

Institutional Aspects of U.S. Intervention

by Owen F. Humpage

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Introduction

Of the various policies that the Federal Reserve System undertakes, none seems as controversial as exchange-market intervention. Opponents of intervention sound four notes of discord: First, intervention that does not alter the domestic monetary base, or *sterilized* intervention, often has no apparent effect on exchange rates. When it does, the influence is usually temporary and small.¹

Second, intervention that does alter the monetary base, or *nonsterilized* intervention, can interfere with the Federal Reserve's capacity to maintain price stability under certain circumstances (see appendix 1). Even if the System is not currently engaged in intervention, holding a large portfolio for that purpose creates uncertainty about the continuing commitment to price stability because it suggests that other policy goals might be considered.

Third, through recent interventions, the United States has acquired large foreign-exchange holdings that are subject to valuation loss when the dollar appreciates. In view of the first two concerns, some critics assert that we should

reduce our exposure or adopt measures for financing intervention that do not result in exchange-rate risk.

Fourth, given that intervention in the United States falls primarily under the purview of the Treasury Department, opponents worry that participation by the Federal Reserve could appear at times to compromise the System's monetary policy independence or its relationship with Congress.

All of these issues have created the undertone for Federal Open Market Committee (FOMC) discussions about exchange-rate policies.² Official expressions of the first three concerns are found both in the 1989 policy dissents of FOMC Governors Angell and Johnson and in the 1990 dissents of Governors Angell and LaWare and Cleveland Federal Reserve Bank President Hoskins.³ Todd (1992) offers evidence of official concern about item four.

■ 1 Edison (1993) and Humpage (1991) survey the literature on the effectiveness of intervention.

■ 2 The FOMC consists of the seven Governors and the 12 Presidents of the regional Federal Reserve Banks. The President of the Federal Reserve Bank of New York is the only President with a permanent vote, and he is the Vice Chairman of the FOMC. The other Presidents share voting privileges, with only five allowed to vote at any given time.

■ 3 See Board of Governors of the Federal Reserve System (1990), p. 117, and (1991), pp. 109–10.

When considering whether to intervene, the FOMC weighs the short-term, often questionable, benefits of pursuing an exchange-rate objective against the possible costs of direct interference with monetary policy, of reduced long-term policy credibility, and of heightened exchange-rate risk exposure. To appreciate the origins and importance of this controversy, one must understand the institutional setting for U.S. intervention. For this purpose, but also as a complement to the growing number of empirical studies of intervention's effectiveness, this article presents an institutional account of U.S. intervention. Generally, the discussion unfolds as an intervention might: from a decision to intervene, to arrangements for financing it, to its execution, and finally, to investment of the proceeds.

I. Authority to Intervene

Governments buy and sell foreign exchange for a variety of reasons, including financing embassies and foreign operations, altering the composition of reserves, and paying interest on foreign debts or receiving interest on foreign assets. Sometimes, they undertake these transactions directly with each other, operating through their central banks and avoiding the private market. Intervention then refers only to those transactions undertaken specifically between governments and the private market to influence market exchange rates.⁴

In the United States, the Foreign Desk of the Federal Reserve Bank of New York (FRBNY) conducts all official exchange-market transactions for the government. With respect to intervention, the Desk maintains two accounts: one for the U.S. Treasury and one for the FOMC. Both the Treasury and the Federal Reserve typically act in concert and split the transactions equally between their two accounts. If, for example, the Foreign Desk purchases \$200 million equivalent German marks, it will usually allocate \$100 million of these to each account.⁵

■ 4 As Adams and Henderson (1983) note, central banks can "passively" intervene through the timing of their other transactions.

■ 5 This 50–50 split has not always been the case. Until the late 1970s, the Federal Reserve undertook most of the intervention for its own account. In 1990, the Treasury undertook some intervention through the Foreign Desk for its own account.

Preeminence of the U.S. Treasury

Although intervention necessarily involves both the U.S. Treasury and the Federal Reserve, the Gold Reserve Act of 1934 (Section 10) vested responsibility for intervention squarely with the Treasury and established the Exchange Stabilization Fund (ESF) specifically for that purpose. The Act capitalized the ESF with \$2.0 billion in profits stemming from a revaluation of the official price of gold from \$20.67 to \$35 per ounce. The ESF is under exclusive control of the Secretary of the Treasury, who acts with the approval of the President. The Treasury's decisions regarding ESF operations are not subject to review by any other officers of the U.S. government (see Todd [1992], p. 102).

In addition to acting as an agent for the U.S. Treasury, the Federal Reserve System has maintained its own account for intervention since the early 1960s.⁶ Although the Federal Reserve Act does not *specifically* authorize the System to intervene, the FOMC interprets various sections of the legislation — considered together — as indeed sanctioning such activities.⁷

Section 14, for example, allows the Federal Reserve to purchase or sell both spot and forward "cable transfers" in domestic or foreign markets. Since cable transfers were the standard means of acquiring foreign-currency-denominated deposits earlier in the century, this provision seems to allow the central bank to acquire foreign exchange in the form of a claim on a foreign bank account. Section 14 (e) further allows the Federal Reserve to hold foreign exchange in the form of open accounts in foreign countries, to appoint correspondents, and to establish agencies. These are all necessary aspects of intervention, since intervention affords the Fed a claim — in the form of a deposit or a liquid security — on a foreign central bank or foreign government. Section 14 likewise enables the Federal Reserve to conduct transactions through another bank in a foreign market. The System interprets this part of the Act as authority to engage in swaps with other central banks.⁸ Finally, Section 12 (a) generally

■ 6 For a historical perspective on U.S. intervention, see Pauls (1990) and Todd (1992).

■ 7 This interpretation is found in a November 22, 1961 memorandum to the FOMC from Howard H. Hackley, the Committee's general counsel. The Hackley memorandum is printed in U.S. Congress (1962).

■ 8 A swap is a transaction in which central banks exchange their currencies for repayment with interest at a specific future date. Central banks prearrange the terms and conditions for swaps annually. U.S. swaps are discussed in more detail on pages 7 and 8.

authorizes operations — conceivably foreign-exchange intervention — that accommodate commerce and business and that maintain sound credit conditions in the United States.⁹

The relationship between the Treasury and the Federal Reserve forged through intervention is also a source of trepidation to many. In 1961 and 1962, when the United States intervened to defend its gold stock and the dollar, some FOMC members expressed concern that the System had overstepped its congressional mandate because the Gold Reserve Act gave primary responsibility for intervention to the U.S. Treasury, and because the Federal Reserve Act did not specifically mention intervention.¹⁰ The fear was that the Fed could be seen as financing a Treasury operation that might otherwise require an additional congressional appropriation. Congress, however, has tacitly recognized the Federal Reserve's authority to intervene both through its continual review and acceptance of such operations and through a 1980 amendment to Section 14 (b) of the Federal Reserve Act that allowed the System to invest its foreign-exchange holdings in obligations of foreign governments.

