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The Use of Foreign Exchange Swaps by Central Banks:
A Survey

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Abstract

The paper discussed the use of foreign exchange swaps by central banks. Such use has aimed at affecting domestic liquidity, managing foreign exchange reserves, and stimulating domestic financial markets. It discusses these different uses and present evidence for a selected group of countries. The paper cautions about the use of foreign exchange swaps to defend a particular exchange rate at a time when foreign exchange reserves are under pressure. It notes, finally, that use of foreign exchange swaps by central banks has been losing importance.

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Summary

Central banks have long engaged in foreign exchange swaps with other central or commercial banks by exchanging, on the initial and maturity dates, principal amounts at agreed exchange rates. Their primary reasons for participating in swaps are to affect domestic liquidity, manage their foreign exchange reserves, and stimulate domestic financial markets. This paper describes how foreign exchange swaps work and the various ways in which central banks have used them to achieve their goals.

Foreign exchange swaps are priced by markets according to the covered interest parity condition, after allowing for maturity, tax treatment, transaction costs, and default, "Herstatt," and sovereign risk. If cover is not maintained, a swap may expose the participants to significant foreign exchange risk. The paper explains how a central bank must also consider the effect of its swaps on domestic liquidity. If not fully sterilized, a swap with a domestic bank will be reflected in a movement in reserve money.

Swaps have been used as a domestic monetary policy instrument in a number of industrial countries (notably Switzerland) and several developing countries (for example, Malaysia, Oman and Turkey). Central banks like to use swaps, which offer flexibility, especially when the domestic securities market is not deep (or is nonexistent) and when the direct effect on the spot exchange rate of outright foreign exchange operations is to be avoided. However, the popularity of swaps has declined as other instruments have been developed.

Central banks have used foreign exchange swaps to manage the risk and return obtained on foreign exchange reserves or to acquire reserves in specific currencies. In addition, the central banks of some countries (for example, Argentina, Chile, and Korea) have resorted to swaps to obtain foreign exchange reserves in conditions of scarcity. In other cases, foreign exchange guarantees were extended to favored sectors or activities, which is tantamount to establishing a swap facility.

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I. Introduction

A foreign exchange swap is a financial transaction in which two counterparties exchange specific amounts of two different currencies at the outset and repay at a future date according to a predetermined rule which reflects both interest payments and amortisation of the principal (Cross 1986, p. 37).

In the 1980s, different types of foreign exchange swaps (and other kinds of swaps, such as interest rate swaps and debt-equity swaps) became quite fashionable and received much attention in the press and in the economic literature. Most of these publications concerned the fast-growing interbank swap market. Less publicized, however, is that for several decades central banks have also used foreign exchange swaps. Dominant objectives in central banks' use of foreign exchange swaps are to affect domestic liquidity, to manage their foreign exchange reserves, and to stimulate domestic financial markets. The aim of this paper is to describe the various ways in which central banks use foreign exchange swaps to achieve these goals.

The paper is organized as follows: section II provides some general information about foreign exchange swaps; section III presents theory and facts about the use of foreign exchange swaps as a money market tool; section IV discusses the use of swaps as a tool for the management and acquisition of foreign exchange reserves, which in some cases coincides with the use of swaps as a way to stimulate and/or subsidize the domestic financial system. The paper ends with a short summary of the main conclusions.

This survey is not meant to encompass all countries where central banks have used swaps, but rather to include countries which illustrate all broad categories of cases. Furthermore, information about central banks' use of foreign exchange swaps is very scarce since it usually does not appear on the balance sheet, and central banks often keep their swap operations confidential in order to avoid adverse signalling effects. Moreover, even if data are available, their quality is often uncertain, so cross-country comparison may not be possible.

II. Foreign Exchange Swaps: Some Background Information

1. Definition and pricing

In the 1980s, a type of foreign exchange swap became common that involves the exchange of streams of payments over time, i.e., streams of interest payments are exchanged for the period between the initial and maturity dates. (For clarity, let us call this more sophisticated type of swap "currency swaps" from now on, even though this distinction is not always made.) For a much longer time, however, a simpler type of foreign exchange swap transactions has been used in foreign exchange markets: only the principal amounts are exchanged on the initial and maturity dates at predetermined exchange rates. For example, one party sells US\$ spot against

DM and simultaneously buys US\$ forward against DM from the same counterparty. This latter kind of swap is the most relevant here, since central banks tend to use it much more often than currency swaps.

According to the covered interest parity condition, the forward premium or discount reflects the corresponding differential between interest rates on the international markets. Thus, if S , the spot price of foreign currency (DM) in terms of domestic currency (US\$), equals 0.5, and if R (the domestic nominal interest rate) equals 12 percent annually and R^* (the German nominal interest rate) equals 10 percent annually, our party in possession of a domestic asset worth US\$100 can do one of two things: keep the domestic asset and sell it after a year, receiving $(1 + R)100 = \text{US}\$112$; or sell it for US\$100, buy $(1/S)100 = \text{DM } 200$, invest this in a German asset for a year, and sell the proceeds forward, at the forward exchange rate F . He would receive $F/S(1 + R^*)100 = F(\text{DM } 220)$. Risk-free arbitrage should ensure that both strategies have the same return, i.e., no unexploited profit opportunities exist, so that $\text{US}\$112 = F(\text{DM } 220)$, or $F = 112/220 = 0.5091$. ^{1/} The mark is at a forward premium to compensate for the lower German interest rate. In general:

$$F = S(1 + R)/(1 + R^*)$$

If we define the forward premium as $f = (F - S)/S = F/S - 1$, then

$$\begin{aligned} 1 + f &= (1 + R)/(1 + R^*) \Leftrightarrow \\ 1 + R &= (1 + R^*)(1 + f) = 1 + f + R^* + fR^* \Leftrightarrow \\ R - R^* &= f \quad (\text{strictly: } f + fR^*, \text{ with } fR^* \text{ negligibly small}) \end{aligned}$$

In our example, f is approximately 2 percent, which is also the interest rate differential. This forward premium, sometimes called swap premium or swap rate, is what we consider the price of the instrument. In countries with well-developed forward exchange markets, this price is market-determined and quotes can be obtained from commercial banks. ^{2/}

Covered interest parity should hold under perfect capital mobility if the assets considered are comparable in all aspects, such as default and political (also called sovereign) risk, ^{3/} maturity and tax treatment. Several studies have shown that covered interest differentials among Eurocurrency deposits, which are identical in terms of political risk, are essentially zero. Of course, allowance must be made for transaction costs. Four types of transaction cost arise with a covered outflow such as in our example: selling a domestic security, purchasing spot foreign exchange, obtaining a forward cover and buying a foreign security all give rise to

^{1/} Abstracting from bid/ask spreads.

