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Why floating exchange rates fail

WHY FLOATING EXCHANGE RATES FAIL

by

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Abstract

A floating exchange rate is one where the monetary authorities neither intervene in the foreign exchange market, nor do they adjust the domestic money supply to smooth exchange-rate fluctuations.

Under the conditions prevailing in the commodity and asset markets of the major industrial economies, I show that a floating rate is an inefficient mechanism for balancing international payments. The comparative political or economic riskiness of holding financial assets in different countries changes continually. But domestic money supplies and national interest rates cannot vary to provide the necessary offsetting risk premia demanded by international investors. The result is inherently high exchange-rate volatility -"overshooting"- that distorts the flow of international commodity trade and causes cycles of unanticipated inflation and deflation in any open economy.

WHY FLOATING EXCHANGE RATES FAIL (*)

I shall first give a nontechnical overview of why floating fails, and then build an analytical model that demonstrates more formally the problems with interest-rate immobility and exchange-rate overshooting.

1 - A Liquidity Trap for the Domestic Rate of Interest

In the international capital market, interest rates would seem to be natural shock absorbers for balancing currency risk in the short run relevant for exchange-rate determination. If dollar bonds suddenly looked more risky relative to sterling bonds, a rise in interest rates in the United States and a fall in Britain could automatically balance international asset portfolios.

Under a floating exchange rate, however, interest rates in each national money market behave as if caught in a liquidity trap. Nominal money supplies remain fixed and domestic-currency prices of the broad range of goods and services are sticky in the short run. Thus, each country's real money stock is invariant to surprise shifts in international portfolio preferences and to unanticipated exchange-rate fluctuations.

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With unchanging real money, each national interest rate is dominated by domestic transactors balancing their liquidity preference between stocks of domestic bonds and money. By itself, the national rate of interest is incapable of equilibrating the domestic money market on the one hand and the international bond market on the other.

This effect is somewhat analogous to the closed-economy Keynesian idea of a liquidity trap: at a full-employment level of income, the rate of interest can't balance liquidity preference between the stocks of bonds and money as well as balance the flow of loanable funds linking current saving to current investment (Keynes, 1936). Unlike the Keynesian liquidity trap, however, this open-economy one does not depend on a very low nominal rate of interest where the interest elasticity of the demand for domestic money becomes infinite. Under a floating exchange rate, an impasse in the international bond market exists at any plausible level of domestic interest rates.

For example, suppose international investors suddenly switch their portfolio preferences from bonds denominated in currency A -- say B_a with interest rate i_a -- to those denominated in currency B -- B_b with interest rate i_b. (In the short run, the private market can't significantly alter the available stocks of B_a and B_b). Financial efficiency requires that domestic interest rates change to reflect this altered assessment of international risk: i_a should increase to reflect the increased relative riskiness of holding B_a, and i_b should fall because assets denominated in currency B are now viewed as a safer haven. But, being caught in its domestic liquidity trap, each national interest rate fails to adjust sufficiently. Indeed, under certain plausible circumstances discussed below, national interest rates could move in the wrong direction: i_a tends to fall and i_b tends to rise!

Therefore, the floating exchange rate bears the whole burden of rebalancing the demands of international bond holders in the short run. Instead of i_a increasing relative to i_b, currency A depreciates against currency B and "overshoots" to the point where people anticipate that currency A is likely to appreciate in the near future. This expectation increases the relative yield on B_a and restores ex ante balance to international bond portfolios. In effect, discrete exchange-rate changes -- which overshoot sufficiently to create expectations of regression to a more "normal" level -- substitute for immobilized national interest rates in providing flexible risk premiums for compensating international investors. But such exchange rate surprises cause unwarranted disruption in national and international flows of goods and services.

There is a better way. For financial assets denominated in different currencies, flexibility in their rates of interest is the preferred short-run shock absorber for balancing the political and economic riskiness of holding interest-bearing assets in country A compared to country B. But this flexibility requires that the central bank stabilize the exchange rate by letting the national money supply vary in response to unexpected shifts in private international portfolio preferences. In our example of such a shift from B_a to B_b, the central bank should contract the national supply of noninterest-bearing money in country A, and the authorities in country B should behave symmetrically by expanding theirs, in order to stabilize the exchange rate between them. Only then can i_a increase and i_b decrease in an appropriately balancing fashion.

Whence my paradoxical conclusion that the correct "market" solution, which releases national interest rates from their respective liquidity traps, requires official intervention to stabilize the exchange rate.

2 - The Illusion of National Autonomy

But isn't monetary sovereignty undermined if the domestic money supply varies continually in order to maintain a stable exchange rate? Even for highly open economies, subordinating short-run changes in the national money supply to political or economic disturbances in international asset preferences seems to let the tail wag the dog.

