

# **CENTRAL BANK POLICY IN THE FOREIGN EXCHANGE MARKET**

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by

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## CENTRAL BANK POLICY IN THE FOREIGN EXCHANGE MARKET

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This paper consists of a series of notes on particular aspects of Central Bank policy, in matters where that policy entails operations in the foreign exchange market, or other (e.g., sterilization) activities that are linked to foreign exchange operations.

### **1. Earning Higher Rates of Return on “Excess” Foreign Reserve Holdings of the Central Bank**

In a significant share of cases in which a Central Bank acts to sterilize large purchases of foreign exchange, the result is an increase in its holdings of foreign currency to levels that are far higher than the amounts it would ordinarily want to hold as international reserves. The desirable amount of the latter can be thought of as being linked to the volatility of the sources of the country's regular flows of foreign exchange (e.g., export proceeds, foreign aid, capital inflows or outflows), and also to the country's vulnerability to capital flight. With regard to sources, the desirable level of international reserves is often thought of as being a certain number of months of the country's imports, more months when the sources are more volatile, fewer when they are more stable. With regard to capital flight, the idea is to protect the country's money supply from a potential speculative attack. Here the desirable reserve level can be thought of as being a certain fraction of M2 (or some other broad-money concept), the fraction being larger in cases where the risk of a speculative attack is considered to be larger. Since both considerations will typically enter into the determination of the desired level of a country's international reserves

(IR<sup>d</sup>), one can think of this level as being linked both to the country's monthly imports and to its broad money supply.

The situation I am referring to is one where, for reasons unconnected with the above, the Central Bank has accumulated international reserves well above its "normal" desired reserves level. Typically such situations occur when the Central Bank is buying lots of foreign currency (say, dollars), and is sterilizing a significant part of these purchases.<sup>1</sup>

The typical result of a sterilizing operation by the Central Bank is that it pays interest on its own obligations (or forgoes interest, say, on government bonds) that it sells in the local market, while it receives interest on the incremental reserves that it acquires, say, in New York or London. Most often, the result is a significant loss for the Central Bank, as the rate of interest that it pays or forgoes in the local market typically is quite a bit higher than the rate it gets in its increased holdings of international reserves. The Central Bank losses (due to the difference in rates paid and received) are not only a source of pain in their own right. Additionally they pose a significant constraint on the Central Bank's use of sterilizing operations.

The purpose of this note is to urge that Central Banks consider sequestering their foreign holdings that are above and beyond their normal demand for international reserves (IR<sup>d</sup>), and treat them differently from standard international reserves. The purpose of treating them differently would be to earn higher interest or other returns on them, thus reducing (or maybe even eliminating), the Central Bank losses that usually accompany sterilizing operations.

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<sup>1</sup>The purpose of sterilization is to prevent the country's exchange rate from appreciating "too much" in real terms. In the case of a fixed exchange rate, it entails reabsorbing some of the local currency (say, pesos) issued to purchase an increased flow of dollars from abroad, either by the Central Bank's selling bonds or other assets, or by its otherwise (say by raising reserve requirements) engineering restriction of bank credit. In the case of a flexible exchange rate, the Central Bank's baseline behavior would be not to intervene at all; this would lead to a sharp appreciation of the country's currency in the face of a sharp increase in the flow of dollars from abroad. If the Central Bank wants to limit the size of this appreciation, it enters the foreign currency market to buy dollars; to do this in a non-inflationary way it issues bonds, sells other assets, or acts in other ways to restrict bank credit. These latter moves represent sterilization in a flexible-exchange-rate setting.

As a background for this suggestion, I must point out that Central Banks' international reserves are usually invested in securities of high liquidity and extremely low risk -- e.g., U.S. Treasury bills. These are ideal vehicles for the standard purposes of international reserves -- to cover an unexpected shortfall in a country's foreign exchange receipts, or to stem a speculative attack on a country's currency. Thus, I am not questioning the wisdom of the use of high-liquidity, low-risk vehicles for the placement of a country's normal holdings of international reserves.