^{2/} However, even in such deep markets as those for the US\$ and the DM, forward markets formally extend to maturities of only one year.

^{3/} The possibility that the foreign country may impose exchange controls before the bill matures.

transaction costs. These costs give an upper and a lower band within which deviations from covered interest parity do not conflict with efficiency. Higher deviations may be due to sovereign risk, but also to less than perfect capital mobility (i.e., time lags or less than infinitely elastic arbitrage schedules) (MacDonald and Taylor 1989, p. 258-59). 1/

Currency swaps (and also interest rate swaps, and cross-currency interest rate swaps) are used by a wide variety of participants, e.g., banks, corporations, thrift institutions, insurance companies, international agencies (the World Bank was a major driving force in the development of the market) and foreign states. There are four broad reasons: (i) to exploit differences in credit rating and differential access to markets, thereby obtaining low-cost financing or high-yield assets; (ii) to hedge interest rate or currency exposure; (iii) for short-term asset/liability management; and (v) to speculate. Central banks have been known to use currency swaps for hedging or asset/liability management, but very rarely (or seldom publicized; two of such cases are discussed below). For this reason the technicalities of those operations will not be elaborated upon; a good discussion can be found in Smith, Smithson and Wilford (1989).

2. Central bank foreign exchange swaps in the balance sheet

When a central bank carries out a foreign exchange swap, it has significant economic effects. Assume, for example, that the Federal Reserve System buys foreign exchange with domestic currency, and simultaneously "sells it back" forward, e.g., agrees to sell the same amount of foreign currency at a certain date more than two days in the future at the forward exchange rate. As the Fed's foreign assets increase, some item on the liabilities side must, therefore, increase, depending on the counterparty. If the latter is another country's central bank, this institution's account at the Fed is credited, meaning that the Fed issues dollars and the other central bank issues its own currency. As long as both central banks do not spend their foreign currency, however, there is no effect on currency in circulation nor on banks' reserves, so both money supplies remain constant.

1/ Under covered interest parity, foreign bonds on which forward cover has been obtained are perfect substitutes for domestic bonds. If, in addition, one assumes that investors are risk neutral, a stronger version of perfect capital mobility applies. In this case, speculation will bring the forward premium on foreign exchange into equality with the expected rate of appreciation of the foreign currency. This means the forward exchange rate should serve as an unbiased predictor of the future spot rate, so that the uncovered interest parity condition holds:

$$R - R^* = E[(dS/dt)/S]$$

A large number of studies have found that this condition often does not hold (see McCallum 1992, Eaton and Turnovsky 1982), but an explanation for the deviations remains elusive.

If the counterparty is the banking system, banks' reserves are credited with the domestic currency equivalent of the foreign exchange purchase, and banks' foreign assets decline. Thus, reserve money increases, which normally causes an expansion of the money supply. (If the Federal Reserve had done a reverse swap, i.e., sold foreign exchange spot to domestic banks and bought it back forward, reserve money would have decreased, tightening the money market.)

Another possible approach is to treat such operations as collateralized loans. In analytic terms, expansionary foreign exchange swaps with deposit money banks are similar in form to direct loans by the central banks (as are discounting and rediscounting and repurchase agreements). Depending on a complex of legal, historical, and institutional considerations, negotiable financial instruments may continue to be booked as assets in the balance sheet of the deposit money banks; their reserves item would increase and be balanced on the liability side by Central Bank Discounts Received, etc. (IMF 1984, A Guide to Money and Banking Statistics in International Financial Statistics, p. 53). In this case, the central bank's balance sheet does not show an increase in foreign assets but in domestic assets (claims on deposit money banks). When the swap is unwound, both domestic assets and banks' reserves return to their old levels, with an interest payment going into the central bank's profit and loss account. This is the same amount as the interest earned on the foreign asset, adjusted for the difference between the spot and forward exchange rates. ^{1/}

Another consequence of the expansionary swap (if the foreign currency is not considered as collateral, but as the actual property of the Federal Reserve) is the creation of a forward foreign liability for the Federal Reserve, matched by a forward domestic asset. This matched pair of contingent accounts can be booked within or outside the balance sheet, depending on the local practice. For instance, Turkey uses such a four-entry system (i.e., with both the current and the forward items in the balance sheet), but it is far more common to record only a change in gross foreign assets plus a change in banks' reserves. A disadvantage of the four-entry system is that it inflates and complicates the balance sheet, but it has the benefit of showing clearly what part of the foreign reserves are only temporary, and, therefore, what exchange risk the central bank would be running if it lost its cover.

The swap in our example may not be intended as a money market tool; nonetheless, it still has the (temporary) expansionary effect on reserve money discussed above. Thus, if the swap was done in order to gain foreign exchange or to provide banks with a forward cover, the monetary expansion it would have caused along the way would have to be sterilized (assuming the country did not incidentally also need a monetary expansion at the same

^{1/} The Deutsche Bundesbank has an operation ("foreign exchange transactions under repurchase agreements"), very similar to a swap, that is treated in this way (see section 3.1).

time). This means the Federal Reserve would have to sell some securities, for instance, bonds from a stabilization fund. The point is that the different goals for which central banks use foreign exchange are often conflicting.