Why should the Bank of England stand ready to increase the sterling money supply when it appears a conservative government will replace a socialist one, or when an unexpected increase in the international price of oil suddenly augments the perceived value of British oil reserves? In 1979, both these political and economic shocks caused a dramatic switch in international portfolio preferences in favor of sterling assets. However, the Bank of England failed to prevent sterling from appreciating, by attempting to adhere to its predetermined monetarist growth path rather than undertaking a once-and-for-all expansion of the money supply. The result was a precipitous rise in sterling's value from $1.90 in 1978 to almost $2.40 in 1980. Less well known was the increase in sterling interest rates in 1979 and early 1980 <u>despite</u> the increased international portfolio demand for sterling assets. (Under a regime of optimal and stable exchange rates, British interest rates would have fallen). The combination of an overvalued currency and high interest rates then severely depressed the British economy in 1979 and 1980 -- well before the worldwide slump of 1981-82.

The moral of this story (and its close parallel with the unexpected appreciation of the dollar in 1981-82 severely depressing the American economy in 1982 and early 1983) is that monetary autonomy among financially open economies is illusory.

Unless central banks adjust their national money growth rates, at least in part, to the need for balancing international payments, individual economies will be continually hit with unexpected inflations or deflations. It matters not whether these international disturbances are "real" shocks to trade flows or a changed assessment of national monetary policy in the future. Under floating, ephemeral changes in political and economic expectations of what currency is the safer haven will unnecessarily disturb domestic income and prices.

3 - Indirect Currency Substitution and the Need for Monetary Coordination

How best to maintain macroeconomic stability can be recast in monetary terms. The primary job of any central bank is to balance the demand and supply of domestic money at a stable price level. For hard-currency industrial economies whose central banks control the rate of domestic money issue[1/], accurately predicting when the short-run demand for domestic money is changing -- perhaps cyclically -- is the key operational problem. Only by accomodating these changes in money demand can the central bank avoid unexpected inflation or deflation.

Fortunately, for financially open economies, changes in the exchange rate indicate shifts in the domestic money demand. When upward pressure in the foreign exchanges indicates that this demand has unexpectedly increased, the central bank should respond by increasing its supply. The easiest way to do this is to intervene directly against the currency(ies) of a major trading partner(s) with a good record of price-level stability, and let the domestic money supply vary accordingly.

But how can the demand for domestic transactions balances -- and the derived demand for base money -- rise just because the international demand for domestic bonds suddenly increases? Why should changes in international portfolio preferences between nonmonetary assets change the effective demand for domestic money? The short answer is that the demand for domestic transactions balances increases indirectly when international investors desire more bonds denominated in the domestic currency.

Suppose countries A and B are in domestic and international portfolio balance, domestic prices are stable, and the exchange rate is maintaining purchasing power parity (PPP) between the two national price levels. Let S = currency A/currency B be the actual exchange rate, and let S^{PPP} be its equilibrium rate.

Now suppose international investors respond to some sudden political or economic news by shifting their desired portfolio from B_a to B_b. If some force -- either the government itself or the belief of private foreign exchange dealers that the government is committed to defending exchange equilibrium -- temporarily maintains $S = S^{PPP}$, i_a will tend to increase and i_b to decline. But this upward pressure on i_a is then trasmitted through the domestic liquidity preference function (the function describing the demand for money by domestic transactions) to the demand for noninterest-bearing domestic money, M_a. This incipient increase in i_a causes an incipient fall in the demand for M_a. Disturbances in the international bond market are thereby transmitted to the national money market.

However, A's private sector can't reduce its actual money holdings unless the government intervenes to withdraw some of M_a from circulation. With M_a unchanging, the attempt by domestic transactors to switch from M_a to B_a simply drives i_a back down to where it started: the liquidity trap. Because the initial decline in the demand for M_a cannot be realized, the temporary increase in i_a (reflecting the risk premia being required by international investors) cannot be sustained and neither can our equilibrium exchange rate. S rises sufficiently far above S^{PPP} until disturbed international investors believe that some significant future decline (appreciation of currency A) is likely. Only after regressive exchange-rate expectations set in is their willingness to hold B_a restored.

For a closed economy, we know that a fall in the demand for money is inflationary if its supply remains unchanged. And in our open economy A, a shift in international portfolio preference from B_a to B_b is also inflationary -- unless the national money supply is contracted. The primary mechanism of inflation is the depreciated value of A's currency in the foreign exchanges. On the other hand, an unexpected deflation in country B occurs -- as if the demand for money had sharply risen there -- unless its central bank increases M_b in an offsetting fashion.

In summary, the shift from B_a to B_b in the international bond market has the effect of <u>indirect currency substitution</u>: as if private agents collectively were reducing their demand for M_a and increasing their demand for M_b. This process of indirect currency substitution suggests why the international coordination of A's and B's monetary policies may be important beyond simply maintaining an equilibrium exchange rate between them. <u>To stabilize their common price level, the symmetry of the situation suggests that, institutional arrangements being equivalent, the supply of one country's money should fall by as much as that of the other increases</u>. If only A's central bank were active in the foreign exchanges so that M_a would fall with no offsetting expansion in M_b, our two-country world would experience a unexpected net deflation -- even though S remained stable.

