Central Bank Intervention: To Sterilize or Not?*

The recent agreement among the Group of Five to intervene in the foreign exchange market in order to bring the dollar down has raised fresh questions about the influence of sterilization. The standard view is that sterilized intervention is not very effective — that is, it does little or nothing to remove or correct a balance-of-payments disequilibrium. However, given the present interest in improving the U.S. *trade* balance, it appears that a case for sterilized intervention can be made. This case is strongest when capital flows are assumed to be autonomous. The standard view is based upon consideration of the total balance-of-payments position and the need to remove an overall deficit or surplus. Unsterilized intervention is then more effective than sterilized because it sets in motion an adjustment process in which underlying economic variables will be changed, thereby eliminating the initial imbalance.

During the Bretton Woods period (1947-1973), nations often used sterilized intervention to maintain pegged exchange rates, and many economists saw this practice as an important element in the persistence of deficits and surpluses. Sterilized intervention simply *financed* a balance-of-payments deficit; it did not alter the economic circumstances that gave rise to the deficit. This conventional view goes back to gold standard days, as in Keynes' famous pronouncement on Federal Reserve Board policy in the 1920s.[1]

* I wish to acknowledge helpful comments by Stanley Black and Patrick Conway.

[1] J.M. KEYNES, *Tract on Monetary Reform* (London, 1924), p. 138.

Intervention with Pegged Rates

The analytical argument is fairly simple, although empirical studies have been fraught with difficulties.[2] Suppose a nation, say Japan, is pegging its currency to the dollar at the rate Y200 = $ 1.00. If Japan is running a deficit in its balance of payments, the Bank of Japan must intervene in the foreign exchange market, selling dollars and buying yen. This action will reduce the monetary base and cause a reduction in the Japanese money supply. As the money supply falls, interest rates tend to rise, leading to a net capital inflow (or reducing an outflow). Deflationary pressures on the Japanese economy cause imports to fall and thus reduce the demand for foreign exchange. If Japanese prices fall, exports will be stimulated, increasing the supply of foreign exchange. The deficit is eventually eliminated through adjustments in both current and capital accounts.

If the intervention is sterilized, however, the Bank of Japan buys domestic assets at the same time that it sells foreign exchange. The purchase of domestic assets increases the monetary base, and thus offsets the reduction caused by intervention in the foreign exchange market. With the money supply unchanged, no adjustment process is set in motion. All that happens is that the Bank of Japan sells dollar assets (e.g., U.S. T-bills) and acquires yen assets (Japanese short-term paper).

Modern portfolio-balance theory holds that, if foreign and domestic assets are perfect substitutes, this change will have no effects on interest rates or other economic variables. (With imperfect substitutability, there is room for some effect on Japanese interest rates when the Bank of Japan buys short-term yen assets, but this influence will presumably be small.)

Intervention to MOVE the Exchange Rate

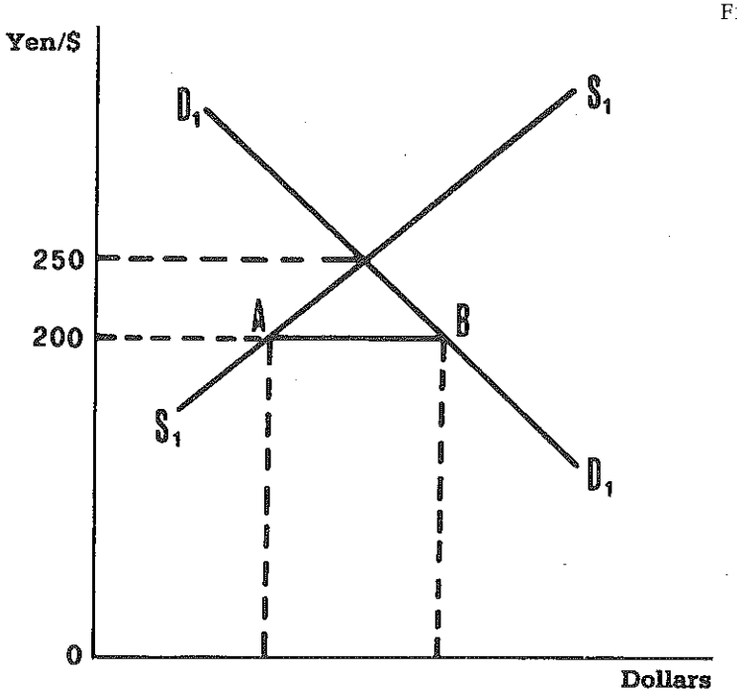
When intervention is undertaken to move the exchange rate to a new level, starting from an initial position of balance-of-payments equilibrium, the above conclusions continue to hold. If the objective is to make the new exchange rate become an equilibrium rate, non-sterilized intervention is more effective than sterilized intervention.