A last topic that needs to be discussed is the risk for the central bank involved with foreign exchange swaps. When you look at foreign exchange swaps as collateralized loans, it becomes clear that normally there will be very little risk. The central bank need not worry about default risk, since it has the collateral. Also, it is not exposed to exchange rate risk, as long as it has the foreign asset to cover the forward foreign liability (neither of these need be shown on the balance sheet). ^{1/} There is exchange risk as soon as either the asset or the liability disappears, i.e., if the counterparty defaults before the swap matures (the central bank would suffer a loss if its domestic currency appreciated), or when the central bank runs out of foreign exchange reserves, i.e., when the country has balance of payments problems (the central bank would suffer a loss if the domestic currency depreciated). The latter situation has indeed occurred in many countries; this will be elaborated upon in sections 4.3 and 5. Finally, there is a settlement risk involved with swaps, as is always the case in any foreign exchange operation; the so-called Herstatt risk. This risk is very small but, nonetheless, it exists; it will be discussed more thoroughly in the next section, which provides some information about the nuts and bolts of (forward) foreign exchange transactions.

3. Foreign exchange markets

In foreign exchange markets, by convention spot transactions are settled on the second business day following trade. This is because the funds are ultimately transferred by having the central bank of the country issuing the currency transfer liabilities from the account of the sending party to the account of the receiving party. For example, if the Swiss central bank (SNB) sells US\$ to a Swiss commercial bank, it will ask the Federal Reserve System in New York to debit its account in dollars, and credit the account of the U.S. branch of the Swiss commercial bank, or that of the latter's American correspondent bank if the Swiss commercial bank does not have an account at the Fed. The SNB will credit the reserve account of the bank in question with the equivalent amount in Swiss francs. Thus, one part of the transaction takes place in Switzerland and the other part in New York. Owing to the six-hour time difference, when the SNB enters into this deal at, say, 12:00, the New York market is not open. The central banks' business closing hour is 15:00, so by the time the New York market opens, the Swiss market has closed. Also, it takes time for telex

^{1/} There is, of course, the risk of opportunity costs: if the domestic currency depreciates by more than the forward premium during the term of the swap, at maturity the foreign asset has to be sold at the agreed forward rate, while it could have earned a better rate in the spot market.

messages to be sent back and forth, to make the transaction final. For this reason, spot transactions take two business days to be settled.

The time difference also causes Herstatt risk, when one party is not able to receive another party's currency after delivering its own due to the delivery lag. The delivery lag is made up by the time difference plus the difference between each country's local time for final settlement. From Table 1, it can be seen that the German mark is delivered nine hours earlier than the dollar, and so on. A central bank engaging in foreign exchange swaps is thus exposed to risk of default by its counterparty when it is trading foreign exchange, since after fulfilling its own obligation it has to wait several hours for payment. This risk is called Herstatt risk after the Herstatt Bank, which went bankrupt in 1974. Many banks had bought U.S. dollars from Herstatt, and had delivered their European currency obligations in the morning (German time), but Herstatt Bank's operations were suspended before it could deliver dollars in return (Kamata 1990, p. 61).

In addition to dealing in the spot foreign exchange market, central banks engaged in foreign exchange swaps also enter the forward market. In order to be suitable for swaps as a money market tool, the forward market should be deep and quotes of the forward exchange rate should be readily available. The first criterion ensures that large transactions are not disruptive. The second requirement means that central banks should preferably not be "making the market;" the price should be truly market-determined. If the market were thin, and the rate would in effect be determined by the central bank, swap transactions could have disruptive effects on exchange rate expectations. ^{1/} Table 2 shows the currencies whose forward markets meet these requirements.

Table 1. Delivery Lags by Transaction Type

	Hours
Yen/U.S. dollar	17
Mark/U.S. dollar	9
Swiss franc/U.S. dollar	12
Pound sterling/U.S. dollar	8
Swiss franc/mark	3
Mark/pound sterling	1

Source: Kamata (1990), p. 68.

^{1/} According to the uncovered interest parity, the forward rate is equal to the expected future spot rate. Thus, if the central bank, which is supposed to defend the currency, would set the domestic currency at a forward discount, this would have a strong announcement effect on the spot foreign exchange market.

Table 2. Forward Foreign Exchange Markets

Traded with Ease	Less Liquid, But Quotes Are Readily Available
U.S. dollar	Danish krone
Pound sterling	Irish pound
German mark	Italian lira
Swiss franc	Finnish markka
French franc	Belgian franc
Canadian dollar	Spanish peseta
Japanese yen	Austrian schilling
Dutch guilder	Australian dollar
	Singapore dollar
	Hong Kong dollar
	Kuwaiti dinar
	New Zealand dollar
	Malaysian ringgit
	South African rand
	Portuguese escudo
	Thai baht
	Saudi riyal
	Norwegian krone
	Swedish krone

Source: Smith, Smithson and Wilford (1989), p. 90.

III. Open-Market Policy

1. OECD countries

An increasing number of central banks in industrialized countries have, in the last two decades, included foreign exchange swaps in their assortment of fine-tuning instruments with which to affect domestic liquidity, even though actual use has remained limited in most countries.

As a result of the enormous increase in the volume, integration and liberalization of international financial markets, and of the emergence of new markets and instruments, a trend has developed for central banks to move from direct to indirect monetary policy. They tend to rely less on the fixing of interest rates by administrative means or on exchange controls, and more on instruments that are in accordance with market mechanisms, such as open market operations. In these operations, central banks buy (sell) foreign or domestic securities spot or forward or under condition of resale

(repurchase) in order to ease (tighten) the market for bank reserves, thus influencing the interest rate. The bulk of money market operations is in the form of central bank credit (except notably in Switzerland), but a variety of other instruments are used for fine-tuning purposes; among them foreign exchange swaps.

Reasons to include foreign exchange swaps are (i) central banks prefer to have a wide range of intervention techniques at their discretion (possibly because they may wish to vary the predictability of their policy actions); (ii) in many countries the domestic short-term secondary market is not deep enough (or nonexistent) to permit market intervention, whereas the market in foreign exchange is generally active; this makes it possible to trade large volumes in any one deal; (iii) unlike outright foreign exchange operations, swaps have no direct effect on the spot (or forward) exchange rate; 1/ (iv) swaps are a flexible instrument: technical procedures are informal and swaps are inconspicuous and easily reversible.