This unfortunate asymmetry exists under the world dollar standard of the 1970s and 1980s, as analyzed by McKinnon (1982). In the face of massive changes in whether or not dollar bonds are in favor, foreign central banks have ironed out the wilder fluctuations in their dollar exchange rates and adjusted their national money supplies to support these interventions. But the U.S. Federal Reserve System has failed to adjust American money growth in a symmetrical, offsetting fashion -- thus aggravating the worldwide cycles of inflation and deflation of the past dozen years.

That international shifts between nonmonetary assets, such as interest-bearing bonds, warrant a domestic monetary response is an idea that the economics profession finds hard to accept.

> "The basic premise of this (McKinnon's) prescription, and its flaw, is that it assumes that exchange rate instability is induced by shifts in the currency denomination of the public's money holdings--that is by currency substitution. But surely international currency speculation is not carried out by shifts between different countries' M_1s (currency plus demand deposits) but by shifts between interest-bearing assets." (Dornbusch, 1983, page 22).

Clearly a more formal demonstration of this idea of indirect currency substitution is now necessary.

4 - A Portfolio-Balance Model of a Nonreserve-Currency Country

The subsequent formal analysis ignores the larger problem of coordinating monetary policies across more than one country. The liquidity trap for domestic interest rates and the excessive volatility of a floating exchange rate are demonstrated for a single open economy. Britain in the 1980s is a good industrial prototype, being sufficiently small that its monetary policies have a negligible effect on the world price level and on interest rates in other countries.

Consider a short time horizon of a few days or weeks such that domestic income Y, the domestic price level P, the foreign price level P*, and trade flows of goods and services are all given. Although the economy is small, the "hard" domestic currency is the preferred monetary habitat of domestic nationals: their demand functions for financial assets including foreign exchange are all specified in the domestic currency. Because industrial countries produce and consume mainly Hicksian "fix-price" manufactured goods and services invoiced in the domestic currency, the domestic price level is invariant to <u>unexpected</u> exchange-rate fluctuations. This short-run stickiness of prices in the industrial economies has been statistically documented by many authors, e.g., Isard (1977) and Frenkel (1982).

Total liquid financial wealth in domestic currency of the <u>private sector</u> is simply:

(1) $$W = M + B + SB^*$$

where M and B are money and bonds denominated in domestic currency. The economy's net position in foreign exchange B* -- interest-bearing bonds denominated in a single reserve currency called dollars -- is the cumulative sum of past current-account deficits or surpluses. S is the spot exchange rate, domestic currency/dollars, and is free to fluctuate; whereas M, B and B* are given within our short term horizon if the government does not intervene in the financial markets. Hence, SB* is the only variable component of private wealth in the relevant short run.

For analytical simplicity, the commercial banks have been integrated with the private sector so that domestic money, M, is all non-interest bearing claims on the central bank -- inclusive of currency outstanding and reserves held by commercial banks with the central bank. M is "transactions balances" in domestic currency held solely by domestic nationals -- who own no transactions balances in foreign currency. Similarly, foreigners own no domestic transactions balances. In effect, the strong assumption of <u>no direct currency substitution</u> between foreign and domestic transactions balances is being imposed.[2/] Then, the demand for M depends only on domestic portfolio preferences, domestic wealth (varying with S) and the rate of interest, i, on bonds denominated in the domestic currency.

(2) $$M = L(\underset{-}{i},\underset{+}{W};\ P,Y) > 0$$

Why exclude the exogenously given foreign rate of interest, i*, or i* adjusted for exchange risk, as an argument in the demand for domestic transactions balances -- the liquidity preference function L? M and B have identical foreign exchange risk because they are both denominated in the domestic currency. Noninterest-bearing M provides a pecuniary service, whereas B provides no pecuniary services (I assume) but only its nominal yield i. Therefore, at any given domestic income and wealth level, domestic transactors adjust M (by buying or selling domestic bonds) such that the marginal product of M/P in providing these pecuniary transactions services is always equal to i -- independently of what i* happens to be. That is, changes in i* alone would have no effect on the demand for M.[3/]

Domestic-currency bonds, B, are claims on domestic real wealth or on the national government. Therefore the net holdings of B by the private sector are always presumed positive. Both foreign-currency and domestic-currency bonds are assumed to be short term so that we may ignore changes in their capital values as interest rates change. However, the foreign (annual) rate of interest i^*, adjusted for the expected rate of depreciation of the domestic currency, now enters as an important determinant of the domestic demand for both classes of bonds -- even if we omitted it from the function describing the demand for domestic money.