[2] "Intervention in Foreign Exchange Markets: A Summary of Ten Staff Studies", *Federal Reserve Bulletin*, November 1983.

This point can be most clearly seen if we assume that all transactions are on current account. For example, in Figure 1 we show the foreign exchange market for a two-country case, Japan and the U.S. We assume that the demand curve for dollars (D_1D_1) arises solely from Japanese demand for U.S. goods and services, and the supply curve of dollars (S_1S_1) solely from U.S. demand for Japanese goods and services. Initially, the market clears at Y250/$1.00; at that rate Japan's balance of payments shows neither deficit nor surplus.

Now let us suppose that the Japanese authorities want to drive the rate to Y200/$1.00. (One might ask *why* they should wish to do so, but here we just assume they do.) If the Bank of Japan intervenes, selling dollars in sufficient quantity to move the rate to Y200/$1.00, the immediate effect (ignoring lags) is to create a deficit in the Japanese balance of payments (and current account) equal to AB in Figure 1. The appreciation of the yen leads to a rise in Japanese imports and a fall in its exports.[3]

FIGURE 1



[3] We assume that the Marshall-Lerner condition is satisfied.

If the intervention is sterilized, this current account deficit will persist. Nothing happens to remove it. But if it is unsterilized, the effects of a fall in the money supply will tend to shift D_tD_t to the left, reducing imports, and to shift S_tS_t to the right, increasing exports. When these adjustments are complete, the current account deficit is eliminated. Valued in dollars, imports and exports may be larger or smaller than before the intervention occurred, or they may be about the same.

The significant point is that sterilization tends to preserve the initial change in the trade balance; nonsterilized intervention removes it.