Possible drawbacks are that (i) foreign exchange swaps might influence the exchange rate after all, because of a strong announcement effect; (ii) it takes two days for foreign exchange transactions to become effective, which makes foreign exchange swaps less appropriate for situations where swift action is required; (iii) in foreign exchange transactions there is no simultaneous exchange of one currency for the other, which gives rise to settlement (or: Herstatt) risk; 2/ (iv) often, there are only a limited number of large banks which may act as counterparties; banks have to get the necessary dollars in the international market, and if the sum is large relative to their capital, a risk premium will be charged. So, smaller banks have a cost disadvantage; (v) if active short-term securities markets exist, central banks often prefer to conduct their operations in paper. This is probably because this market is more open to the rest of the economy than the interbank market (institutional investors and large corporations are also participating), which causes the market to be more efficient, with stronger competition and better price-setting; (vi) if monetary policy targets interest rates instead of a monetary aggregate, allocation of central bank credit might be a more suitable instrument, since the immediate effect of swaps is on the high-powered money supply.

1/ Swaps can be seen as analytically similar to temporary operations in domestic securities: there is a direct impact on banks' domestic currency reserve balance at the central bank, but the exchange rate will normally be influenced only to the extent of the impact on interest rates (Kneeshaw and Van den Bergh 1989, p.69). Of course, this might amount to the same thing, as interest rate policy and exchange rate policy are often inextricably connected.

2/ Abstracting for the moment from the possibility that the central bank ends up with a net short position in foreign currency (which would give rise to exchange risk much larger than the settlement risk) since in such situations central banks would not be using swaps as a money market tool.

Since swap transactions are temporary by nature, they are suitable for short-term technical adjustment: either to influence the general liquidity of the market so as to neutralize the effect of fortuitous or seasonal factors (connected, for instance, with note circulation, or with the semi-annual payment of oil taxes as in Norway) or to bring about or maintain temporary market imbalances which can push interest rates in the desired direction (National Bank of Belgium, Annual Report 1990). However, swaps can easily be rolled over so that a longer-term impact can be achieved, and also the maturity of swap operations has been extended, presently ranging from 24 hours to 24 months. Central bank foreign exchange swap operations may be conducted anonymously in the market at the maturities customarily traded there (one week and one, three, six and twelve months), but more flexible contracts may be concluded bilaterally with banks. A common characteristic is that they generally involve U.S. dollars.

Switzerland is the only country where foreign exchange swaps are the main instrument for managing bank reserves, mainly because of the lack of short-term government securities (the Swiss government usually does not run a budget deficit). As can be seen in Table 3, National Bank foreign exchange swaps became a permanent source of bank reserves in the early 1980s; contracts were regularly renewed and the total amount outstanding subsequently rose progressively, reaching a peak of around 40 percent of the monetary base. Swiss foreign exchange swaps are almost exclusively done in U.S. dollars, although there have been marginal amounts traded in German marks. There are three large banks that together have a monopoly position. The Swiss Central Bank calls them in the morning to obtain quotes, and the transactions are carried out at the market-determined price.

Table 3. Evolution of Swiss National Bank Foreign Exchange Swaps

Year	Average Amount Outstanding	
	In billions of Swiss francs	As percent of the monetary base
1976	1.4	6
1977	1.0	4
1978	1.2	4
1979	4.5	14
1980	6.8	23
1981	9.1	32
1982	9.8	33
1983	10.4	34
1984	12.4	40
1985	13.7	43
1986	14.3	44
1987	13.9	42
1988	11.9	38
1989	11.6	39
1990	10.5	36
1991	11.5	39

Source: Schweizerische Nationalbank, Monthly Bulletin May 1992.

Apart from Switzerland, the two countries that rely most on central bank foreign exchange swaps are The Netherlands and Germany. In both, short-term securities markets are extremely thin, but the central banks use foreign exchange swaps infrequently because they rely more on other open-market instruments. In Germany, foreign exchange swaps have been used by the Bundesbank since 1958. For the first decade, it used contractive swaps both to influence the domestic money market and to stimulate short-term foreign investment by offering attractive swap rates. As from the late 1960s, swaps were motivated mainly by attempts to calm the international monetary situation and strengthen confidence in the dollar parity. Foreign exchange swap transactions have only served the purpose of "fine-tuning" the money market since 1979.

Besides swaps, the Bundesbank carries out "foreign exchange transactions under repurchase agreements." These are essentially the same as swaps, but the ownership of the foreign asset does not change, i.e., in a contractive swap, the Bundesbank's net foreign assets are unchanged, banks' reserves decrease, and the Bundesbank's liabilities to domestic banks

arising from repurchase obligations increase. Quantitatively, foreign exchange swaps and repurchase agreements have sometimes been of considerable importance. The instruments are used for fine-tuning, both to provide and to withdraw liquidity, so they do not make up a substantial part of the monetary base (Deutsche Bundesbank 1989, pp. 77-79).

Table 4 shows that the importance of the foreign exchange swap in the Netherlands was never great, 1/ and operations have ceased during the last few years (although the instrument has not been officially abandoned). This was partly because of the aforementioned drawbacks of swaps, and partly because another open-market instrument, the so-called special loan, has become more flexible and suitable to be used swiftly over the years (as can be seen from the increased frequency and the declining average maturity of this instrument). Also, the Netherlands Bank's policy targets primarily interest rates instead of some monetary aggregate, and the most direct effect of swaps is on the monetary base.

Other countries that have used currency swaps (albeit very rarely) are: the U.K., Norway, Finland, Belgium, Ireland and Austria (Bingham 1985, Kneeshaw and Van den Bergh 1989, and annual reports of various central banks).

1/ The average amount outstanding is given here for the sake of comparability with other countries. As the use of foreign exchange swaps is becoming more infrequent, this figure is increasingly meaningless; for example, as can be seen from the table, the 3 million guilders outstanding on average in 1987 were in fact 1,010 million guilders for just one day, and zero for the rest of the year.