More recently, concern has focused on the implications of the relationship between the Treasury and the Federal Reserve for perceived System independence and for the credibility of domestic monetary policy. The Secretary of the Treasury is the nation's primary financial officer and is responsible to the President and Congress for formulating and implementing international financial policies. He typically represents the United States at important international meetings where the Federal Reserve Chairman is often an active participant and where specific exchange-rate policies are sometimes recommended. U.S. administrations and foreign governments at times view exchange-rate changes as an instrument of international policy (more specifically, as a tool for closing a trade deficit or for avoiding protectionism) or as a signal for demonstrating cooperation with other countries. Participants at the G5 meeting in September 1985 and the G7 meeting in February 1987, for example, agreed to policies of concerted intervention for the respective purposes of depreciating and stabilizing the dollar.¹¹ Given the limited effectiveness of sterilized intervention, such agreements could pressure the Federal Reserve to focus monetary policy on an exchange-rate objective, which at any specific time may or may not be consistent with domestic price stability (see appendix 1). Destler and Henning (1989), pp. 108–12, provide an example of this type of pressure.

FOMC Oversight

Within the Federal Reserve System, the FOMC maintains authority over intervention operations because intervention involves a type of open-market transaction. A subcommittee consisting of the Chairman and Vice Chairman of the FOMC, the Vice Chairman of the Board of Governors, and one other member of the Board chosen by the Chairman (with responsibilities for international matters) is accountable for intervention when the full FOMC is not immediately available for consultation.

Generally, the FOMC's guidelines for intervention consist of three documents. The *Authorization for Foreign Currency Operations* sanctions the System's purchases and holdings of balances in specific foreign currencies and establishes an overall limit on the System's net open position (see figure 1).¹² Although the Fed typically holds and intervenes only in German marks and Japanese yen, the *Authorization* actually permits the holding of a wide range of currencies, including such relatively minor ones as Austrian schillings, Belgian francs, Norwegian kroners, Swedish kronors, and Mexican pesos. Mexico is the only developing country whose currency the FOMC has authorized the System to hold. The *Authorization* also permits swap lines and lists existing swap arrangements. In addition, it provides general guidelines for investing foreign currency balances, for the responsibilities of the Manager of the FRBNY's Foreign Desk, and for reporting intervention to Congress and the Treasury.

While the *Authorization* describes the means for conducting intervention, a second document, *The Foreign Currency Directive*, focuses more on the objectives of intervention and on the manner in which the Foreign Desk should undertake such transactions. Among other

■ 9 Lawyers for the Treasury and the U.S. Attorney General have agreed with the System's interpretation of the Federal Reserve Act. See U.S. House of Representatives (1962), pp. 156–58.

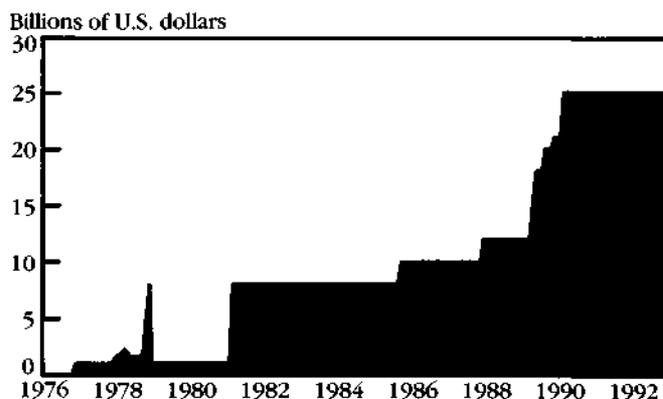
■ 10 See Governor Robinson's dissent on the motion for approval of Federal Reserve foreign-currency operations in Board of Governors of the Federal Reserve System (1963), pp. 55–56. See also Todd (1992), pp. 133–39.

■ 11 The G5 (Group of Five) comprises France, Germany, Japan, the United Kingdom, and the United States. The G7 (Group of Seven) comprises the G5 plus Canada and Italy.

■ 12 The net open position in any single currency, which equals current balances valued at historical exchange rates plus outstanding contracts for future receipt or delivery, represents the System's overall exposure to exchange-rate risk.

FIGURE 1

FOMC's Authorizations for Net Open Position



NOTE: At its December 1976 meeting, the FOMC replaced separate limits on various types of spot and forward transactions with a single limit on the System's overall open position.

SOURCE: Annual Report of the Board of Governors of the Federal Reserve System, various issues.

things, it directs intervention to counter disorderly market conditions and to maintain the dollar's value consistent with Article IV, Section 1 of the International Monetary Fund (IMF) Act.¹³ The *Directive* also requires close and continuous consultation with the U.S. Treasury and cooperation, when appropriate, with foreign monetary authorities. The Board of Governors publishes both the *Authorization* and the *Directive* as a matter of public record once per year in its Annual Report or, when changes occur, in the *Federal Reserve Bulletin*.

Finally, *Procedural Instructions* clarifies the relationship among the FOMC, the Foreign Exchange Subcommittee, and the Foreign Desk Manager. It also sets limits on the amount of intervention and swap transactions, both daily and cumulative, that the Manager may undertake between FOMC meetings. *Procedural Instructions* is not published.¹⁴

■ 13 Article IV, Section 1 requires members to maintain orderly exchange markets through cooperation and by avoiding unilateral actions designed to gain unfair advantage.

■ 14 Foreign Desk actions are regularly summarized in the *Federal Reserve Bulletin* and in the FRBNY's *Quarterly Review*.

Interpretation of the Directive

As noted in *The Foreign Currency Directive*, the Federal Reserve is authorized to intervene to counter disorderly market conditions, a concept that defies precise measurement. Official views about the nature of market disorder and about the role of intervention in the exchange market have varied from time to time since the inception of floating exchange rates in 1973. Through mid-1977, the Fed seemed to define disorderly markets in terms of the Foreign Desk's perception of the degree of confidence underlying the market's near-term exchange-rate forecast. Indicators of market uncertainty, such as abrupt changes in exchange rates, wide variation in quotes, rapid movements in one direction, and wide bid-ask spreads, figured in the Desk's determination. The Federal Reserve intervened frequently then, in relatively small amounts, and did not maintain a specific buy or sell posture for very long.

During the late 1970s, the dollar came under downward pressure because of rising U.S. inflation. At times between 1977 and 1980, both the Treasury and the Federal Reserve seemed to view a strategy of selling foreign exchange to moderate the dollar's depreciation as consistent with avoiding disorderly market conditions. As discussed below, the method of financing intervention necessitated the frequent repurchase of foreign exchange, leading to the back-and-forth pattern seen in figure 2. In late 1980 and 1981, the System took advantage of the dollar's strength to acquire foreign exchange for the nation's portfolio.

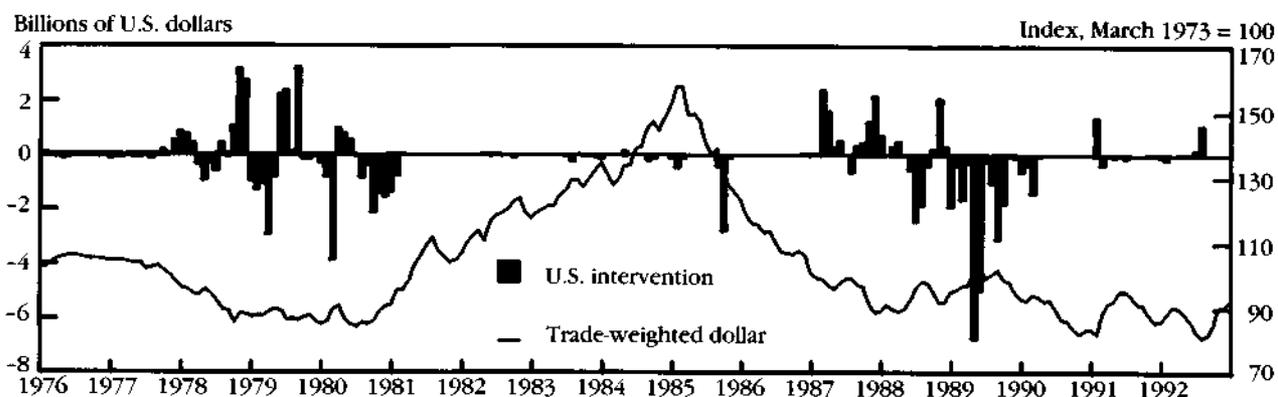
During the early 1980s, the Reagan administration viewed exchange markets as inherently stable and eschewed intervention in all but extremely unusual circumstances. Exchange-rate volatility was ascribed to erratic movements in underlying market fundamentals, which in the administration's view stemmed chiefly from uncertainty about government policies.