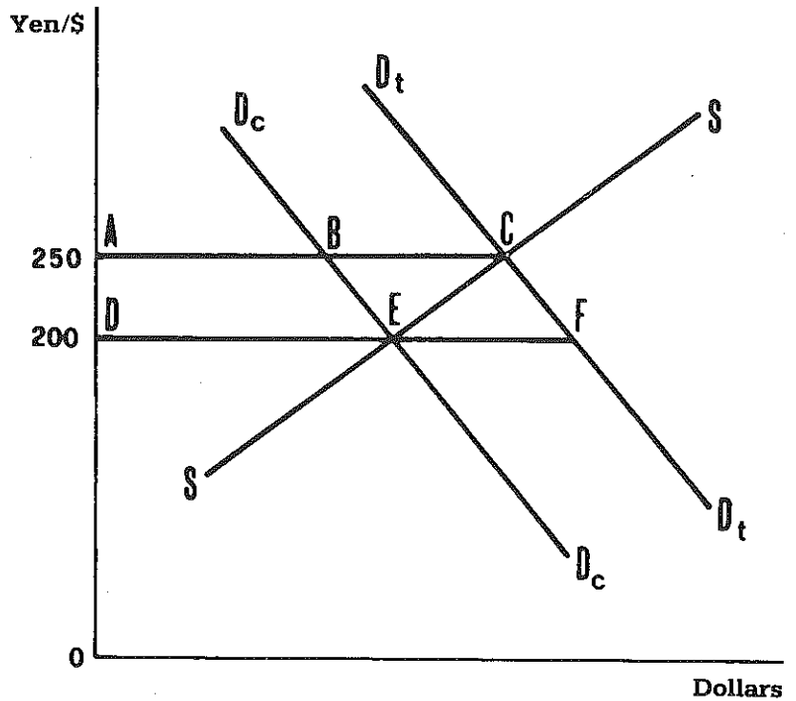
The 1985 Interventions

One of the principal purposes of the Group of Five agreement on intervention was to improve the U.S. *trade* balance and avert protectionist pressures in the United States. When intervention is undertaken to achieve this purpose by moving the exchange rate (depreciating the dollar), it will be more effective with sterilized than with unsterilized intervention, assuming capital flows remain the same. That is, a given exchange rate change will have a greater effect on the trade balance with sterilized than with unsterilized intervention. As before, we use the Japan-U.S. case as an example to demonstrate this result.

The initial situation is depicted in Figure 2. The foreign exchange market clears at Y250/$1.00. Although Japan's overall balance of payments is in equilibrium, it has a current account surplus and a capital account deficit (both equal to BC in Figure 2). The supply of dollars (SS) is assumed to represent U.S. current account expenditures, while D_cD_c represents Japan's current account expenditures, and D_tD_t represents the total Japanese demand for dollars on both current and capital accounts. Initially, U.S. imports (AC) equal Japanese imports (AB) plus Japanese purchases of U.S. financial assets (BC).

Now suppose the Bank of Japan intervenes, selling dollars to drive the exchange rate to Y200/$1.00. Ignoring J-curve effects, and assuming the Marshall-Lerner condition is satisfied, Japanese imports rise from AB to DE, and Japanese exports fall from AC to DE. The current account is now in balance, but if capital exports continue at the original rate Japan will have a balance of payments deficit of EF (=BC). If the

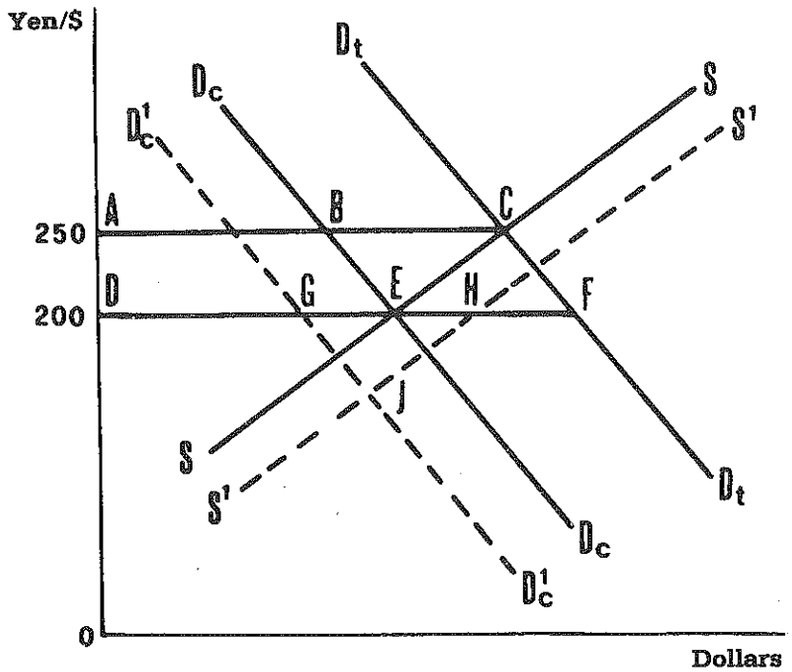
FIGURE 2



intervention is sterilized, SS and D_cD_c will remain in place (except for the income effects arising from the expenditure switches), and the overall payments deficit will persist. The desired change in the current account balance will have been achieved, but intervention must continue in order to hold the exchange rate at its new level.

If the Bank of Japan does not sterilize its intervention, the money supply will drop and deflationary pressures will develop. We show this case in Figure 3, with the initial situation the same as in Figure 2. As income and prices decline in response to the reduced money supply and rising interest rates, Japanese demand for imports will fall: D_cD_c shifts to the left, to $D'_cD'_c$. At the same time, U.S. consumers will be induced by lower yen prices to increase imports (SS shifts to the right, to S'S'). Thus Japan's trade balance moves back into a surplus (equal to GH in Figure 3), but if the capital outflow continues at the same rate the balance of payments returns to equilibrium and intervention can be terminated. The new total demand curve (not drawn) will intersect S'S' at point H.