Table 4. Special Loans and Foreign Exchange Swaps in the Netherlands
(In millions of guilders: (+) easing, (-) tightening)

Special Loans					
Year	Frequency	Average maturity in Days	Average Amount Per Loan	Average Amount Outstanding	
				(In millions of guilders)	(percent of monetary base)
1976	5	25	840	292	1.74
1978	9	18	1,800	810	4.21
1980	10	17	1,400	661	2.97
1982	20	9	3,080	1,540	6.42
1984	20	10	3,360	1,867	6.48
1986	36	9	3,160	2,844	9.11
1987	44	7	6,590	5,638	16.90
1988	46	7	3,690	3,301	8.41
1989	51	6	3,570	3,035	7.22
1990	58	6	4,390	4,244	6.69
1991	56	6	3,468	3,237	9.80

Foreign exchange swaps					
Year	Frequency	Average Maturity in Days	Average Amount per Per Loan	Average Amount Outstanding	
				(In millions of guilders)	(Percent of monetary base)
1976	25	36	120	300	1.79
1978	14	32	130	162	.84
1980	21	21	310	380	1.71
1982	7	17	690	228	.95
1984	14	22	540	462	1.60
1986	6	4	490	33	.10
1987	1	1	1,010	3	.01
1988	4	40	-520	-231	-.59
1989	10	9	-580	-145	-.35
1990	-	-	-	-	-
1991	-	-	-	-	-

Source: Den Dunnen and De Wilde 1991, p. 66, The Netherlands Bank. ^{1/}

^{1/} The average amount outstanding was calculated as a daily average, i.e. (frequency x average maturity in days x average amount) divided by 360.

2. Non-OECD countries

Now let us consider the usefulness of foreign exchange swaps as a money market tool for less developed countries. The preceding discussion suggests that swaps could be recommended for countries that a) wish to conduct monetary policy in a market-oriented way; b) target a monetary aggregate; c) lack a well-developed market for short-term securities (especially countries where there is no securitized government debt); and d) have deep spot and forward foreign exchange markets. The latter criterion is probably the most binding; the countries that qualify can be read from Table 2 (see p. 10).

Non-OECD countries that do in fact use foreign exchange swaps include Kuwait, Saudi Arabia, and Malaysia, all of which meet the forward market criterion, 1/ and Oman, U.A.E., Bahrain and Turkey, that do not.

Malaysia's financial system is to a large extent liberalized. Interest rates on interbank borrowing and lending are essentially determined by market conditions. 2/ There is an active money market; interventions by the central bank (BNM) have usually been quite small and aimed at stabilizing interest rates. The discount rates on various instruments are generally set in line with the prevailing money market rates; BNM does not announce a discount rate. BNM has a wide range of policy instruments: besides changes in statutory reserve requirements, it uses open-market operations in government securities, rediscounting of commercial bills, recycling of government deposits, and foreign exchange swaps. The latter are not conducted as an open-market operation but as bilateral arrangements. BNM swap facilities provide liquidity to banks with a premium or discount in line with the interest rate differential, at commercial terms roughly equal to those which commercial banks charge their customers. The swap period does not exceed three months.

Rediscount operations have been of only limited importance in Malaysia. In the first half of the 1980s, recycling of government deposits and foreign exchange swaps were the principal instruments. In the latter half of the decade, swaps have increasingly been replaced by open-market operations and the issue of central bank certificates. Thus, as the market for short-term government securities matured, the BNM preferred to use these securities for open-market operations, even though Malaysia has an active forward exchange market.

The central bank of Kuwait (CBK) introduced a Kuwaiti dinar/U.S. dollar swap facility to provide liquidity to commercial banks in April 1978. The

1/ South Africa also qualifies, and it uses swaps, but not as a money market tool.

2/ Before 1978, interest rates were kept low relative to international rates. There still is a policy of supplying loans to priority sectors and special groups at low cost.

swap period does not exceed six months, and the forward rate is established by the central bank (at a market-related level). Individual ceilings apply to one to six-month swaps, but not to swaps for shorter terms. Swap operations have played only a limited role since the introduction of treasury-bill operations. They are intended essentially to adjust unexpectedly overdrawn bank positions at the central bank if a bank is unable to utilize the CBK's treasury bill facility or sell foreign exchange to the CBK. Thus, the CBK apparently prefers operations with short-term government paper to foreign exchange swaps as a money market tool.

The central bank of Saudi Arabia (SAMA) also provides liquidity to banks through foreign exchange swaps at its discretion. These entail spot sales of U.S. dollars to SAMA with a repurchase agreement based on the market-determined forward exchange rate. Foreign exchange swaps are available only for short durations with terms decided by SAMA on a case-by-case basis. The swap facility is not a very important instrument in terms of relative size, but it has been quite helpful occasionally; e.g. swaps were used during the recent regional crisis to provide the market with emergency liquidity.

The Central Bank of Oman started its swap facility in March 1980. It is basically a passive instrument, i.e., all foreign exchange swaps (always expansionary swaps) are initiated by the commercial banks, each of which has an individual ceiling. One might argue that, in order to measure liquidity, it is more relevant to look at the potential capacity, i.e., the ceilings, than at the actual amount outstanding. ^{1/} But while the CBO might stand ready to execute swaps up to the ceiling, this can only be undertaken if commercial banks have the necessary foreign exchange, and the capacity of the banking system to attract foreign resources is difficult to estimate for the central bank.

Initially, U.S. dollars were swapped at par (the Omani rial is pegged to the U.S. dollar; the exchange rate has been very stable). This is, of course, related to the fact that there is no developed forward market in Omani rials, and the financial system is fairly regulated. The drawbacks of this situation became clear in 1986, when the domestic interest rate exceeded international rates. This gave the banks the possibility of risk-free windfall profits, leading to a peak level of RO 27 million outstanding in August 1986. In July, the facility was modified to cure this flaw. A charge on the exchange rate was computed as the difference between a notional domestic rate ^{2/} and the Eurodollar rate. The outstanding swap amount subsequently declined sharply. In 1989, there was a squeeze on banks' Omani rial liquidity, so use of the swap facility rose again to a

^{1/} The total swap ceiling on the banking system rose from RO 12.7 million in 1981 to RO 50.6 million in 1986. After that, ceilings became variable, with different costs for different portions.