But what about holdings that are significantly above the normal, prudent level? Why should Central Banks feel constrained to hold these "excess" amounts in forms where their low yields are the source of painful Central Bank losses? I feel there is little reason to restrict these "excess" amounts to the same rigorous liquidity and safety rules that have become traditional with respect to "standard" reserve holdings.

My minimal suggestion would be that Central Banks suffering significant losses from sterilizing operations should seriously consider looking for higher yields on their foreign holdings in excess of the standard level of prudent international reserves,  $IR^d$ . These could consist of standard commercial paper, medium-term government bonds, stock-market index funds, etc. How far to go along the tradeoff curve between risk and level of expected reward is not for me (or any other outside observer) to say. That is for the country's own authorities to decide. But they should reach this decision realizing that, when large reserves holdings are generating big Central Bank losses, there are good reasons to seek higher returns on the fraction of those reserves that is above  $IR^d$ .

In conversing with central bankers on this issue, I have made the point that the endowment portfolios of major U.S. universities have quite reliably yielded real rates of return of

7% or more. These portfolios indeed carry a certain degree of risk, but no one thinks of them as being especially risky. In my view it would not be unreasonable for a Central Bank to allocate its holdings of foreign exchange, above and beyond IR<sup>d</sup>, in a pattern that imitates the average of how Harvard, Yale, Princeton, Chicago and Stanford Universities invest their endowment. This is not meant as a piece of advice as to what might be best for a particular Central Bank; it is only intended to say that a University-style portfolio should not be arbitrarily ruled out of consideration, as the search for an appropriate portfolio is pursued.

## **2. Considering Sterilized Intervention in the Context of an Exchange-Stabilization Fund**

In my policy report “Economic Policy and the Real Exchange Rate”, I analyzed Central Bank intervention in the context of its reacting to an unexpected large inflow of foreign exchange. That is indeed a realistic situation, which many Central Banks have had to face. But it is not the only context that can be relevant. In this section, I will explore the case of a more “permanent” intervention policy by a Central Bank.

The easy way to formulate this problem is to visualize the Central Bank as setting up an Exchange Stabilization Fund, which then would intervene to smooth out fluctuations that are deemed to be transitory in nature, and to moderate (or eliminate) the real-exchange-rate “overshoots” that often occur as an economy adapts to a large increase or decrease in the normal supply of foreign exchange flowing into the country.

One way to approach this problem is to think of an in-and-out operation, in which the Central Bank may be dealing not with a very short term “blip”, but with a sort of wave, or bulge, or cycle in the flow of foreign exchange to the country. This image leads me to take a somewhat different view from that expressed in the aforementioned policy report. There, one looked at a

sterilized intervention as the purchase of an “excessive” inflow of foreign exchange -- that purchase being financed by the sale of bonds or other assets by the Central Bank. The result was an expected loss by the Central Bank, period after period, as the interest received on the Central Bank’s above-normal holdings of international reserves fell short of the interest paid (or forgone) on the domestic-currency bonds sold by the Central Bank in the country’s own capital market.

When our focus is shifted to a stabilization fund, the above image is modified. Instead of a one-way street, we are looking at a two-way street. If the Central Bank incurs losses as it copes with an unexpected rise in the flow of foreign exchange to the country, it will quite clearly make profits as it deals, in a symmetrical way, with an unexpected fall in the same flow. In the latter, the operation would consist of selling dollars from its stabilization fund, and using the peso proceeds to buy back some of the local currency obligations it had previously issued (or simply sold, as in the case of government bonds.) So long as the interest rate paid or forgone in the local market exceeds the interest rate received on the Stabilization Fund’s holdings, this operation would entail a clear Central Bank profit.