$$B = J(\underset{+}{i},\ \underset{-}{i^*+z},\ \underset{+}{W};\ P,Y) > 0 \tag{3}$$

$$SB^* = K(\underset{-}{i},\ \underset{+}{i^*+z},\ W;\ P,Y) > 0 \text{ or } < 0. \tag{4}$$

The functions of J and K represent the demand for domestic and foreign bonds respectively -- each measured in domestic currency. Whereas B and SB^* represent the given available stocks inherited from the past. z is risk premium demanded by international investors for holding B instead of B^* -- and will be discussed in more detail presently. Here it suffices to note that if z increases exogenously because the long run inflation risk or political risk of holding domestic-currency bonds has increased, then equations (3) and (4) tell us that i must increase in a compensating fashion if the exchange rate is to remain stable.

For a given z, M, B and B^*, equations (1) to (4) define basic portfolio equilibrium. Because from Walras' Law only two out of the three portfolio balance conditions are independent on one another, this leaves three equations to determine the endogenous variables W, i and S.

The equilibrium portfolio conditions can be seen more clearly by using equation (1) to replace W with S to get:

$$M = l(\underset{-}{i},S) \tag{2}$$

(3)' $$B = j(\underset{+}{i}, \underset{-}{i^*+z}, S)$$

(4)' $$SB^* = k(\underset{-}{i}, \underset{+}{i^*+z}, S)$$

For given i* and z, two of these equations are sufficient to determine the portfolio-equilibrium (pe) values, i^{pe} and S^{pe}, of i and S respectively.

How does the liquidity trap work? Suppose $i = i^{pe}$ and $S = S^{pe}$ in full portfolio equilibrium. Suppose further that the commodity markets are in balance with no price inflation, and that S^{pe} is also the purchasing-power-parity exchange rate. Now z -- the perceived international riskiness of holding domestic currency bonds -- suddenly increases. What happens to i?

If the exchange rate S remains temporarily stable at S^{pe}, i can't change in the relevant short run. Equation (2) tells us that the domestic money market is just balanced at the old rate of interest. Any incipient increase in i from pressure in the international bond market will be offset as by domestic transactors attempting to dishoard M to purchase B. Only if the authorities drain domestic money from circulation can a short run increase in i be sustained in order to balance the international bond market.

This important point can be seen from another angle if we rewrite equation (2) to be the demand for "real" cash balances:

(2)'' $$M/P = m(\underset{-}{i}, \underset{+}{S}; Y)$$

Because of domestic price stickiness, real balances can't change immediately when z increases and puts incipient upward pressure on i. Even if S changes, the domestic price level remains unaltered in the relevant short run.

Of course a major sustained depreciation (increase in S) of the domestic currency would, in the long run, cause domestic inflation and eventually reduce real cash balances -- thus releasing i from its liquidity trap. Putting the economy through an unanticipated inflationary spiral hardly seems like an optimal monetary control mechanism. Far simpler is to reduce M immediately when z increases; the increase in i then gives international investors their increased risk premium without upsetting the domestic price level.

Suppose, however, that S floats: it is not fixed by domestic monetary policy. In response to the increased z, does the resulting discrete exchange depreciation have any further stabilizing or destabilizing impact on i through domestic wealth effects? Note that whether dl/dS is less than or greater than zero in equation (2) depends on whether B* is greater than or less than zero. If the net foreign-currency indebtedness of the private sector B* = 0, dl/dS = 0 and short run changes in S have no further influences on the money-market rate of interest. If $B^* > 0$, then $dl/dS > 0$; and if $B^* < 0$, $dl/dS < 0$.

For our small nonreserve-currency country, empirical considerations suggest that the net foreign exchange claims of the <u>private sector</u> are normally negative, i.e., $B^* < 0$. Why?

First, suppose our economy was neither a net international creditor nor debtor: the cumulative sum of past current account surpluses is approximately zero. We know that the typical government of an industrial country accumulates <u>positive</u> net exchange reserves in dollars in order to guard against future contingencies such as wars, famines and financial crises. If so, the private sector's net foreign-currency position, B*, must be <u>negative</u>. Only if the country in question has been a large net international creditor over the years, would one expect $B^* > 0$.

Secondly, at any point in time a substantial proportion of outstanding import payables will be denominated in some international reserve currency; whereas current "on-account" receivables from exports will be denominated mainly in the domestic currency. This pattern of trade credit merely reflects the fact that domestic industrial exports are invoiced mainly in the home currency, whereas imports tend to be invoiced in foreign exchange. The upshot is that an unexpected increase in S causes domestic importers to incur losses on their outstanding debts (which they had not covered in the forward market) and perhaps on new import purchases to which they are committed, whereas the portfolio position of exporters is unaffected. Thus does the net trade balance -- as conventionally measured -- initially deteriorate after a surprise devaluation. And for analyzing short run exchange stability, this well known J-curve effect is neatly represented in our model of portfolio equilibrium by having B^* made even more negative.