This perception changed in 1985, when the United States purchased large amounts of foreign exchange in order to encourage a faster depreciation of the dollar. The monetary authorities defined disorder in terms of differences between a market-quoted exchange rate and a rate that seemed consistent with a set of fundamental economic variables, such as interest rates, the current account, and relative inflation rates. Accordingly, U.S. and other G7 policymakers regarded the dollar as overvalued.

After a yearlong hiatus, the United States began a period of intensive intervention, in close

FIGURE 2

Monthly U.S. Intervention and the Trade-Weighted Dollar



NOTE: Positive (negative) values represent sales (purchases) of foreign exchange against dollars.
SOURCE: Board of Governors of the Federal Reserve System.

cooperation with other major central banks, following the Louvre Accord in February 1987. The plan was to stabilize the exchange value of the dollar and possibly to maintain the dollar within undisclosed target bands. The monetary authorities intervened frequently, in large amounts, and maintained a specific buy or sell posture for long periods.

Since early 1990, the United States has intervened rarely, though at times in heavy volumes. Officials once again seem to interpret the concept of disorder and the role of intervention more narrowly.

The Decision to Intervene

Intervention usually results from a joint decision by the U.S. Treasury and the Federal Reserve System. The process begins with a morning consultation between the staffs of the FRBNY and the Treasury prior to opening of the New York market. They discuss available information from markets open elsewhere in the world and from morning consultations with foreign central banks. In light of current market developments, the FRBNY's Foreign Desk may offer a recommendation on intervention consistent with the FOMC's directive, which the Treasury may or may not accept. If opinions about the merits of intervention differ, discussions would continue at higher levels of authority and eventually might involve the Treasury Secretary and Federal Reserve Chairman (see Smith and Madi-

gan [1988], pp. 189-90). Ultimately, the Federal Reserve must act as an agent for the ESF, but the Treasury cannot require the System to intervene for its own account. Moreover, although it has never happened, if the Federal Reserve intervenes for its own account *against* the wishes of the Treasury, the Treasury could inform Congress that the System's actions are interfering with U.S. foreign policy. Hence, formal statutory independence between the organizations is maintained.

II. Financing Intervention

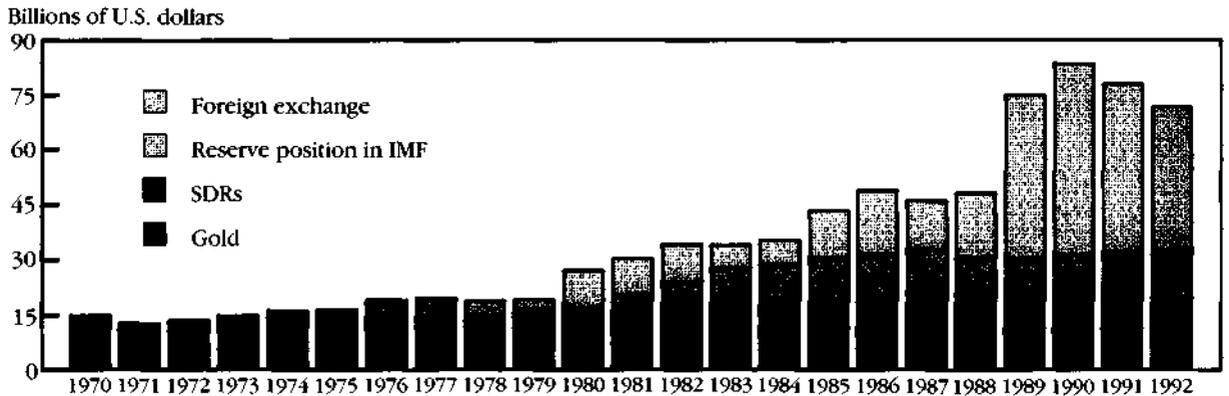
Once they decide to intervene, the Federal Reserve and the ESF must determine how they will finance the transactions. The method of financing depends first on whether the United States will sell or buy foreign exchange.

Sales of Foreign Exchange

All industrialized nations maintain international reserves, which are highly liquid assets unconditionally available to the monetary authorities for intervention. Exactly what types of assets qualify as international reserves is to some extent subjective, but generally, countries count their official holdings of gold and foreign exchange, their reserve position in the IMF, and

FIGURE 3

U.S. Official Reserve Holdings



SOURCE: International Monetary Fund.

their holdings of Special Drawing Rights (SDRs) (see figure 3).¹⁵

Foreign exchange refers to liquid claims on foreign governments that are denominated in convertible foreign currencies, typically U.S. dollars, German marks, Japanese yen, or British pounds. Usually, these take the form of foreign government securities or deposits at foreign central banks, but sometimes they include Eurocurrency deposits or deposits at the Bank for International Settlements (BIS). Nevertheless, we typically refer to foreign-exchange reserves as if they were currencies.

Under the Bretton Woods fixed-exchange-rate system, a primary function of the IMF was to provide a source of international reserves to member countries. When a country joins the IMF, it receives a quota that establishes its subscription to the organization as well as its voting rights. Related to its subscription is a country's reserve position in the Fund. This is the amount of its subscription that is automatically available in a foreign-currency equivalent and that is therefore considered a reserve asset. In addition, since 1968 the IMF has periodically created SDRs and allocated them to its member countries according to their quotas. All member countries agree to accept SDRs in official exchanges for their home currencies.

Besides financing intervention from their international reserve assets, countries can 1) borrow foreign exchange through swap lines with

other central banks, 2) issue debt obligations (bonds) denominated in foreign currencies to public or private lenders, or 3) borrow from credit facilities at international organizations like the IMF and the European Monetary System. Chief among the possible instruments for borrowing foreign exchange are Reciprocal Currency Arrangements, or swaps. These are short-term, reciprocal credit lines available under prearranged terms, which countries set for a one-year period. (*Reciprocal* implies that either party can draw on the line.) Drawings are typically for three months and, by convention, may be renewed only once. The Federal Reserve maintains 14 swap lines. The Treasury also maintains swap lines, including some with developing countries that are not reciprocal and that are not necessarily intended for exchange-market intervention.

When drawing on a swap line, the parties simultaneously contract for both spot and forward currency exchanges. For example, in a swap with Germany, the United States would buy German marks in a spot transaction and simultaneously sell them back to the Bundesbank in a forward transaction, typically with a three-month settlement date. The United States would then sell the newly acquired German marks in the foreign-exchange market for dollars. To earn interest on its dollar holdings until the forward settlement date, the Bundesbank would invest its dollars through the Federal Reserve in special, nonmarketable interest-bearing U.S. Treasury securities.

