lacunes (ou si l'on y remédie), les assertions initiales selon lesquelles les taux d'intérêt seraient "nettement" plus instables, se trouvent "fortement" atténuées. L'étude conclut que si les objectifs monétaires peuvent quelque peu accroître l'instabilité des taux d'intérêt, cet accroissement devrait être faible.

Politiques de taux d'intérêt dans les pays de l'Afrique de l'Ouest — SERGIO PEREIRA LEITE (pages 48–76)

La formulation et l'application des politiques de taux d'intérêt revêtent une importance capitale dans les pays les moins développés en raison de leurs répercussions sur l'incitation à l'épargne, la répartition des ressources et le contrôle des pressions inflationnistes. La question cruciale est donc : comment faire pour que les politiques de taux d'intérêt soient réalistes dans les pays les moins développés, où les imperfections du marché et les structures bancaires oligopolistiques ont une incidence prédominante. Il faut reconnaître que, dans de telles conditions, il n'est pas pratique de laisser les forces du marché déterminer les taux d'intérêt et qu'une intervention de l'Etat, sous une forme ou une autre, est inévitable. Toutefois, il importe que cette intervention ait pour effet d'atténuer les distorsions et non de les accentuer. Il semble donc essentiel d'établir un ensemble de critères que les autorités pourront utiliser pour déterminer le niveau et la structure des taux d'intérêt dans les pays les moins développés. L'auteur propose quatre critères principaux sur lesquels les autorités peuvent s'appuyer pour déterminer les taux d'intérêt adéquats. Ce sont : a) les taux d'intérêt réels positifs; b) les taux d'intérêt mondiaux, corrigés pour tenir compte des anticipations relatives au taux de change; c) les taux de rentabilité des investissements; et d) l'écart entre les taux emprunteurs et les taux prêteurs. Toutefois, l'importance de ces critères peut varier légèrement d'un pays à l'autre et le poids qu'il convient d'attribuer à chacun d'eux est une question de jugement. L'auteur souligne, en outre, l'importance que revêtent la politique budgétaire de l'administration centrale et la politique d'investissement du sectuer public. Il examine la structure des taux d'intérêt dans dix pays d'Afrique de l'Ouest qu'il a choisis en raison de la diversité de leur cadre institutionnel et de leur politique générale, et compte tenu des considérations d'ordre analytique mentionnées ci-dessus.

Evaluation du potentiel inflationniste des marchés financiers extérieurs — D.F.I. FOLKERTS-LANDAU (pages 77–107)

Dans la présente étude, l'auteur fait valoir que ni les modèles antérieurs d'équilibre temporaire à coefficient fixe du type Phillips, ni les récents modèles

d'équilibre du portefeuille du type Tobin, élaborés dans le cadre de l'analyse du mécanisme de l'offre de monnaie, n'appréhendent la création potentielle de monnaie et de crédit par les marchés financiers extérieurs. N'offrant qu'un équilibre partiel, les deux types de modèles se bornent à analyser les effets exercés sur les agrégats de la monnaie et du crédit quand des dépôts intérieurs sont transférés à l'étranger à un intermédiaire bancaire. Ils n'expliquent donc pays le rythme auquel les dépôts sont transférés ou le volume de ces transferts.

On peut montrer que le multiplicateur de monnaie externe est inférieur à l'unité, mais il n'est pas possible d'établir des limites quantitatives analogues pour le rythme auquel les dépôts sont transférés vers les marchés financiers extérieurs. Les innovations dans le domaine de la technologie des transactions financières extérieures, les facilités élargies de prêteur en dernier ressort et une meilleure définition des responsabilités juridiques des banques nationales à l'égard de leurs filiales à l'étranger ont réduit le coût des transactions et du risque en ce qui concerne les engagements à vue émis á l'étranger. L'auter présente les grandes lignes d'un modèle d'équilibre général des marchés financiers internationaux dans le cadre duquel on peut analyser cette évolution.