^{2/} Assumed to be equal to the maximum allowable one-year rial deposit rate of 8.5 percent plus a variable margin initially set at 0.5 percent.

peak of RO 35 million in April. As can be seen from Table 5, apart from these peaks the share of reserves acquired through foreign exchange swaps in the monetary base has been less than 1 percent.

Another disadvantage of the way the swap system is organized in Oman (i.e., not market-determined) is that the CBO cannot do reverse swaps to withdraw liquidity because this would cause destabilizing expectations of exchange rate movements. The system is thus not very flexible: a change in strategy would be disruptive.

In Bahrain, a U.S. dollar swap facility provides liquidity in exceptional circumstances. Swap terms are set on a case-by-case basis largely for banks not holding treasury bills. Use of swaps has diminished considerably following the introduction of the repurchase facility for treasury bills. The Central Bank of the U.A.E. also offers a swap facility, with individual ceilings for banks. In the absence of a significant forward exchange market, no quotes can be obtained. Pricing is done by the central bank, dependent on the dirham/U.S. dollar interest rate differential.

Table 5. Foreign Exchange Swaps in Oman 1/

Year	Average Amount Outstanding	
	In thousands of Omani rials	As percent of reserve money
1981	1,130	0.51
1982	475	0.17
1983	-	-
1984	1,625	0.64
1985	200	0.08
1986	9,333	3.61
1987	217	0.08
1988	499	0.21
1989	18,517	7.19
1990	867	0.31

Source: Central Bank of Oman.

1/ In this table and in the ones that follow, annual average amounts outstanding were calculated as the average of end-of-month figures.

Turkey presents an interesting case. Monetary control has been exercised largely through the reserve requirement ratio, and, occasionally, limits on central bank credit. Open-market operations, which began in 1987, have been expanded, both by direct sales of government securities and through repurchase arrangements. They have been limited by the size of the Central Bank's portfolio, and, to some degree, the thinness of the securities market. Interest rates on deposits were regulated until October 1988, when they were partially liberalized. The Turkish lira/U.S. dollar swap facility has been in operation for over a decade. The swaps are carried out as an exchange of mutual deposits, i.e., the commercial bank places a foreign exchange deposit at the central bank and the central bank "deposits" Turkish lira at the commercial bank (it credits the bank's reserve account). This gives rise to the four-entry system mentioned earlier. The foreign exchange deposit causes the central bank's foreign assets to rise, and creates a (forward) foreign liability. The Turkish lira deposit increases banks' reserves, and the central bank's domestic assets. During the term of the swap, the central bank's foreign asset is valued at the historical exchange rate but its foreign exchange liability is revalued with the current exchange rate. Since the Turkish lira has constantly been depreciating since the 1970s, the net of these four items is always negative. This net figure is what is called "foreign exchange swaps" in the Turkish banking system accounts. The interest on the Turkish lira deposit, which should in theory compensate for the capital loss, goes into the profit and loss account.

This treatment implies that no forward exchange rate is agreed upon; the central bank relies on the uncovered interest parity to hold. If the Turkish lira depreciates at a higher rate than the interest differential, it will suffer a loss; it can gain if the interest differential is greater than the rate of depreciation. The amount of swaps outstanding peaked in 1988, probably because the expected liberalization of interest rates in October would widen interest differentials substantially, thereby reducing the (expected) profitability of swap operations to commercial banks. The outstanding amount decreased notably since then, and has been virtually stable since mid-1990, when the central bank stopped actively using swaps.

IV. Management and Acquisition of Foreign Exchange Reserves

1. Asset/liability management

Central banks nowadays are under more pressure to manage their assets actively than in the past. Although the need to defend the exchange rate often constrains central banks' investment strategies, they too have to search for better returns. But, since intervention in the foreign exchange markets requires instant access to reserves, liquidity is crucial. In determining the currency composition of their reserves, some central banks take account of the currency composition of their country's import basket, with higher weights for currencies with liquid bond markets and for the currencies that a country uses for intervention. This provides a rationale

to use currency swaps to temporarily adjust the currency distribution when it has been distorted as a result of intervention. The central bank of Norway uses currency swaps 1/ and forwards to maintain the liquidity of its assets while leaving the currency distribution unchanged (Cookson 1991).

Currency swaps also provide cross-currency hedging (and interest rate hedging if cross-currency interest rate swaps are used). This is done when foreign assets are in different currencies than foreign liabilities. In less developed countries, foreign asset/liability management is not so much about maximizing returns while maintaining liquidity for reasons of exchange rate policy: often, it is more a matter of minimizing the inevitable financial risk. One way to do that is to improve the matching and currency composition of foreign asset and liability structures. Currency swaps can be used in this framework for cross-currency hedging. A developing country that has engaged in such activities is Trinidad and Tobago. The country has considerable external debt, denominated in Japanese yen, which was partially taken over by the central bank. The--widely fluctuating--foreign reserves (mainly earnings from oil exports) are largely in U.S. dollars, since the TT dollar is pegged to the U.S. dollar. The central bank has used currency swaps to hedge against changes in the U.S. dollar/yen exchange rate, as well as swaps from floating rate into fixed rate liabilities. 2/

Yet another rationale to use currency swaps in asset/liability management is to influence published official foreign exchange asset positions, i.e., to hide the real fluctuations in them. The Banque de France has been reported to do that, but many others might be doing so, since this would of course not be public knowledge.

2. Acquisition of foreign exchange reserves through swaps between central banks

Foreign exchange swap transactions that are made as part of a strategy to acquire foreign exchange reserves can be divided into two broad categories: (i) those carried out in the market, i.e., with the banking system as counterparty, and (ii) those with other central banks as counterparties. This subsection deals with the latter category.

If central banks deem it necessary to intervene heavily in the foreign exchange market but their supply of foreign reserves is insufficient, they

1/ Note that these are currency swaps involving the exchange of streams of interest payments, not foreign exchange swaps.