Thus, one has a sense that, as far as interest rate differentials are concerned, the two-way street of a stabilization fund would sometimes produce losses, and other times produce gains, on individual “sterilized” foreign currency interventions.

In addition, there is the possibility of a stabilization fund yielding a genuine profit over time, as a result of a sequence of exchange-market interventions. These would stem from its dealings in foreign currency. If it buys dollars when the dollar is cheap in terms of real pesos, and sells when the dollar is expensive in the same terms, there should be real peso profit involved in a sequence of such operations over time. One should be careful not to put too much credence in this presumption, however, for it is based on the notion that the Stabilization Fund

authorities are right most of the time. It does not contemplate cases in which dollars are bought when they are thought to be cheap, only to find that they later become even cheaper -- reaching, say, a new permanent level far below what the authorities had in mind. But one thing can surely be said. This sort of risk becomes smaller, the wider is the “band” within which the real exchange rate is allowed to fluctuate without calling forth intervention.

A final note on the topic of Exchange Stabilization Funds concerns how they are financed in the first place. If they are financed from the beginning by the sale of bonds or other obligations in the local market, then, of course, there will be a loss (due to the interest rate differential) on the Fund’s average holdings of foreign exchange, once again calling attention to the wisdom of carefully weighing the risk-reward tradeoff when deciding on the appropriate portfolio composition of the Fund’s foreign asset holdings.

### **3. Sterilized Intervention and the “Reflux” Phenomenon**

This section deals with a problem whose importance is small (often negligible) in developing economies that have not modernized very much, and which in particular have not developed strong capital-market linkages with the major financial centers of the world. What I specifically mean here by “strong capital-market linkages” refers to situations in which investors and financial institutions in the rest of the world respond readily to changes in the tightness and ease of the capital markets in the country in question. Even small rises in the general level of interest rates of the country would, under strong linkages, bring significant additional flows of foreign capital into the local markets.

The paradigm for “strong capital-market linkages” is the situation that exists among the major financial centers themselves. In these cases the linkages are fueled by the phenomenon of

covered interest arbitrage. If the interest rate in New York is 5% (in dollars) and in Frankfurt is 4% (in Euros), there would seem at first glance to be a chance for German investors to gain, by shifting their balances to the New York market. But to do so would entail a risk that the exchange rate might change. That risk can be covered by selling dollars in the forward market -- enough to bring the deposit proceeds (plus interest) back to Germany at the appropriate time. If the forward exchange rate is exactly the same as the spot rate, this will still yield an advantage of 1% per year, as a result of shifting the funds for Frankfurt to New York. However, this is not likely to be the situation in the real world. Why? Because people, taking advantage of the opportunity to gain by covered interest arbitrage, will bid up the forward exchange rate so that the dollar is worth 1% less, in terms of Euros, at a distance of one year. With arbitrage working “perfectly” in this sense, marginal investors would end up earning exactly the same, in “covered” operations, regardless of whether they keep their money in Frankfurt, or instead send it to New York, or to London, or to Zurich, etc.

Covered interest arbitrage works so well among the major financial centers that one can say, for practical purposes, where short term, low-risk funds are concerned, that these centers together form just one big “world capital market.”

If, in that market, the Federal Reserve were to engage in a sterilized intervention, buying Euros in order to offset a big inflow of foreign currency from some source (say, a big rise in the price received on U.S. exports of wheat), the likely initial result would be a rise in U.S. interest rates, as the Fed sold bonds as it sterilized part of the inflow. But this rise in interest rates would tend to draw funds in from abroad, the end result being either that enough funds would come in to bring the New York interest rate back down to where it started, or else, with less funds coming

in, the financial market would build in a depreciation of the future dollar, by enough so as to offset any further arbitrage gain to foreigners from shifting their deposits to the United States.