The parties to an official swap calculate the forward exchange rate for the transaction from

■ 15 Heller (1974) provides an excellent introduction to the topic of international reserves.

the covered-interest-parity (CIP) condition. This ensures that the cost to the United States of borrowing foreign exchange through a swap line equals the risk-free cost of borrowing in the foreign country.¹⁶ When the term of the swap borrowing ends, the country that intervened must deliver the foreign exchange in repayment of the line. Although the swap itself involves no currency exposure, the intervention it finances involves exchange-risk exposure. (I discuss both of these issues in a later section.)

Though swaps are the most common form of borrowing to acquire funds for intervention, the United States has occasionally used other methods when seeking to extend the maturity of its debts. Roosa bonds, for example, were nonmarketable U.S. Treasury obligations denominated in foreign currencies and issued to foreign governments in the 1960s. Carter bonds were similar instruments issued in private markets during the late 1970s. Beyond this, the United States, like all IMF members, has various credit lines (tranches) available at the Fund.

Countries prefer to finance intervention out of reserves rather than through borrowing. One reason is that official creditors may condition loans on the adoption of specific macroeconomic policies or on the attainment of particular macroeconomic goals, reducing the borrower's sovereignty over its policy choices. Another problem is that the borrowing country may need to repay the loans before the exchange-market crisis has fully passed, thereby forcing the borrower to reverse its original exchange-market transactions.

Between 1977 and 1980, for example, when the dollar experienced heavy downward pressure, the United States relied on swap lines to augment its foreign-exchange reserves and to finance intervention. Moreover, in November

1978, the United States drew on its reserve position in the IMF, sold SDRs to foreign central banks, and issued Carter bonds. To conserve resources and to acquire funds to repay our borrowings, we often reversed our intervention before the crisis had completely passed (see figure 2).

To limit these problems, the United States began to acquire an open position in foreign exchange in the early 1980s. Prior to 1980, gold made up the main portion of U.S. official reserves. The most rapid growth in our foreign-exchange position occurred in 1989 and 1990, when we attempted to avoid a dollar appreciation by buying foreign exchange. In 1987, total reserves equaled nearly \$36 billion, of which \$13 billion, or approximately 36 percent, was foreign exchange. By 1990, U.S. official reserves had grown to \$83 billion, of which \$52 billion, or approximately 60 percent, was foreign exchange (mainly German marks and Japanese yen).

Purchases of Foreign Exchange

Because the Federal Reserve can create unlimited amounts of reserves in the U.S. banking system, only the FOMC's authorization restricts its ability to acquire foreign exchange. In contrast, the ESF has a finite balance sheet with a current net worth of \$19.1 billion. The ESF has total assets of \$37.5 billion, which includes \$20.7 billion of foreign exchange, mostly Japanese yen and German marks.¹⁷ As noted earlier, the ESF was initially capitalized with \$2 billion in profits from a revaluation of official gold stocks. Since then, its resources have grown from interest earnings, intervention profits, and valuation adjustments.¹⁸ With the exception of these sources of growth and warehousing (discussed below), the ESF would require an appropriation from Congress to increase its available resources for intervention.

Warehousing

At times, the ESF has needed to augment its dollar holdings temporarily and has done so by warehousing foreign exchange in its portfolio

■ **16** In our example, the return to the Bundesbank on each mark swapped with the Federal Reserve equals

$$(1) \quad S^{-1}(1+r)F,$$

where S is the spot exchange rate in German marks per U.S. dollar, r is the U.S. Treasury bill rate, and F is the forward exchange rate. CIP holds that

$$(2) \quad (1+r) = S(1+r^*)F^{-1},$$

where r^* is the German Treasury bill rate. CIP implies that

$$(3) \quad F = \frac{S(1+r^*)}{(1+r)},$$

and equation (1) becomes

$$(4) \quad S^{-1}(1+r) \frac{S(1+r^*)}{(1+r)} = (1+r^*).$$

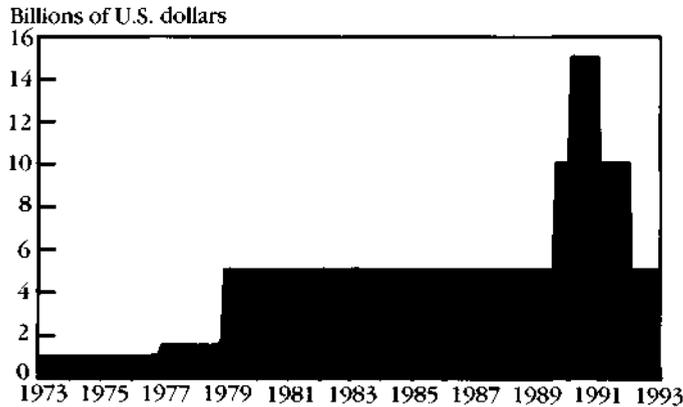
Hence, the United States pays a net interest cost of r^* for every mark borrowed through a swap.

■ **17** All data are as of September 30, 1992. See U.S. Treasury (1993), table ESF-1.

■ **18** In 1945, the United States paid two-thirds of its initial subscription to the IMF (\$1.8 billion) out of its ESF holdings. See Todd (1992), p. 124.

FIGURE 4

FOMC Authorizations for Warehousing



SOURCE: Annual Report of the Board of Governors of the Federal Reserve System, various issues.

with the Federal Reserve System. Warehousing is a swap transaction in which the Fed buys foreign currency from the ESF in a spot transaction and sells it back to the ESF through a forward transaction. Currently, the spot and forward exchange rates in a warehouse transaction are market-based. The Federal Reserve holds the foreign exchange acquired from the ESF in an interest-bearing form. Although the Fed does not charge the ESF interest, if CIP holds, its earnings should approximate the opportunity cost of the dollars.¹⁹

Warehousing has been controversial. Some critics contend that it directly violates the Banking Act of 1935, which prohibits the Federal Reserve from purchasing U.S. government obligations, *except in the open market*. The Hackley memorandum, on the other hand, defends the practice by arguing that the Treasury is merely a part of the foreign-exchange market and, hence, that transactions with it *are* in the open market. In contrast, the Treasury creates the market for Treasury securities because it is the sole supplier; thus, direct Federal Reserve purchases of Treasury issues would not be in the open market.

Legal issues aside, opponents contend that warehousing is, in effect, a loan from the central bank to the Treasury, which is contrary to the tenets of central-bank independence. Proponents view warehousing not as a loan, but as an asset exchange. In a warehousing swap, the Federal Reserve acquires an asset of the

Treasury (foreign currency), not a Treasury obligation. In either case, warehousing has sometimes weighed heavily on FOMC decisions pertaining to intervention (see Board of Governors [1991], p. 110). Figure 4 shows FOMC authorizations for warehousing, which increased sharply during the period of heavy U.S. dollar sales in 1989. In 1992, the FOMC reduced the authorized warehousing limits to \$5 billion, and since early that year, no foreign-currency balances have been warehoused with the Federal Reserve.

III. Buying and Selling

The foreign-exchange market is a global one in which trades occur virtually around the clock. In April 1992, the BIS estimated the average daily volume of the foreign-exchange market at \$880 billion (equivalent), with approximately 80 percent of all transactions involving U.S. dollars (see BIS [1993]). Although the typical amount of an intervention is small relative to the daily volume of dollars traded in the market, at the margin, intervention could still have an influence. Moreover, if intervention works by affecting market expectations, then the simple knowledge that the Federal Reserve is in the market — rather than the volume of the transaction — could be the decisive factor for expectations (see appendix 1).