2/ The central bank of Trinidad and Tobago managed to realize profits in currency swaps of U.S.\$ 40 million (1 percent of GDP) in 1988, but shifted to a loss of U.S.\$ 47 million (1.2 percent of GDP) in 1989. Information about the exact details of these contracts was not available, but this result was probably connected with the fact that foreign reserves were very low in 1988 and 1989, so that the central bank still ended up with an open position. No such operations were undertaken after 1989.

may acquire the reserves needed by drawing on a swap line with the corresponding central bank. For this purpose the Federal Reserve swap network exists; this is a system of reciprocal short-term credit arrangements between the Fed and fourteen other central banks and the Bank for International Settlements. It enables the Fed to acquire currencies needed for market operations to counter disorderly market conditions, and it enables the swap partners to acquire dollars they need in their own operations. The swap lines amount to \$30.1 billion (see Table 6).

Swap drawings to finance official exchange intervention do not affect the money supply under these operating procedures. For example, if the Fed draws on the swap line with the Bundesbank to finance a market sale of marks, U.S. bank reserves are depleted when the Fed sells marks for dollars but the same amount of dollars is created by crediting the Bundesbank's account at the Fed. The Bundesbank, which does not immediately need the dollars, invests them in U.S. securities so that these dollars find their way back into U.S. bank reserves (Kubarych 1978, p. 19).

These Federal Reserve swaps were prominent in the late 1970s but their importance has diminished since then (although the swap lines have increased). Because swap transactions inevitably mature, they are suitable for short-term adjustment, to smooth irregularities. For this kind of operations to make sense, the exchange rate must be only temporarily diverging from a known trend level, or it should at least be believed to do so. The persistent random movements of the dollar vis-à-vis other major currencies suggest that this is not the case. 1/

Swaps between central banks need not arise for foreign exchange intervention purposes exclusively; they can also be connected with trade. For example, Guatemala and Costa Rica swapped their currencies in the early 1980s to deal with regional trade deficits. (As Guatemala failed to repay the Costa Rican colones, this has turned into a long-term loan from Costa Rica.)

1/ If the exchange rate follows a random walk, all shocks are permanent; i.e. there is no trend level to which it returns. If the shocks were believed to be random however, the interventions should have a permanent effect. From the fact that swap-financed interventions have largely been abandoned we might therefore conclude that policy makers are more inclined to regard the exchange rate as following a random walk.

Table 6. Federal Reserve Reciprocal Currency Agreements

(In millions of U.S. dollars)

Institution	Amount of Facility
Austrian National Bank	250
National Bank of Belgium	1,000
Bank of Canada	2,000
National Bank of Denmark	250
Bank of England	3,000
Bank of France	2,000
Deutsche Bundesbank	6,000
Bank of Italy	3,000
Bank of Japan	5,000
Bank of Mexico	700
Netherlands Bank	500
Bank of Norway	250
Bank of Sweden	300
Swiss National Bank	4,000
Bank for International Settlements:	
Dollars against Swiss Franc	600
Dollars against other authorized European currency	1,250

Total	30,100

Source: Federal Reserve Bank of New York (1992).

3. Acquisition of foreign exchange reserves in situations of scarcity

a. Foreign exchange swaps

Many developing countries suffer from a structural dependence on foreign trade and assistance, substantial external indebtedness and wide fluctuations in their export earnings on the one hand, and a steady demand for imported basic goods on the other. These countries must hold foreign exchange reserves in order to prevent excessive short-term fluctuations in the exchange rate. Of prime importance is liquidity: foreign exchange should be readily available to meet essential needs (including the servicing of foreign liabilities) (Blackman 1982, p. 2-4).

When faced with an acute shortage of liquid foreign exchange reserves, central banks in a number of countries resorted to swaps as a way to increase their gross foreign exchange holdings. Examples are Chile, Argentina, Uruguay, Ecuador, the Philippines, Indonesia and Korea.

Argentina experienced a balance of payments crisis starting in 1982, whereupon it announced a number of far-reaching measures to deal with this situation. These included foreign exchange swaps with domestic banks and residents (e.g. importers) in possession of foreign exchange deposits. Also, domestic banks and corporations with foreign debt that had to be serviced were encouraged to renegotiate the debts, asking for suspension of payment and new loans. If this could be achieved, they were allowed to pay the domestic currency equivalent of their debt service to the central bank (BCRA), which would take on the U.S. dollar liability. This amounted to an exchange rate guarantee for the remaining life of the debt.

Considering the desperate reserve position, both measures exposed the BCRA to exchange rate risk, since it could not cover these foreign liabilities. Without cover, it was dependent on the uncovered interest parity to hold; the swap premium should be related to the expected rate of depreciation. The BCRA could not set its swap rate in this way, because it had to set a preferential rate to attract the swaps, and because the announcement effect of a "realistic" swap rate would cause undesirable capital movements. Consequently, the BCRA suffered huge losses, with negative external operating results equivalent to about 0.5 percent of GDP on average since 1984. Other countries where central bank foreign exchange swaps have led to large losses from the depreciation of the domestic currency are the Philippines and South Africa.

In 1982, the Central Bank of Chile tried to gain reserves by establishing a swap facility for banks. In this operation, it bought U.S. dollars at the central exchange rate minus a commission depending on the swap's maturity. The sale of dollars back to the commercial bank occurred at the exchange rate of the initial transaction adjusted for the difference between domestic and foreign inflation during the swap period. The covered interest parity condition was not taken into account, so it was possible to engage in arbitrage. The swap provided a real, but not nominal, exchange

rate guarantee. There were limits to the use of the facility, depending on the origin of the foreign exchange and on the funding of the commercial bank.

Although swap operations did not cause exchange losses in Chile, the central bank started restricting them in 1990, to discourage short term capital inflows, which were considered an undesirable source of net international reserves, and to help depreciate the exchange rate. Moreover, the central bank felt it should not provide exchange rate guarantees. Therefore it adopted a series of measures. The commissions on swaps were raised sharply to offset the differential between domestic and foreign interest rates. Also, the exchange rate used in the swap transaction was changed from the central exchange rate to the observed rate in the market.