La contribution à l'inflation intérieure de l'accroissement des engagements à l'étranger des intermédiaires financiers est déterminée par la croissance de la fraction de leurs engagements monétaires qui peut être facilement substituée aux engagements monétaires des intermédiaires intérieurs et qui est utilisée dans les transactions intérieures. L'auteur établit quelques estimations chiffrées pour les Etats-Unis. Il évalue ensuite le potentiel inflationniste indirect des marchés financiers extérieurs, qui résulte du fait que l'expansion des marchés extérieurs peut accroître le caractère inflationniste de certains types de politique monétaire. Il est devenu notamment beaucoup plus difficile de définir et de calculer les agrégats pertinents de la monnaie et du crédit. L'accroissement de la mobilité des capitaux internationaux ainsi que la possibilité de substituer des actifs libellés en différentes monnaies peuvent être traduits par une intervention plus massive sur les marchés des changes ou une plus grande variabilité des taux de change.

L'Islam et l'intermédiation financière — INGO KARSTEN (pages 108–42)

Dans la présente étude, l'auteur décrit un certain nombre de dispositions qui ont été prises et qui ont pour objet d'islamiser le système financier dans les pays musulmans; il examine en outre certains problèmes d'ordre pratique qu'il faudra résoudre et analyse les conséquences que ce mouvement entraîne pour l'épargne, l'investissement et le processus de développement. Pour illustrer ses observations, l'auteur s'appuie tout particulièrement sur le modèle pakistanais.

L'étude porte principalement sur l'abolition du *Riba* — paiement d'un intérêt fixe. Elle expose les raisons qui, du point de vue social, justifient la suppression de ce système et examine d'autres formes de rendement financier — le partage des profits et pertes, par exemple — compatibles avec les exigences de la morale islamique. L'auteur décrit les nouveaux instruments financiers qui ont été mis au point au Pakistan, et les problèmes que pose l'adaptation des divers éléments de l'actif et du passif des banques au système du partage des profits et pertes.

Dans son analyse des conséquences qu'entraîne l'adaptation des opérations bancaires au système du partage des profits et pertes, l'auteur fait ressortir l'importante distinction qui existe entre un système dans lequel les opérations

sous forme de partage des profits et pertes sont facultatives et un système dans lequel toutes les opérations bancaires s'effectuent sur la base de ce partage. Dans certaines conditions, l'extension des opérations sous forme de partage des profits et pertes peut présenter des avantages : elle peut accroître la protection du taux de rendement réel *ex post* contre les effets de variations imprévues du taux d'inflation, accroître le degré de souplesse effective des taux lorsque les rendements nominaux sont "rigides", intensifier le rôle des intermédiaires financiers dan l'activité financière des emprunteurs, enfin, doter les nouveaux instruments financiers d'un attrait spécial aux yeux des épargnants qui, par scrupules religieux, renoncent à acquérir des actifs traditionnels rémunérés.

Certains problèmes inhérents au système du partage n'ont pas encore été résolus; il faudra notamment déterminer de quelle façon doit s'effectuer la répartition des profits et pertes des emprunteurs entre les divers bailleurs de fonds (en particulier les fonds à court terme) et quels moyens il convient d'adopter pour veiller à ce que les incertitudes implicitement liées à un système de partage des profits et pertes ne détournent pas les sujets économiques de l'épargne.

RESUMENES

La dinámica de los tipos de cambio y la hipótesis del ajuste excesivo
—JACOB A. FRENKEL y CARLOS A. RODRIGUEZ (páginas 1–30)

En este trabajo se analizan los factores determinantes de la evolución de los tipos de cambio dentro del contexto de diferentes modelos de dinámica del tipo de cambio. Se examina la hipótesis del ajuste excesivo en modelos que hacen hincapié en las diferencias en la velocidad de ajuste en los mercados de activos financieros y de bienes, y en modelos que atribuyen gran importancia a los aspectos del equilibrio de cartera. Se demuestra que el ajuste excesivo del tipo de cambio *no es* una característica intrínseca del mercado de divisas y que depende de una serie de supuestos específicos. También se demuestra que el ajuste excesivo *no es* una característica del supuesto de previsión perfecta, y que no depende en general del supuesto de que en los mercados de bienes y de activos financieros la oferta y la demanda se equilibran a velocidades diferentes. Mientras las velocidades de ajuste de los diferentes mercados sean inferiores a infinito, el factor clave que determina los efectos a corto plazo de una expansión monetaria es el grado de movilidad del capital. Cuando el capital tiene mucha movilidad, el tipo de cambio sobrepasa su valor a largo plazo, y cuando el capital se mantiene relativamente inmóvil, el tipo de cambio no alcanza dicho valor. Dentro del contexto del modelo de equilibrio de cartera, se demuestra que los efectos de una expansión monetaria en la dinámica de los tipos de cambio y, en particular, en la posibilidad de que los tipos de cambio sobrepasen o no alcancen su línea de equilibrio, dependen crucialmente de cómo se especifique la elección de activos, del grado de sustitución entre los activos y de la calidad de los diferentes activos en cuanto protección contra la inflación. En particular, cuando los bienes que son objeto de comercio internacional constituyen una mejor protección contra la inflación que los bienes que no lo son, el tipo de cambio nominal sobrepasa el nivel de los precios internos, y viceversa.