In executing an intervention, the System either deals directly with commercial banks as counterparties or goes through the brokers' market, using a commercial bank as its agent. In dealing directly with commercial banks, the counterparty can make the information about the intervention public. In dealing through the brokers' market, however, the agent bank cannot reveal that it is acting on behalf of the Federal Reserve. The broker knows and announces only the names of the two commercial banks that are party to the transaction. Hence, interventions through the brokers' market give the Fed a greater degree of anonymity, which under certain circumstances might influence the effectiveness of an intervention.²⁰ Prior to the mid-1980s, the System typically operated through the brokers' market. Now it usually deals directly with banks. Following exchange-

■ 19 See footnote 16.

■ 20 Hung (1991) discusses whether discreet intervention is more effective than overt intervention.

FIGURE 5

The Federal Reserve Purchases Foreign Exchange for Its Own Account

1. The Federal Reserve (FED) acquires foreign exchange from a domestic commercial bank (cb) in the form of a claim on a deposit at a foreign commercial bank (fcb), which it immediately transfers to the appropriate foreign central bank (FCB). The FED pays for its acquisition by crediting the cb's reserve account at the FED. The FCB creates a deposit for the FED by debiting the fcb's reserve account.

Federal Reserve System (FED)		U.S. Commercial Bank (cb)		Foreign Commercial Bank (fcb)		Foreign Central Bank (FCB)		Foreign Treasury (FT)	
+ Deposit at FCB	+ Reserves	- Deposit at fcb		- Reserves	- Deposit of cb		+ Deposit of FED		
		+ Reserves					- Reserves		

2. The FED holds its foreign exchange in an interest-bearing security provided by the foreign Treasury (FT).

Federal Reserve System (FED)		U.S. Commercial Bank (cb)		Foreign Commercial Bank (fcb)		Foreign Central Bank (FCB)		Foreign Treasury (FT)	
- Deposit at FCB						- Deposit of FED		+ Deposit at FCB	+ FT bill
+ FT bill						+ Deposit of FT			

3. The FED sterilizes its intervention by selling a U.S. Treasury security from its own portfolio and then debiting the reserve account of the purchaser. The FCB sterilizes the intervention by purchasing FT securities and crediting the reserve account of the seller.

Federal Reserve System (FED)		U.S. Commercial Bank (cb)		Foreign Commercial Bank (fcb)		Foreign Central Bank (FCB)		Foreign Treasury (FT)	
- T bill	- Reserves	+ T bill		- FT bill		+ FT bill	+ Reserves		
		- Reserves		+ Reserves					

NOTE: Following convention, assets appear on the left-hand side of the T-account and liabilities appear on the right.
SOURCE: Author.

market conventions, foreign-exchange transactions typically settle after two business days.

The Federal Reserve commonly enters the New York market, but may intervene in a foreign market either directly with foreign commercial banks or by using a foreign central bank as an agent. Usually, the United States intervenes in the New York market while the European markets are still open. When the Federal Reserve or the ESF enters the market, its actions have an incipient effect on both domestic and foreign bank reserves. If the Fed and the appropriate foreign central bank each sterilize the effects of intervention on their bank reserves, the intervention will change the currency composition only of publicly held government debt. A substantial body of re-

search questions how much, and through what channels, such changes might affect exchange rates (see Edison [1993]).

To demonstrate the mechanics of intervention, figures 5 through 7 present T-accounts for Federal Reserve and ESF operations financed through common alternatives. The examples do not include every possibility, but the main results are similar in all cases (see Balbach [1978]). Each of these examples assumes that the United States intervenes in the U.S. market with a domestic commercial bank as its counterparty.

FIGURE 6

The Federal Reserve Sells Foreign Exchange Financed through a Swap Drawing

1. In a swap drawing, the Federal Reserve (FED) acquires a claim on a foreign central bank (FCB), and the FCB acquires a special Treasury (T) security, which the FED has purchased from the Treasury by crediting the Treasury's account at the FED.

U.S. Treasury (T)	Federal Reserve System (FED)	U.S. Commercial Bank (cb)	Foreign Commercial Bank (fcb)	Foreign Central Bank (FCB)
+ Deposit at FED	+ Deposit at FCB			+ T bill
+ T bill of FCB	+ Deposit of T			+ Deposit of FED

2. The FED sells foreign exchange in the form of a claim on the FCB to a U.S. commercial bank (cb) and debits the cb's reserve account at the FED. The cb deposits the funds with a foreign commercial bank (fcb). The FCB facilitates the transaction by crediting the fcb's reserve account.

U.S. Treasury (T)	Federal Reserve System (FED)	U.S. Commercial Bank (cb)	Foreign Commercial Bank (fcb)	Foreign Central Bank (FCB)
	- Deposit at FCB	- Reserves	+ Reserves	- Deposit of FED
	- Reserves	+ Deposit at fcb	+ Deposits of cb	+ Reserves

3. The FED and the FCB sterilize any undesired change in reserves through open-market operations.

U.S. Treasury (T)	Federal Reserve System (FED)	U.S. Commercial Bank (cb)	Foreign Commercial Bank (fcb)	Foreign Central Bank (FCB)
	+ T bill	- T bill	- Reserves	- FT bill
	+ Reserves	+ Reserves	+ FT bill	- Reserves

4. To repay the swap, the FED acquires foreign exchange through sterilized intervention, which it holds as a deposit at the FCB (see figure 5).

U.S. Treasury (T)	Federal Reserve System (FED)	U.S. Commercial Bank (cb)	Foreign Commercial Bank (fcb)	Foreign Central Bank (FCB)
	+ Deposit at FCB	- Deposit at fcb	- FT bill	+ FT bill
	- T bill	+ T bill	- Deposit of cb	+ Deposit of FED

5. When the swap matures, the FCB debits the FED's deposit and the Treasury retires the security held by the FCB by giving it a claim on the Treasury's account at the FED, which the FED then clears in repayment of the swap.

U.S. Treasury (T)	Federal Reserve System (FED)	U.S. Commercial Bank (cb)	Foreign Commercial Bank (fcb)	Foreign Central Bank (FCB)
- Deposit at FED	- Deposit at FCB			- T bill
- T bill of FCB	- Deposit of T			- Deposit of FED

NOTE: Following convention, assets appear on the left-hand side of the T-account and liabilities appear on the right.
SOURCE: Author.

FIGURE 7

The ESF Buys Foreign Exchange

1. The ESF sells nonmarketable Treasury (T) bills to acquire a deposit at the Federal Reserve (FED).

U.S. Treasury (T)		Exchange Stabilization Fund (ESF)		Federal Reserve System (FED)	
- Deposit at Fed	- T bill	- T bill		- Deposit of T	
		+ Deposit at FED		+ Deposit of ESF	

2. The FED, acting as the ESF's agent, acquires foreign exchange from a domestic commercial bank (cb) in the form of a claim on a foreign commercial bank (fcb), which it immediately transfers to the appropriate foreign central bank (FCB). The FED debits the ESF account and credits the cb's account, thereby increasing reserves in the U.S. banking system. The FCB debits the fcb's reserve account in creating the deposit for the ESF.