Korea's financial sector has been quite regulated, characterized by direct credit controls, interest rate ceilings, and collateral requirements. Before 1986, Korea had a persistent balance of payments deficit, so foreign exchange reserves were scarce. The Central Bank of Korea engaged in swaps with foreign commercial banks, which were not allowed to establish a network of local branches. This caused their domestic currency funding to be very limited, so to acquire working capital they borrowed from their head offices and swapped the proceeds into won. The swap rate was chosen to provide an incentive for capital inflows, and individual bank swap limits were regularly increased. Also, two development institutions were allowed to borrow abroad and swap the proceeds for won with the central bank. The larger part of these swaps were sterilized by the monetary stabilization account and by the sale of monetary stabilization bonds. As of 1986, the balance of payments went into surplus, which eliminated the need for swaps. The local branches of foreign banks were granted the option of having access to the discount window of the Bank of Korea, and they were allowed to issue certificates of deposit. The swap limits have not been increased since then.

To sum up, the use of foreign exchange swaps in a situation of scarce foreign reserves has the benefit of providing a short term capital inflow. On the other hand, they have an expansionary monetary effect that has to be sterilized; if there is no (active) forward market, the central bank has to set a swap rate which can have adverse signalling effects. Moreover, if the country is in a really severe crisis, using swaps to boost gross foreign exchange reserves temporarily will only delay the necessary adjustment. And, above all, if the central bank cannot keep its position covered (as in times of speculation against the currency), it is liable to suffer exchange losses. In the case of Argentina, these negative effects clearly outweighed the benefit. There are examples of countries (such as Korea), however, that do not seem to have experienced particularly adverse effects, so the instrument cannot unambiguously be judged to be unsatisfactory.

The use of foreign exchange swaps to gain reserves is difficult to distinguish from central bank swaps used to stimulate financial markets or to subsidize certain activities. Examples of the latter use are central

banks acting as market-maker in forward foreign exchange markets, providing forward cover and exchange rate guarantees, subsidizing domestic financial institutions and attracting foreign investment. Some of these activities amount to quasi-fiscal operations, involving subsidies; they have been quite common in developing countries. Regardless of the purpose, these operations are very similar to those discussed above: they amount to the central bank taking an open position, thereby assuming the exchange rate risk which often results in large losses. These kinds of activities are not to be recommended in general. Central banks can do more to stimulate financial markets by conducting a credible exchange rate policy. Subsidies should be on the government budget, and the financial sector does not gain in the long run if its central bank incurs substantial losses, which most often have to be monetized.

b. Gold swaps

Gold swaps are another way to obtain liquid foreign resources. Those swaps are loans in foreign currency backed by deposits of gold. The classic operation consists of selling the gold at the current price (with delivery within two days of agreement on the sale price), and repurchasing the same gold at a future date. Such an operation makes it possible to obtain temporary financing while paying an interest rate below the current market rate (the risk premium is reduced because the gold serves as collateral).

Swaps are concluded for between three and twelve months, with the sale price being the market price on the day of the transaction. The repurchase price is fixed at the same level, plus interest accrued at the interest rate on loans in the currency in which the deal was carried out (LIBOR usually serves as the basis). When the swap matures, it can either be liquidated or extended. If the foreign currency is not repaid, the lender can hold the gold as a guarantee. The Bank for International Settlements (B.I.S.) can organize swaps for currency amounting to 80 percent of the value of the gold involved, and provides general information on this type of operations.

Uruguay and Ecuador have been active in gold swaps, swapping gold for Swiss francs. As long as the central banks keep their positions covered, i.e., hold on to the foreign exchange to make sure they have a matching asset by the time the swap matures, there is no exchange risk involved. Unfortunately, when reserves are scarce this is often neglected, so that the bank will suffer a loss if the domestic currency depreciates during the interval.

c. Central bank losses

As was discussed above, swaps can cause substantial central bank losses, which has a negative impact on the economy in a number of ways. Large losses erode the central bank's capital, which may jeopardize its independence. Moreover, the losses represent an injection of liquidity, which, if large relative to the monetary base, would be very hard to sterilize. This might make it necessary for the central bank to issue

interest-bearing liabilities, which embodies a risk that future losses may grow exponentially.

Persistent losses of the central bank could lead to inconsistency in the use of monetary policy instruments, as the bank is trying to absorb liquidity but at the same time it is under pressure to implement an expansionary policy as a way to reduce future losses. Thus, central bank losses embody an inherent bias toward generating inflationary surprises (Vaez-Zadeh, 1991).

V. Summary and conclusions

Central banks of OECD countries use foreign exchange swaps to "fine-tune" the money market, to acquire foreign reserves for intervention purposes and as a part of their asset/liability management. In some non-OECD countries, central banks also use foreign exchange swaps to control bank liquidity. In other cases, they use swaps to defend scarce official reserves, and to stimulate and/or subsidize the domestic financial system.

As a money market tool, foreign exchange swaps are flexible and can be used in the absence of a developed short-term financial market. The operations should preferably be conducted in accordance with market mechanisms; therefore, a deep and well-developed forward foreign exchange market is necessary for the instrument to function smoothly.

As a means of defending foreign reserves in times of balance of payments problems, the appropriateness of foreign exchange swaps is considerably more questionable. In countries where those problems are acute, swaps can have adverse effects, because they leave the central bank with an open currency position that almost always leads to losses. For the same reason, using central bank swaps to stimulate the development of financial markets is not to be recommended. Central bank losses could seriously damage monetary policy, and thus monetary stability. In countries with moderate and temporary balance of payments difficulties, swap schemes can be useful as a transitory means to boost a countries' gross foreign exchange reserves.

On a worldwide scale, it appears that central bank foreign exchange swaps are losing favor; in the large majority of cases, swap facilities have been restricted or dormant in recent years. This is probably connected with the ongoing development of financial markets all over the world; as short-term securities markets develop, swaps become less attractive as a money market tool, and the poor experience of countries which have used swaps in more difficult circumstances have discouraged such use.

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