Hence, it seems most likely the private sector of a "typical" industrial country is a net dollar debtor. But with $B^* < 0$, a floating exchange rate becomes even more unstable. In response to an unexpected increase in z, for example, the resulting increase in S reduces private sector wealth so that the demand for domestic money declines, i.e., $dl/dS < 0$ in equation (2) . This induces a <u>fall</u> in that rate of interest, i, necessary to clear the domestic money market. In the bond markets, the unexpected currency depreciation increases the burden of dollar indebtedness measured in domestic currency. Individuals become anxious to reduce their dollar borrowing by financing more bonded indebtedness in domestic currency. The result is a capital outflow that pushes S up further.

Clearly, with interest rates failing to adjust properly, a floating exchange tends toward short run instability -- the more so when $B^* < 0$.

5 - Regressive Expectations and the Margin of Exchange Risk

Nothing has yet been said whether new short-run "equilibrium" values of S and i exist and are stable under a free float. In response to some shift in international portfolio preferences, plausible assumptions about exchange-rate expectations linking the future to the present had not yet been introduced.

In a longer-run perspective, however, both domestic price and output decisions are flexible; and both the traditional elasticities and absorption theories suggest that a devaluation of the domestic currency will ultimately improve the trade balance. In rational anticipation, shouldn't stabilizing private speculators then step forward to buy the domestic currency immediately after it depreciates unexpectedly -- and vice versa?

For the analysis to follow, suppose that this traditional wisdom accurately reflects what exchange-market participants believe -- without questioning its empirical validity. Assume that peoples' expectations are regressive: For any unanticipated discrete change in the exchange rate away from equilibrium, people expect a return towards some (possibly new) norm. For analytical purposes, therefore, the private foreign exchange market is now assumed to be stable in the "large" -- even when monetary authorities do not respond to exchange fluctuations.

Under this assumption of regressive expectations very favorable for exchange stability, the question is then asked. Do a cleanly floating exchange rate and the domestic interest rate respond correctly to discrete, but commonly experienced, disturbances in the risk margin between domestic and foreign bonds? The answer is still "no": the long-run exchange equilibria move too much, and this is further aggravated by short-run overshootings.

In undertaking our comparative static analysis of short-run equilibria, it is convenient analytically to replace the two bond-market equations, (3)′ and (4)′ with a single equation that describes portfolio balance between domestic-currency and foreign-currency bonds. In an open economy without exchange controls, suppose all relevant information on this relative riskiness can be summarized by the wedge between domestic and foreign interest rates. Let z denote this <u>margin of exchange risk</u> such that short-run portfolio balance can only hold if

$$i - i^{*} = z = z_a + z_b + z_c \qquad (5)$$

where the components of z remain to be described.

Let z_a denote all those exchange risks that are given exogenously to our very short-term model of portfolio balance, where neither domestic prices nor commodity flows are flexible, and which are capable of disturbing the floating exchange rate. z_a would include:

1) <u>Political Risk</u>: fear of exchange controls, possibly new taxes or other factors that bear on the convenience of holding assets in the domestic currency as distinct from the international reserve money.
2) <u>Inflation Risk</u> in the longer term: an assessment of the rate of future domestic money creation and ongoing domestic price inflation relative to that prevailing in the reserve-currency country, i.e., a best guess of the percentage annual rate of exchange depreciation of the domestic currency into the indefinite future.
3) <u>Real exchange-rate risk</u> due, say, to an unexpected decline in the international terms of trade that reduces

current-account surpluses in the future. The impact of a fall in the price of oil on the attractiveness of a "petrocurrency" is an example.

Often, individual investors might not distinguish sharply between "political" risk and "inflation" risk. For example, suppose the future election of a radical populist government suddenly appears more likely as the present government stumbles. Domestic investors don't really know what will hit them hardest: new taxes on wealth or future exchange depreciation. Whether or not they make this distiction, z_a sharply increases as it would under a real shock such as a decrease in the price of oil. In this view point, the monetary consequences of international asset switching from such "real" or "nominal" shocks can't be meaningfully distinguished.

Conversely, in more unusual cases, z_a for our small open economy could be negative reflecting a period of world-wide turbolence where inflation risk in the reserve-currency country seemed greater. For example, in the 1970s, long-term inflation risk in the United States seemed greater than in the Netherlands.

To incorporate the regressive exchange-rate expectations necessary for short-run portfolio equilibria to exist, it is necessary to specify the long-run level to which people feel the current spot rate will gravitate. Under a floating exchange rate left to itself, people know that an increase in z_a will cause an internal price inflation. If we maintain the assumption that purchasing power parity reasserts itself in the long run, and $\underline{S}$ is this long-run PPP exchange rate, then

(6) $$\underline{S} = \underline{S}(z_a) \quad \text{where } \underline{S}' = d\underline{S}/dz_a > 0.$$

Although not demonstrated here, it is easy to show that $\underline{S}'$ depends directly on the interest elasticity of the demand for money. In response to an increase in z_a, in the long run the domestic currency will depreciate more (the expected future price level is higher) the more interest elastic are domestic real money holdings.