Exchange Stabilization Fund (ESF)		Federal Reserve System (FED)		U.S. Commercial Bank (cb)		Foreign Commercial Bank (fcb)		Foreign Central Bank (FCB)	
- Deposit at FED		- Deposit of ESF		- Deposit at fcb		- Reserves	- Deposit of cb		+ Deposit of ESF
+ Deposit at FCB		+ Reserves		+ Reserves					- Reserves

3. The ESF holds its foreign exchange as an interest-bearing foreign Treasury (FT) security.

Exchange Stabilization Fund (ESF)		Federal Reserve System (FED)		Foreign Central Bank (FCB)		Foreign Treasury (FT)	
- Deposit at FCB				- Deposit of ESF		+ FT bill	+ Deposit at FCB
+ FT bill				+ Deposit of FT			

4. The FED sterilizes the effects on domestic bank reserves resulting from the change in ESF deposits by selling Treasury securities from its own account and debiting the reserve account of the cb's that buy them. The FCB sterilizes the effects of intervention on its bank reserves by buying FT securities and then crediting the fcb's reserve account.

Federal Reserve System (FED)		U.S. Commercial Bank (cb)		Foreign Commercial Bank (fcb)		Foreign Central Bank (FCB)	
- T bill	- Reserves	- Reserves		- FT securities		+ FT securities	+ Reserves
		+ T bill		+ Reserves			

NOTE: Following convention, assets appear on the left-hand side of the T-account and liabilities appear on the right.
SOURCE: Author.

Federal Reserve Purchase of Foreign Exchange

When the Federal Reserve System intervenes in support of a foreign currency, it contacts a domestic commercial bank as a customer.²¹ As shown in line 1 of figure 5, the Federal Reserve System (FED) acquires foreign exchange in the form of a claim on a foreign-currency-

denominated deposit that the U.S. commercial bank (cb) maintains with a foreign commercial bank (fcb). The FED does not maintain the deposit at the fcb, but presents the claim on it to the appropriate foreign central bank (FCB), which clears the transaction and establishes an account for the FED.

■ 21 Major commercial banks stand ready to buy or sell foreign exchange at any time. They adjust their bid (to buy) and offer (to sell) quotes to manage their positions. See Flood (1991) and the references therein.

The FED pays for its newly acquired foreign exchange by crediting the cb's reserve account. In so doing, the FED creates reserves in the U.S. banking system. Similarly, the FCB reduces reserves in its banking system when it transfers the funds into an account on its books for the FED.

As discussed in the next section, the Federal Reserve holds its foreign-exchange reserves in an interest-bearing form, which may vary depending on the arrangements made with specific foreign central banks. One possibility, shown in line 2 of figure 5, is that the FED holds a foreign Treasury (FT) obligation.

The net effect of these transactions is an increase in the U.S. monetary base and a contraction in the foreign monetary base. The Federal Reserve's Open Market Desk, however, will automatically offset any increase in bank reserves that is inconsistent with its near-term objectives of adding reserves to, or draining reserves from, the U.S. banking system (see Smith and Madigan [1988] and Lewis [1993]). As shown in line 3 of figure 5, the FED sterilizes a purchase of foreign exchange by selling Treasury bills in the open market to financial institutions, then debiting their reserve accounts accordingly. The figure also assumes that the FCB sterilizes the effects of intervention on its bank reserves by buying foreign Treasury securities.²²

As noted, the Federal Reserve's Open Market Desk sterilizes only intervention that conflicts with the near-term target for reserve growth. Sometimes, however, the FOMC has considered exchange-rate objectives in establishing its overall monetary policy. Consequently, although U.S. intervention is routinely sterilized in the manner illustrated in the figure, the System does not always divorce its monetary and exchange-rate policies (see Furlong [1989] and Pauls [1990]).

Although the completely sterilized intervention described in figure 5 leaves the U.S. and foreign monetary bases unchanged, it does alter the currency composition of the stock of publicly held government securities. After the Federal Reserve's sterilized acquisition of foreign exchange, the public (domestic and foreign) holds more assets denominated in dollars and fewer assets denominated in the foreign currency (see appendix 1).

Federal Reserve Intervention Financed with a Swap Drawing

When the Federal Reserve intervenes to support the dollar, it usually sells foreign exchange out of an existing portfolio. In figure 6, however, I assume that the FED initially does not hold foreign exchange, but acquires it through drawing on a swap line.

As shown in line 1, in activating its swap line, the FED acquires foreign exchange in the form of a deposit at the FCB, while the FCB receives a deposit at the FED that is immediately converted to an interest-bearing, nonmarketable U.S. Treasury (T) security. The FED acquires the special Treasury security by crediting the Treasury's account at the Federal Reserve. On net, then, the System gains an asset in the form of a deposit at the FCB and incurs a liability in the form of a Treasury deposit at the FED.

In line 2, the FED intervenes by selling to a cb the foreign exchange that it holds as a claim on the FCB. The cb deposits the funds with its fcb. In clearing the transaction, the FCB credits the cb's reserve account, increasing the foreign monetary base. For its part, the FED debits the cb's reserve account, contracting the U.S. monetary base.

Although intervention tends to reduce U.S. bank reserves and the monetary base, the extent to which the latter contracts also depends on the actions of the Treasury Department. If the Treasury draws down its deposit at the Federal Reserve, reserves in the U.S. banking system increase. (Figure 6 assumes no change in Treasury deposits.) In line 3, the Federal Reserve's Open Market Desk, which in conducting day-to-day operations also monitors Treasury deposits at the FED, sterilizes any net effect on reserves resulting from intervention or from U.S. Treasury actions that are inconsistent with the monetary policy designs of the FOMC. The FCB also sterilizes the effects of intervention on its bank reserves.

Eventually — typically within three or six months — the FED must repay its swap drawing by acquiring foreign exchange from the market through sterilized intervention, as described in figure 5. Accordingly, in line 4 of figure 6, the FED holds a newly acquired balance at the FCB. At the appropriate time, as line 5 illustrates, the FCB debits the FED's balance as repayment for the swap. The Treasury retires the security held by the FCB, giving the FCB a claim on the Treasury, with which it repays dollars to the FED.

■ 22 See von Hagen (1989) and Neumann and von Hagen (1991) for a discussion of the Bundesbank, and Takagi (1989) for a discussion of the Bank of Japan. See also BIS (1988).

ESF Purchases of Foreign Exchange

The ESF holds its dollar balances in nonmarketable Treasury securities. As figure 7 shows, to finance intervention, the ESF first sells securities back to the Treasury. In facilitating the transaction, the FED debits the Treasury's account and credits the ESF's account.

The FED, which now acts as the agent for the ESF, proceeds exactly as described in figure 5, except that when it buys foreign exchange from a cb, it debits the ESF's dollar balances in payment. As in figure 5, the ESF acquires a claim on the FCB, which it eventually converts to an interest-bearing asset such as a foreign Treasury security.

ESF intervention, like FED intervention, affects U.S. bank reserves, because ESF deposits at the FED are not counted as part of the monetary base. This does not pose a direct problem for U.S. monetary policy, however, because the Open Market Desk sterilizes the transactions. As noted previously, the Desk routinely considers changes in Treasury balances when conducting monetary policy operations.

ESF Sales of Foreign Exchange

To finance a sale of foreign exchange, the ESF must undertake some type of transaction (swap borrowing, foreign-currency bond sales, or SDR sales) that will give it a claim on a foreign central bank. Once the ESF obtains foreign exchange, the intervention transactions proceed in a manner similar to those described for the FED in figure 6.