Efecto de las metas monetarias en los tipos de interés—WARREN L. COATS, JR. (páginas 31–47)

En este estudio se analiza la repercusión de la fijación de metas monetarias en el comportamiento de los tipos de interés dentro de la gran variedad de contextos económicos y políticos de los diversos países. Dicho comportamiento depende del marco económico en al cual se aplican las medidas monetarias. En general, aun en las economías más aisladas y financieramente subdesarrolladas, no es posible fijar simultáneamente metas para los tipos de interés y la oferta monetaria (valiéndose únicamente de la política monetaria). Por esta razón el principal problema de los tipos de interés vinculado con las metas monetarias en los países que cuentan con un mercado financiero desarrollado es la repercusión de dichas metas en lo que se refiere a la volatilidad de los tipos de interés. Al

examinar la relación fundamental que vincula el comportamiento monetario con el de los tipos de interés en un esfuerzo por evaluar la magnitud de la repercusión de la fijación de metas monetarias en la volatilidad de los tipos de interés, se hacen notar varias deficiencias de los estudios existentes. Al tener en cuenta (o corregir) estas deficiencias, la conclusión tradicional de que los tipos de interés serían "mucho" más volátiles se ve "notablemente" atenuada. Finalmente, se concluye an el estudio que, si bien es posible que las metas monetarias aumenten en cierta medida la volatilidad de los tipos de interés, este aumento sería moderado.

Las políticas de tipos de interés en los países de Africa occidental —SERGIO PEREIRA LEITE (páginas 48–76)

La formulación y puesta en práctica de las políticas de tipos de interés son sumamente importantes en los países en desarrollo, desde el punto de vista del fomento del ahorro, la asignación de recursos y el control de las presiones inflacionarias. El aspecto fundamental es cómo establecer políticas realistas de tipos de interés en los países en desarrollo, en los cuales existen imperfecciones en los mercados y estructuras bancarias oligopolistas. Se reconoce que, en esas circunstancias, no es práctico dejar la determinación de los tipos de interés a las fuerzas del mercado y que la intervención estatal —de una u otra forma— es inevitable. No obstante, es importante que esa intervención atuenúe las distorsiones y no las acentúe. Por esta razón, parece indispensable establecer un conjunto de criterios que las autoridades de los países en desarrollo puedan aplicar para determinar el nivel y la estructura de los tipos de interés. Se sugieren, como orientación general, cuatro criterios principales para determinar los tipos de interés adecuados: a) tipos de interés reales positivos; b) tipos de interés mundiales corregidos para tener en cuenta las expectativas en cuanto al tipo de cambio; c) tasas de rentabilidad de la inversión y d) la diferencia entre los tipos de interés aplicables a los préstamos obtenidos y a los concedidos. Sin embargo, la importancia de estos criterios puede variar de un país a otro y la importancia relativa que se asigne a cada uno es subjetiva. También se señala la importancia del presupuesto del gobierno central y la política de inversión del sector público. Se examina la estructura de los tipos de interés de diez países de Africa occidental —seleccionados en función de sus diferentes marcos institucionales y de política— teniendo presentes las consideraciones analíticas antes mencionadas.

Potencial de los mercados financieros externos para la creación de dinero, crédito e inflación—D.F.I. FOLKERTS-LANDAU (páginas 77–107)

En este trabajo se aduce que ni los modelos anteriores tipo Phillips de coeficiente fijo o de equilibrio temporal ni los modelos más recientes tipo Tobin de equilibrio de cartera del proceso de la oferta monetaria captan el potencial de los mercados financieros externos en lo que respecta a crear dinero y crédito. La condición de equilibrio parcial limita ambos tipos de modelo a un análisis de los efectos que la transferencia exógena de depósitos internos a un intermediario bancario externo produce en los agregados monetarios y crediticios. Por con-

siguiente, lo que se ha escrito en este sentido no da ninguna idea de la determinación del ritmo a que se transfieren los depósitos o del volumen de los mismos.