Now, define the short-term expected <u>movement</u> towards this long-run equilibrium as z_b, the regressive expectations component of the margin of exchange risk where

(7) $$z_b = (1 - S/\underline{S})v$$

where $0 < v < 1$. Note that $dz_b/dS < 0$. The more S increases, the smaller is z_b. Indeed, if S increases past $\underline{S}$, z_b becomes negative.

Our second endogenous component, z_c, depends on foreign-currency exposure <u>apart from</u> any view that the exchange rate is likely to move in a particular direction in the future, and apart from political risk. As long as $B* \neq 0$, and people know that the future exchange rate will vary, then z_c reflects this exposure premium. In the simplest linear format, define

(8) $$z_c = -uSB*/W$$

where the parameter $u > 0$ reflects risk aversion. Unlike equation (8), $dz_c/dS > 0$ when $B* < 0$. That is, when S increases, the burden of foreign indebtedness rises and people require a higher i. Why?

In our small economy, the national currency is the natural monetary habitat of private domestic transactors whose risky foreign-currency exposure is B* -- bonds denominated in the international reserve currency, dollars. If, as discussed above, B* is likely to be significantly negative, then i would normally exceed i*. To keep domestic nationals happy with their debt overhang in foreign currency, the borrowing cost i in domestic currency must exceed the borrowing cost i* in foreign currency when the domestic currency is not expected to appreciate vis-à-vis dollars, and if political risks of currency holding are equalized internationally.

Because of this burden of dollar indebtedness which is endogenous to exchange rate movements, regressive expectations by themselves are necessary -- but not sufficient -- for stable exchange-rate equilibria to exist. The regressive expectations effect, z_b, must outweigh the debt burden effect, z_c, in response to any change in S. Let $z_{bc} = z_b + z_c$. Then exchange stability requires that

$$(9) \qquad dz_{bc}/dS = d(z_b + z_c)/dS < 0$$

To understand intuitively condition (9), start from full long-run equilibrium where $S = \underline{S}$, $i = \underline{i}$ and with $z_a = 0$. Now z_a (and $\underline{S}$) suddenly increases inducing people to move from domestic to foreign-currency bonds which depreciates the domestic currency, i.e., increases S. In the short run, the supplies of domestic and foreign currency assets are fixed. Thus to keep people happy (in portfolio balance) with their existing assets, $z_b + z_c$ must fall in order to offset the positive impact of z_a on the risk margin. But z_b can only become negative if S overshoots $\underline{S}$ to set up the regressive expectation of a future fall in S. And this overshooting must be greater the larger is z_c.

Consider further the economic basis for this stability condition. Deriving dz_b/dS from equation (8), and dz_c/dS from equation (9), and substituting into equation (9), we have

$$(9)' \qquad dz_{bc}/dS = -v/\underline{S} - u[B^*/W - S(B^*/W)^2] < 0$$

Let us evaluate dz_{bc}/dS in the neighborhood of $S = \underline{S}$. Multiplying through by $-\underline{S}$, our stability condition reduces to

$$(10) \qquad v > -u\underline{S}B^*/W + u(\underline{S}B^*/W)^2$$

The parameter v, representing regressive expectations, must be greater than the risk-aversion parameter u weighted by the share of foreign-currency bonds in total domestic wealth. Both terms on the right-hand side of equation (10) are positive when $B^* < 0$ reflecting the debt-burden effect. And the larger this debt-burden effect, the larger v must be to ensure that a new stable equilibrium is attainable when z_a (and S) suddenly changes. (Of course, when $B^* > 0$ so that domestic nationals hold positive net claims on foreigners, the system a stable equilibrium exists even without regressive expectations. But short-run overshooting of the exchange rate still occurs.)

6 - Overshooting in the Liquidity Trap

Supposing that our stability condition (10) holds, we may now study how the equilibrium exchange rate responds to an unanticipated and exogenous increase in z_a. Our conditions for short-run portfolio equilibrium reduce to just two equations in S and i. Equation (2)'' above still describes equilibrium in the domestic money market; and balance in the international bond market can be described by substituting our explicit expressions for z_b and z_c into equation (5) to get:

$$(11) \qquad i - i^* = z_a + (1-S/\underline{S})v - uSB^*/W$$

Equations (2)'' and (11) jointly determine S and i in short-run equilibrium: domestic and international portfolios of bonds and money are in balance, although the expected movement in the exchange rate can differ from zero. Being interested primarily in discrete changes in the short-term equilibrium rate, S^{pe}, let us totally differentiate both (2)'' and (11) with respect to z_a and evaluate in the neighborhood of $S = \underline{S}$ to get

(12) $$0 = m_1 di + m_2 dS$$

and

(13) $$di = dz_a - (v/S)dS + (v\underline{S}'/S)dz_a + uQdS$$

$$\text{where } Q = -\left[B^*/W - S(B^*/W)^2\right]$$

The differential equations (12) and (13) then jointly determine di and dS in moving from one short-run equilibrium to another, remembering that P,M,i and Y are held constant.