From its sale of foreign exchange, the ESF acquires dollar deposits at the FED that it exchanges with the Treasury for a nonmarketable security. The FED then debits the ESF's account and credits the Treasury's account. As in all of the earlier cases, the intervention will tend to affect both U.S. and foreign bank reserves. However, the Open Market Desk routinely sterilizes any unwanted effects on domestic reserves, because in conducting its day-to-day operations, the Domestic Desk regularly adjusts for changes in Treasury balances and in the deposits of FCBs.

IV. Investing the Proceeds

Except for small working balances, the Federal Reserve holds all of the foreign exchange it acquires through intervention in highly liquid, interest-bearing forms, typically government or money-market instruments that mature in not more than 12 months. These foreign-exchange holdings appear as an asset on its balance sheet. If the System's foreign-exchange assets are not exactly matched by similarly denominated foreign-exchange liabilities, it holds a net open position, and exchange-rate changes will affect its net worth. A private company wishing to avoid such risk exposure covers foreign-currency assets (liabilities) by incurring liabilities (assets) of equal value in the same currency. This means that any exchange-rate change will affect both sides of its balance sheet similarly, leaving its net worth unchanged. A net open position, then, measures the Federal Reserve's exchange-rate exposure. The System *realizes* a profit or loss only when it sells foreign exchange from its portfolio. Nevertheless, the Fed values the portfolio monthly, and *unrealized* foreign-currency profits or losses affect the overall profits that it remits to the Treasury.

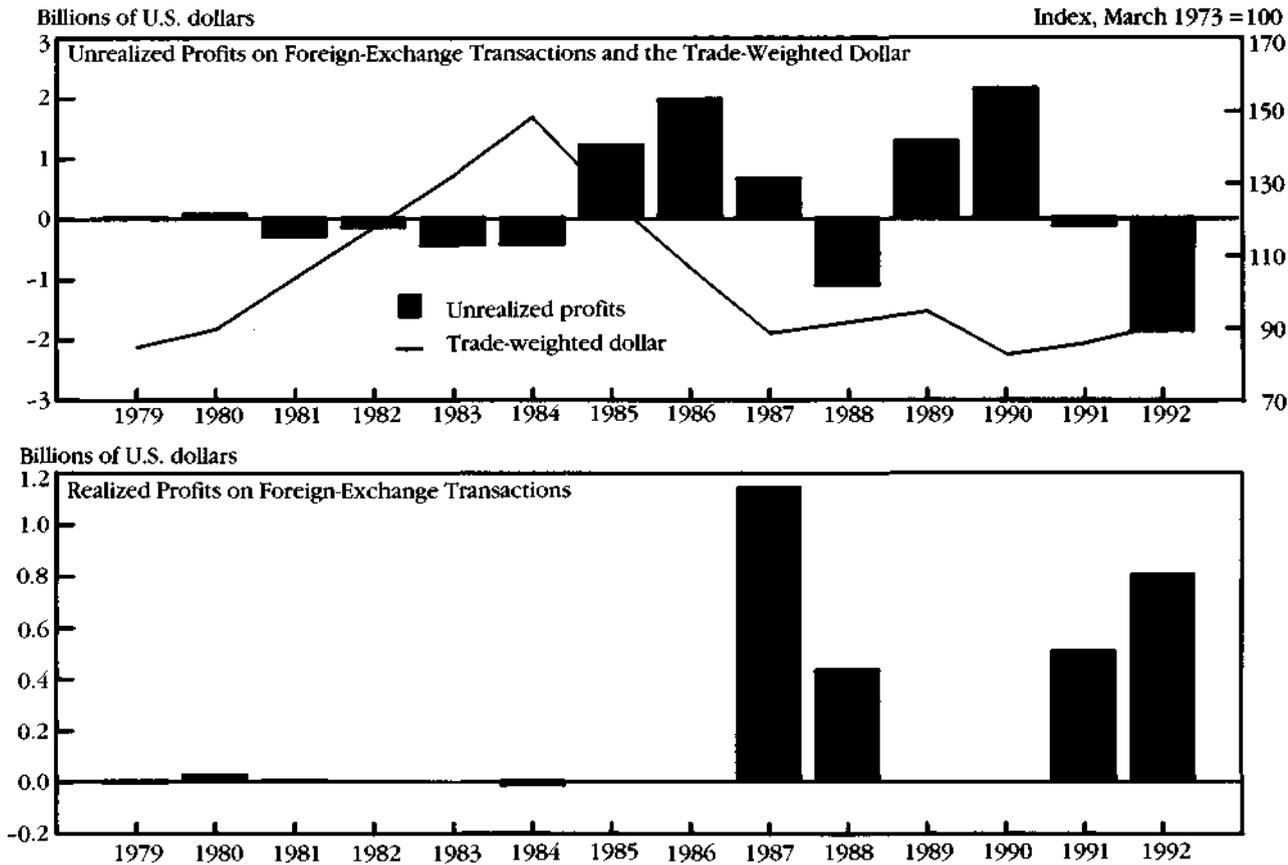
Calculating Profits and Losses

When the Federal Reserve buys or sells foreign exchange, whether for its own account or for the ESF, it books the transactions at current exchange rates. Foreign-currency-denominated interest payments on the account are treated similarly. Over time, however, the System books increments to the portfolio at different exchange rates. When it calculates the profit or loss associated with a subsequent foreign-exchange sale, the monetary authorities must decide which of the exchange rates used to book the foreign-exchange acquisitions is the appropriate base for the transaction. That is, did it sell foreign exchange booked at an exchange rate early on, or did it sell foreign exchange booked relatively more recently? The choice can make a substantial difference to the profit calculation when exchange rates fluctuate continuously.

The System resolves the problem by using a weighted-average exchange rate based on its entire existing portfolio. This rate equals the cumulative book value in a particular foreign currency divided by its cumulative book value in dollars (see appendix 2). Realized profits or

FIGURE 8

Intervention Profits



SOURCE: Annual Report of the Board of Governors of the Federal Reserve System, various issues.

losses compare the exchange rate at which currency is sold to this weighted-average rate.

The Fed also calculates the valuation, or unrealized profits, on the entire portfolio at particular times. To do so, it revalues the entire portfolio using an end-of-period exchange rate and compares this valuation with the aforementioned weighted average. Essentially, this reveals the profits from selling off the entire portfolio at a particular time. On this basis, the System and the ESF have generally profited from intervention, but not always (see Leahy [1989]).

Figure 8 shows year-end over year-end changes in the cumulative valuation of the System's portfolio (unrealized profits) and realized profits from 1979 through 1992.²³ Most of the shifts in the portfolio's value seem to result from exchange-rate movements. As the dollar depreciates, the value of the foreign-exchange portfolio appreciates, generating unrealized profits. Moreover, since 1988, as the size of the portfolio has increased, relatively small move-

ments in the dollar have seemed to create relatively large valuation changes. In contrast, the System typically realizes profits on actual sales of foreign exchange.

Table 1 relates profits from foreign-exchange operations to both total Federal Reserve remittances to the Treasury and total Treasury receipts. Because the Federal Reserve data are on a calendar-year basis while the Treasury data are on a fiscal-year basis, strict year-to-year comparisons are not accurate. Nevertheless, the summary statistics are instructive. Over the sample period, the average year-to-year percentage contribution of exchange operations to Federal Reserve remittances to the Treasury

■ 23 Annual data are found in the section entitled "International Developments," and in the table entitled "Income and Expenses of the Federal Reserve Banks," in the Board of Governors' Annual Reports. Data showing the cumulative value of the portfolio and realized profits at a quarterly frequency are found in "Treasury and Federal Reserve Foreign-Exchange Operations," published regularly in the FRBNY's *Quarterly Review*.