A quick way to summarize the likely outcome of an attempt at sterilized intervention by the Federal Reserve is that a goodly fraction of the money that the Fed sent abroad in the hope of sterilizing an initial inflow would itself be offset by the “reflux” of money from foreign markets - - this “reflux” being stimulated by the rise of New York interest rates brought about by the Fed’s sterilizing operation (say, sale of T-bills in the New York market).

One can quantify the reflux phenomenon with a reflux coefficient -- the fraction of the amount the Central Bank sends abroad in an operation of sterilized intervention, which then returns to the country via new capital flows from abroad that are stimulated by the rise in local interest rates that the Central Bank’s operation has itself brought about.

For myself, I have no doubt that the reflux coefficient is big enough to worry the Federal Reserve, The Bank of England, and the European Central Bank, as they contemplate sterilizing operations. At the other extreme, it is unlikely that Madagascar, or Paraguay, or even China, have sufficiently close linkages with the world capital market for the reflux coefficient to be of any serious magnitude.

In between these extremes, I was able to watch, as Chile’s ties to the world capital market developed: the reflux coefficient, initially negligible, grew over time so as to cause serious worries for the Central Bank. In the end, that bank for a time placed what amounted to a tax on inflows of financial capital, in order to reduce the reflux coefficient and make sterilized interventions more manageable.

A quick summary of this point would be that sterilized interventions work with maximum efficiency when the reflux coefficient is zero, and that they are totally impotent when the reflux

coefficient is one. For most countries it is likely to be somewhere in between. But it is unlikely to be of any worrisome magnitude for most developing countries. Those with truly modern capital markets, however, should study carefully how international capital flows respond to movements between tightness and ease in their own market. One unexpected dividend of successful capital-market development may, in such cases, turn out to be a weakening of the capacity of the Central Bank to offset important ups and downs in the flows of foreign exchange arriving in the country.

#### **4. Dealing with International Reserves that are “Too High” in a New Equilibrium**

This section builds on the fact that when there is a “permanent” or long-lasting change in the regular flow of foreign exchange into a country, the end result will (or should) be an equilibrium in which the Central Bank no longer intervenes in the foreign exchange market. If, on the contrary, it continues to intervene, trying to prevent the real exchange rate from reaching its new equilibrium, the result will be that its reserves will keep on growing, period after period, with no end in sight so long as the underlying forces that determine the equilibrium real exchange rate do not themselves change.

Here, we consider that a Central Bank has intervened along the path from the old equilibrium (with a lower regular flow of foreign exchange) to the new equilibrium (with a higher regular flow). This intervention may have had the purpose of preventing or mitigating an “overshoot” of the real exchange rate, or it may simply represent a resistance to precipitous changes in the RER. For our argument the purpose does not matter; what is important is that the Central Bank has built up a large stock of reserves, and (perhaps because these are generating Central Bank losses) would much prefer for that stock to be smaller.

The key point to be made is that the flow equilibrium of the country's balance of payments will be basically the same, regardless of whether the Central Bank holds \$2 billion, \$1 billion, or \$500 million of international reserves.<sup>2</sup>

The problem we here pose for the Central Bank is the following: how to get from a full equilibrium with international reserves of \$2 billion, to a nearly-the-same full equilibrium with international reserves of \$1 billion?

Three routes come immediately to mind. One is simply to allow the stock of reserves to move gradually from the higher to the lower level -- say, by selling off \$200 million of reserves in each of five consecutive years. This would lead to a modest transitional fall in the real peso price of the dollar, but it would be quite modest compared to what would happen if the Central Bank tried to dump the full "excess" amount of \$1 billion on the market in a single year.