Si bien se puede demostrar que el multiplicador externo del dinero es inferior a la unidad, no es posible calcular límites cuantitativos semejantes del ritmo a que los depósitos se desplazan hacia los mercados financieros externos. Con las innovaciones tecnológicas en las transacciones financieras externas, la ampliación de los servicios de prestamista de última instancia y una definición jurídica más precisa de las responsabilidades de los bancos internos ante las sucursales en el exterior se han reducido el costo y el riesgo de las transacciones relacionadas con obligaciones por depósitos emitidas en el exterior. Se esboza un modelo de equilibrio general en el cual los mercados financieros internacionales están en equilibrio y se pueden analizar estas cuestiones.

La medida en que el aumento de las obligaciones de los intermediarios externos que reciben depósitos contribuye a la inflación interna de precios viene determinada por el aumento de la proporción de sus pasivos monetarios que puede sustituir fácilmente a los pasivos monetarios de los intermediarios internos y ser utilizada en transacciones internas. Se obtienen algunas estimaciones numéricas correspondientes a Estados Unidos. Luego se evalúa el potencial inflacionario indirecto de los mercados financieros externos, que tiene su origen en la posibilidad de que, con la expansión de los mercados externos, algunos tipos de política monetaria resulten más inflacionarios. En particular, se ha tornado mucho más difícil definir y medir los agregados monetarios y crediticios pertinentes. Es posible que la mayor movilidad de los capitales internacionales y la posibilidad de sustitución entre activos denominados en monedas distintas hayan causado una mayor intervención en los mercados de divisas o un aumento de la variabilidad de los tipos de cambio. Se exiten asimetrías en los esfuerzos por neutralizar los efectos monetarios de la intervención en los mercados de divisas, o asimetrías en la dinámica de los precios internos, el aumento de la movilidad del capital ejercerá presiones inflacionarias.

Islamiso e intermediación financiera—INGO KARSTEN (páginas 108–42)

En este artículo se describen varias medidas que se han tomado para islamizar el sistema financiero en los países musulmanes, se examinan algunas cuestiones prácticas que hay que resolver y se analizan las repercusiones de todo esto en el ahorro, la inversión y el proceso de desarrollo. Se señala especialmente el caso de Pakistán.

El estudio se centra principalmente en la eliminación del pago de intereses fijos, denominados *riba* en árabe. Se examinan las razones sociales que justifican la eliminación de los *riba* y otras formas de rentabilidad financiera, como por ejemplo las utilidades y pérdidas compartidas, que están en consonancia con los preceptos del islamismo. Se describen los nuevos instrumentos financieros que ha creado Pakistán y los problemas que se presentan al couvertir diversos activos y pasivos del sector bancario al sistema de ganancias y pérdidas compartidas.

Al analizar las repercusiones de la transición de las operaciones bancarias al sistema de ganancias y pérdidas compartidas, en este trabajo el autor señala la importante diferencia entre un sistema en que las operaciones del tipo de ganancias y pérdidas compartidas son facultativas y un sistema en que todas las

transacciones del sector bancario se efectúen de este modo. Entre las posibles ventajas de la ampliación de la gama de operaciones del tipo de ganancias y pérdidas compartidas se cuentan, en ciertas circunstancias, la mayor protección de las tasas de rentabilidad real *ex post* contra variaciones inesperadas de la tasa de inflación; una mayor flexibilidad *de facto* del interés cuando los tipos nominales "no reaccionan" fácilmente; mayor interés de los intermediarios financieros por los resultados financieros que obtengan los prestatarios y las ventajas que tendrían los nuevos instrumentos financieros para los ahorradores que se sientan restringidos por su religión en lo que respecta a los activos tradicionales que devengan intereses.

Entre los problemas que quedan por resolver se cuentan el de la forma de distribuir las ganancias y pérdidas de los prestatarios entre las distintas fuentes de fondos obtenidos en préstamo (especialmente en el caso de los préstamos a corto plazo) y el de la forma de impedir que la incertidumbre inherente al sistema de ganancias y pérdidas compartidas menoscabe el incentivo al ahorro.

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