FIGURE 3



Thus the effects of unsterilized intervention have restored equilibrium in the balance of payments and removed the need for continued intervention, but they have counteracted the initial improvement in the trade balance. If *that* is the main goal, nonsterilized intervention is not appropriate.

Two objections can be raised against the above conclusion that sterilized intervention is more effective than nonsterilized. First, it is a temporary, shortrun argument, since intervention cannot continue indefinitely. Second, and more important, the conclusion may be altered when we allow for effects that may occur through the capital account.

So far, we have not taken into account the effects of intervention on the capital account. In the case of sterilized intervention, there are no direct effects on money supplies and interest rates in the two countries. If the initial capital flow was occurring in response to an interest-rate differential, nothing has happened to alter it.

However, if anticipation of further dollar appreciation was an important factor in the initial Japanese capital outflow, even sterilized intervention can have an effect. The best hope, given that the primary objective is to improve the U.S. trade balance, is that intervention to depreciate the dollar (from Y250 to Y200 in Figure 3) will convince the market that the dollar is no longer an appreciating asset. In that case, the capital outflow might fall sharply. If it ceased altogether, point E would become an equilibrium point. No further intervention is then necessary, and the desired improvement in the trade balance will have been achieved. Intervention to depreciate the dollar achieves its success simply by altering exchange-rate expectations. (In currently fashionable terminology, one could say that intervention may prick the speculative bubble.)

At the opposite extreme, the market might consider the dollar depreciation to be merely a temporary dip. If market participants regard the dollar as a bargain at Y200, the capital outflow could rise dramatically. Speculators may doubt the ability or determination of the Bank of Japan to intervene in sufficient volume to maintain the dollar depreciation, and they may rush to buy dollars when the central bank sells them. In a contest between speculators and the central bank, official exchange reserves could be rapidly depleted. In this event, sterilized intervention would not achieve its purpose of depreciating the dollar, much less improving the U.S. trade balance.

Thus it seems that the actual outcome can vary from complete success to utter failure, depending on the responses of the market — the reaction of market participants to central bank intervention. Since that reaction cannot be predicted with any confidence, the value of sterilized intervention as a policy tool seems questionable.

In the case of non-sterilized intervention, the fall in Japan's money supply will tend to increase interest rates and thereby reduce the initial capital outflow. The more interest-sensitive the capital flows, the greater this effect.

In Figure 3, if the rising Japanese interest rate *eliminates* the capital outflow, the initial intervention will have been larger than necessary to move the exchange rate to Y200/$1.00. As drawn, with capital outflow reduced to zero, the relevant demand and supply curves are $D'_cD'_c$ and $S'S'$, producing an equilibrium at an exchange rate well below Y200 (at point J). A smaller initial intervention would have been enough to achieve the desired dollar depreciation.

The influence of intervention on exchange-rate anticipations is again crucial, just as in the case of sterilized intervention. As intervention tightens the Japanese money market, market participants may be convinced that further dollar appreciation is unlikely. Then a relatively small intervention (and associated monetary tightening) may be enough to reduce or eliminate the capital outflow, and thus achieve the objective of a depreciated dollar and an improvement in the U.S. trade balance. But if the belief in continued dollar appreciation is strongly held, capital outflows may continue even when Japanese interest rates begin to rise. For example, an expected dollar appreciation of 20% would swamp a 2-3% rise in interest rates.

Taking capital account effects into consideration thus strengthens the case for non-sterilized intervention. It produces changes in money market conditions that will tend to move exchange rate expectations in the right direction. In view of the volume and volatility of capital movements, the effect on expectations is a crucial aspect of any policy action.[4]

Chapel Hill, N.C.

JAMES C. INGRAM

[4] In late 1985, as the yen price of the dollar fell from Y250 to about Y200, Japanese interest rates rose, suggesting non-sterilized intervention. But in early 1986 the Bank of Japan reduced its discount rate and adopted a policy of monetary expansion. This implies offsetting the effects of the intervention.