Suppose now that net dollar indebtedness, B*, is close to zero. Unanticipated exchange rate fluctuations have no substantial wealth effects on the demand for money or bonds. Then m_2 in equation (12) and Q in equation (13) are both zero. This implies immobility in the domestic interest rate, the liquidity trap where di = 0. Rewriting our two equilibrium conditions we obtain

(12)' $$0 = m_1 di$$

(13)' $$dS^{pe} = dS = (S/v + \underline{S}')dz_a$$

The short-run change in S in equation (13)' reflects the change in its portfolio-equilibrium value S^{pe} in response to some unexpected change in the risk margin, z_a. Notice also that this latter effect is equivalent to an increase in the foreign rate of interest i* with z_a held constant. That is, we could equally well substitute di* for dz_a in equation (13)': either causes a switch away from domestic-currency to dollar bonds.

The resulting depreciation of the domestic currency can be neatly decomposed into 1) the shift in its long-run equilibrium as denoted by $\underline{S}'dz_a$, and 2) the additional overshooting <u>beyond</u> this new long-run equilibrium as denoted by $(S/v)dz_a$. They are both portrayed in Figure 1. The strength of the first effect varies directly with the interest elasticity of the demand for domestic money, and the second is inversely related to v. The more confident people feel about the exchange rate returning to its new norm, the less overshooting there will be.

However the important economic point is that neither component of the change in S is warranted. Both hit the economy with an inflationary impulse -- albeit one that may take months or years to work itself out in domestic prices. As analyzed above, a central bank, acting properly to stabilize the domestic price level, should spring the liquidity trap by immediately contracting the domestic money supply, in response to the unexpected increase in z_a. i could then increase and give international investors the enhanced risk premium they now require -- without putting the economy through an unnecessary inflation for achieving the same result.

7 - Further Interest-Rate Disalignment and Aggravated Overshooting

Now suppose that general wealth effects, from unexpected changes in S, significantly influence the demand for domestic money. The first striking result is that, when $B^* < 0$, the domestic nominal rate of interest, i, changes in the <u>wrong direction</u> from the point of view of stability in the international bond market. An increase in z_a, the perceived riskiness of domestic vis-à-vis foreign currency bonds, induces i to fall once a new short-run portfolio equilibrium is achieved. This interest-rate perversity was noted by McKinnon (1983) in analyzing the narrower problem of exchange instability arising from the J-curve effect by itself.

Wrong-way interest adjustment is easily seen from equation (12). As S increases with $B^* < 0$, the domestic burden of carrying dollar indebtedness increases. This reduction in their net financial wealth reduces the demand for money by domestic transactors, such that $m_2 < 0$. In order to equilibrate the domestic money market, the resulting change in the interest rate is

$$(14) \qquad di = -(m_2/m_1)dS < 0$$

which is negative because $dS > 0$ when z_a increases, and $m_1 < 0$.

These perverse wealth and interest rate effects further aggravate the overshooting of the exchange rate. In order to relieve their suddenly increased dollar debt burdens, individual firms try to repay some of their foreign (dollar) borrowing, and finance these repayments by borrowing domestically at the lowered national rate of interest. The result is a new capital outflow that accentuates the effect of the initial increase in the risk premium, z_a.

Rather than developing this concept of "aggravated overshooting" algebraically which is straightforward but tedious, the dashed line in Figure 1 illustrates how much further S overshoots in the short-run when $B^* < 0$ in comparison to $B^* = 0$ for an exogenously given disturbance to z_a. Indeed, when B^* is large and negative, any system of fluctuating exchange rates tends towards breakdown. The governments of countries with heavy private indebtedness abroad are well aware that an unexpected exchange depreciation may bring on bankruptcies and financial panic.

That said, it is well to remember that a floating exchange rate remains an inefficient method for balancing international payments even when $B^* > 0$, international indebtedness is not a problem, and short-run overshooting of the long-run "equilibrium" exchange rate is not very pronounced. As Figure 1 shows, an unexpected change in the risk premium z_a on domestic-currency bonds still forces a discrete depreciation of the domestic currency to a new long-run equilibrium, which, if sustained, will cause unnecessary domestic price inflation once purchasing power parity reasserts itself in the commodity markets. But a more precise description of commodity market and trade-balance adjustment over time is beyond the scope of this paper.