TABLE 1

Federal Reserve Profits from Foreign-Exchange Operations and Their Relationship to Treasury Receipts^a

Year	Federal Reserve Profits ^b	Payments to Treasury	Ratio of Profits to Treasury Payments	Total Receipts ^c	Ratio of Payments to Total Receipts
1975	\$ -241.8	\$ 5,382.1	- 4.49 %	\$ 280,642	1.92 %
1976	-25.1	5,870.5	- 0.43	318,508	1.84
1977	-146.4	5,937.1	-2.47	365,199	1.63
1978	-505.7	7,005.8	-7.22	416,110	1.68
1979	-3.7	9,278.6	-0.04	480,526	1.93
1980	96.1	11,706.4	0.82	533,017	2.20
1981	-306.0	14,023.7	-2.18	662,485	2.25
1982	-149.6	15,204.6	- 0.98	608,822	2.50
1983	- 456.3	14,228.8	-3.21	612,915	2.32
1984	- 454.8	16,054.1	-2.83	683,209	2.35
1985 ^d	1,210.0	17,796.5	6.80	745,084	2.39
1986 ^d	1,970.0	17,803.5	11.07	781,869	2.28
1987	1,804.3	17,738.9	10.17	868,996	2.04
1988	-510.9	17,364.3	-2.94	925,979	1.88
1989	1,204.2	21,646.4	5.56	979,923	2.21
1990	2,139.0	23,929.4	8.94	1,031,462	2.32
1991	366.5	20,777.6	1.76	1,054,260	1.97
1992	-1,078.0	16,774.5	- 6.43	1,091,692	1.54
Summary Statistics:					
Mean		0.66 %		2.07 %	
Standard deviation		5.59		0.28	
Minimum		-7.22		1.54	
Maximum		11.07		2.50	

a. Profits, payments, and receipts are expressed in millions of dollars.

b. Realized and unrealized.

c. Off-budget plus on-budget items.

d. Unrealized profits; total profits were not reported as a separate item.

SOURCES: "Income and Expenses of Federal Reserve Banks." Board of Governors of the Federal Reserve System, Annual Report, years 1975-1992; and "On-budget and Off-budget Receipts by Source." Table FFO-2, Department of the Treasury, *Treasury Bulletin*, years 1975-1992.

is essentially zero (0.7 percent), but the variance and range are high. Total Federal Reserve remittance, however, is a minor and reasonably stable share of total Treasury receipts (2.1 percent).²⁴

V. Conclusion

Exchange-market intervention has created an interesting type of institutional symbiosis between the Federal Reserve System and the U.S. Treasury, which this article has traced. Through this relationship, the Treasury acquires additional support for an operation that federal law places directly under its purview, and the System gains influence — as an active participant

rather than as a passive agent — over an important financial policy closely involving the commercial banking network and having possible monetary policy implications.

Although this relationship does not directly impinge on the statutory independence of the Federal Reserve, opponents of intervention fear that the alliance could ultimately prove detrimental to the consistency and credibility of price stability in the United States. Their misgivings start with the observation that sterilized intervention has little lasting influence on ex-

■ 24 This raises questions about the credibility of using intervention as a signal of monetary policy.

change rates, if any. Consequently, intervention does not afford the Treasury or the Federal Reserve a means of influencing exchange-rate trends independent of monetary policy. Moreover, when the exchange-market disturbance is neither domestic in origin nor monetary in nature, nonsterilized intervention conflicts with price stability.

This basic concern, together with several institutional considerations, has established the atmosphere surrounding FOMC deliberations on intervention in recent years. Thus, one cannot fully understand U.S. intervention policy without an appreciation of its institutional aspects, and one should not recommend intervention as an effective means of influencing exchange-rate patterns without considering its possible implications for the consistency and credibility of monetary policy.

Appendix 1

Theories about How Intervention Might Work

Studies suggest a number of channels through which intervention might affect exchange rates. Edison (1993) and Humpage (1991) survey the literature, and Kaminsky and Lewis (1993) discuss passive signaling.

Monetary Channel (Nonsterilized Intervention)

Central banks can alter nominal exchange rates by changing the relative growth rates of their monetary bases, either through intervention or through other policies. Depending on the nature of the exchange-rate disturbance, such intervention can promote price stability or interfere with it. If, for example, the underlying disturbance is real in nature or foreign in origin, nonsterilized intervention by the home country is inconsistent with price stability there.

Portfolio-Balance Channel

Sterilized intervention alters the currency composition of the stock of publicly held government securities. If international investors view these securities as net wealth and as imperfect substitutes, sterilized intervention can alter nominal exchange rates by affecting the risk premium embedded in the uncovered arbitrage condition between securities. Little support for this channel exists.

Signaling

Active: Sterilized intervention could influence exchange rates by providing new information about future monetary policy to an otherwise efficient (semi-strong form) market. Thus, a central bank might use intervention as a strategic signal of future monetary policy. By incurring an open position that is subject to valuation loss if the signaled policy is not adopted, the central bank increases its credibility.

Passive: If a monetary disturbance simultaneously affects exchange rates and prices, the Federal Reserve's Foreign and Domestic Desks might respond independently, but in a consistent manner. It is then conceivable that intervention might occur ahead of open-market transactions, that it would be correlated with changes in monetary policy, and that exchange traders could learn to discern something about future monetary policy from it (see Kaminsky and Lewis [1993]).

Transactions Costs

Although generally small, transactions costs — including the costs of acquiring information — are significant, and they may increase when markets become volatile. If the Federal Reserve System has an advantage in the acquisition of information, realizes when the exchange market is uncertain about available information, and can provide the necessary information to the market through intervention, it could reduce transactions costs.

Appendix 2

Profit and Loss Calculations

Assume that the New York Trading Desk undertakes only three purchases of German marks, so that the entire portfolio consists of DM638 million as follows:

Time Period	Millions of Dollars	Exchange Rate	Millions of Marks
1	200	1.76 DM/\$	352
2	50	1.80 DM/\$	90
3	100	1.96 DM/\$	196
Total	350		638

The book value of the total portfolio is \$350 million. To calculate a *realized* profit or loss, the System uses a weighted-average exchange rate based on the entire existing portfolio. Assume that at a current (time period 4) exchange rate of 1.78 DM/\$, the System sells DM100 million from the portfolio. The dollar value of this transaction is approximately \$56 million ($(DM100(1/1.78))$). To estimate the associated profit or loss, the System first calculates the weighted-average exchange rate implied by the entire portfolio as $DM638/\$350 = 1.823$ DM/\$. Using this rate, the base value of the transaction is nearly \$55 million ($(DM100(1/1.823))$), and the realized profit from the sale of DM100 million is \$1 million ($\56 million $-$ $\$55$ million). The profit results because the mark appreciated over the average value at which the portfolio was booked.

To calculate the cumulative valuation (unrealized) profits on the portfolio at any particular time, the Federal Reserve revalues the entire portfolio using end-of-period exchange rates. Assume, for example, that the System undertook no DM sales in period 4. The value of the portfolio at that time is \$358 million [$DM638(1/1.78)$], and the unrealized profit is \$8 million ($\358 million $-$ $\$350$ million).

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