The second route is a close "twin" of the first. Instead of dumping foreign exchange on the market (which virtually implies a flexible exchange rate), consider instead expanding domestic credit via open market operations or some similar mechanism. This would be compatible with a fixed exchange rate but would not require one. The key feature here is that the credit expansion would itself generate new demands -- for both tradable and nontradable goods, and the increment to tradables demand would have an essentially one-for-one reflection in a loss of international reserves. The mechanism involved here is that emphasized by the so-called monetary approach to the balance of payments. Bank credit rises by 100, accompanied by a rise in deposits of like amount. When the recipients of the credit spend that money, the part spent on tradables causes either increased imports or reduced exports or both. In all of these cases, it

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<sup>2</sup>Minor differences would exist because the interest income earned on the reserves themselves would be different in the three cases. But the main balance-of-payments items -- exports, imports, normal capital flows, normal emigrant remittances -- would presumably be the same and would produce substantially the same real exchange rate, as in all three cases the Central Bank is neither increasing or decreasing its level of reserves.

leads to an equivalent loss of international reserves by the Central Bank (necessarily with a fixed exchange rate; at its option [i.e., if it is willing to part with them] under a flexible rate).<sup>3</sup> If 40 of the increment of credits is spent on tradables, that 40 disappears from both deposits and international reserves; the remaining 60 of new credits is spent on nontradables. As a result, the money supply is now larger by an amount of 60, and the result is an excess, in the local economy, of actual real cash balances ( $M_2^S/P$ ) over desired real cash balances ( $M_2^d/P$ ). These excess balances will be spent, not typically all at once, but quite certainly in a gradual pattern over time. As this process goes on, the part spent on tradables will again lead to a loss of foreign exchange reserves, and a reduction in the amount of undesired monetary balances. Thus, a Central Bank can in fact “create” incremental demand for tradables, almost at will, simply by expansionary monetary policy. This should not be inflationary, though it may lead to a transitory rise in the price level of nontradables. The big lesson of the monetary approach is that the mechanisms of direct spending of an increment to credit, plus the mechanism of the gradual spending of undesired real cash balances [ $(M_2^S/P) - (M_2^d/P)$ ] will quite rapidly get rid of international reserves, without much impact on internal prices or interest rates.<sup>4</sup>

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<sup>3</sup>The best way to think of sterilized intervention in a flexible-exchange-rate setting is to visualize the Central Bank as: a) buying some part of an inflow of foreign currency, issuing additional local currency in the process) and b) selling government bonds or some other asset in order to reabsorb the extra local currency issued under a). To generate a loss in reserves, this operation is put in reverse gear. The Central Bank buys bonds in the market, issuing local currency in the process, and sells foreign exchange to re-absorb the amount issued. In the scenario described in the text, this sale of foreign currency (and the concomitant re-absorption of the initial expansion) takes place gradually rather than instantaneously. Only when the re-absorption is gradual do we have adjustment through the “monetary approach” mechanism. Otherwise, equilibrium is achieved through real exchange rate adjustment.

<sup>4</sup>The well-known link between credit expansion and internal price rises comes, in a fixed-exchange rate setting, stems from countries taking defensive measures to prevent the loss of reserves -- increasing tariffs, imposing import quotas or prohibitions, instituting prior deposits and/or licensing schemes on imports, etc. It is these measures that “bottle up” the inflationary force of an increased money supply within the economy, instead of letting the excess money ( $M^S - M^d$ ) escape through the balance of payments.

The third way of a Central Bank getting rid of undesired international reserves requires the collaboration of the government. This consists in augmenting government demand for tradable goods (i.e., shifting the government demand curve for tradable goods to the right) at such times as the Central Bank makes a plea in that direction. Usually there are items in a government's budget that entail the use of foreign exchange, and these often can be expanded without such expenditures becoming wasteful. The Central Bank might find it easier to persuade the government to seek out such possibilities by helping to make bank credit available for the purpose (in a sense pursuing a course similar to the previous method, but in this case expanding bank credit in favor of the government rather than the private sector).

I believe that these three ways of working down an undesired excess of international reserves make it quite clear that no Central Bank has to feel it is simply stuck with a too-large holding of such reserves. There are, indeed, ways to get rid of them over time, without paying a heavy cost in terms of real exchange rate appreciation or price-level increase.