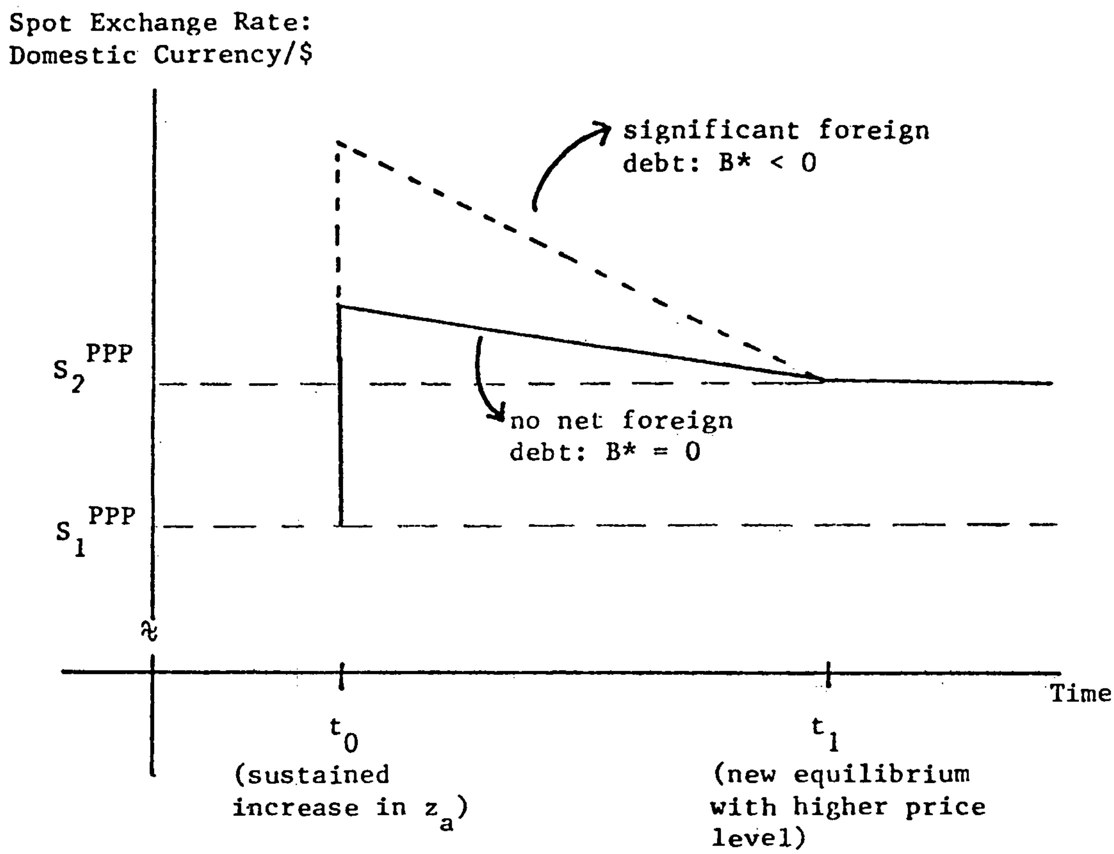

Figure 1

Exchange-Rate Overshooting from Increased Domestic Risk

<u>Notes:</u>

<u>1</u>/ Here I am not considering the problem of endemic inflationary finance where the central bank must continually monetize public debt issues, thus losing control over the money-supply process itself.

<u>2</u>/ In a separate paper "Direct Currency Substitution and Gresham's Law II", I show that the more unusual case of M_a begin directly substitutable for M_b -- as when two currencies circulate in parallel -- leads to even greater exchange-rate volatility.

<u>3</u>/ Interestingly, this proposition would not be true if domestic nationals also held transactions balances in foreign currency, and these foreign-currency balances were a (partial) direct substitute for domestic money in providing domestic pecuniary services. Then, if i^* increases with i held constant, individuals would reduce their holdings of foreign transactions balances M^* -- because i^* measures the opportunity cost of holding them. But the decline in M^* would increase the marginal product of M, and thus increase the demand for domestic money! This theoretical argument was well stated by Miles (1978, 1978b), even if one rejects his empirical findings of direct currency substitution in Canada (Bordo and Choudri, 1982).

This implication of <u>direct currency substitution</u> seems paradoxical and in conflict with the standard portfolio-balance approach (Cuddington, 1982) where any one agent holds domestic money and bonds as well as foreign money and bonds. If all four assets are (conventionally) assumed to be gross substitutes as Cuddington does, then increasing i^* would reduce the demand for M. But, for the purposes at hand, this standard portfolio approach based on gross substitutability is misspecified in failing to define narrowly the different opportunity costs for holding M and M*, or to take into account the direct substitution between them in satisfying transactions needs. Properly specified, the demands for M and B* behave as if they were portfolio complements: an increase in i*, in the presence of direct currency substitution, will increase the demand for M.

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