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Volume Author/Editor: Michael D. Bordo, Owen F. Humpage, and Anna J. Schwartz

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Chapter Author(s): Michael D. Bordo, Owen F. Humpage, Anna J. Schwartz

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US Intervention and the Early Dollar Float, 1973–1981

> There's an adage in the marketplace that says one should always go against an intervention, since any intervention reflects an inherent weakness in the currency being supported.
> —*Wall Street Journal* (3 August 1983, 3)

5.1 Introduction

On 12 March 1973, the Bretton Woods fixed-parity system effectively ended when eight key European industrialized countries instituted a joint float against the dollar. In doing so, they joined Canada, Italy, Japan, Switzerland, and the United Kingdom, which already had allowed their currencies to float unilaterally against the dollar. Most monetary authorities at the time grudgingly accepted floating as a necessary step to a restructured international monetary system based once again on fixed exchange rates. In the interim, they thought, floating could raise the cost of speculation, which the February 1973 dollar depreciation had greatly encouraged, and—most importantly—could limit the substantial inflows of unwanted dollar liquidity stemming from persistent US balance-of-payments deficits and, ultimately, US inflation.[1]

The international community, of course, never returned to fixed-dollar exchange rates. Initially, a persistently high US inflation rate, the disparate impact of oil price shocks, and idiosyncratic business-cycle patterns made a return to a parity system impossible. Eventually, private markets adjusted to the volatility of floating rates, and policymakers realized that floating exchange rates fostered macroeconomic stability better than fixed exchange rates and did so with no obvious cost to international trade or investment. Under floating, countries continued to cooperate on international monetary matters; they did not revert—as was often feared—to the beggar-thy-neighbor policies of the 1930s. By 1975, then, the monetary authorities in most developed countries accepted floating exchange rates and free cross-border financial flows as a sustainable solution to the fundamental trilemma.

Although monetary authorities eventually accepted floating exchange rates, they continued to view the foreign-exchange market as inherently prone to bouts of disorder. Monetary authorities never clearly articulated the market failure underlying this alleged disorder, but they seemed to believe that information imperfections could cause exchange rates to deviate from their fundamental values, create excessive volatility, and foster destabilizing speculation. Under such conditions, they contended, foreign-exchange intervention could help direct exchange rates along a path consistent with fundamentals and could do so with lower volatility than otherwise would be the case. An official presence, particularly on the part of the United States, was necessary to maintain market order.

The record of US operations between March 1973 and April 1981, however, was equivocal at best. The United States intervened almost exclusively in support of the dollar, but during nearly every operation, the dollar continued to depreciate. To be sure, US interventions at the time often sought only to smooth dollar movements, not to prevent or reverse them.[2] On this score, we offer some limited evidence of success. Still, the overall record led many observers and practitioners to question the usefulness of sterilized intervention.

United States interventions during the early floating-rate period are best understood as reflections of the monetary policy of the era. The period covers most of the Great Inflation episode, America's longest period of peacetime inflation. The renewed acceleration of US inflation in late 1977, after repeated attempts to rein it in, seriously weakened the credibility of US monetary policy. It prompted a sharp dollar depreciation, which eventually challenged beliefs about the efficacy of sterilized intervention. By August 1979, monetary policy began to change under the direction of Federal Reserve Chairman Paul Volcker, and by April 1981, US intervention operations all but stopped with the urging of the Undersecretary of the Treasury for Monetary Affairs, Beryl Sprinkel.

5.2 The Great Inflation, 1965–1980

Exchange rates are endogenous variables that respond to, and help propagate, the impact of unanticipated economic developments. In the face of a shock, exchange rates arguably may undershoot or overshoot their equilibrium values in the short run, but ultimately their steady-state paths reflect economic fundamentals. When monetary authorities intervene, particularly when they intervene over long periods of time, they are reacting to whatever economic events sent the exchange-rate along a path that they found undesirable. In that sense, prolonged sterilized intervention is often a reflection of some fundamental underlying economic occurrence, such as inappropriate monetary policy (Sprinkel 1981, 16). Any analysis of intervention requires an understanding of the basic macroeconomic developments occurring in

concert with the operation. By and large, active interventions during the early floating rate period, especially after 1976, attempted to attenuate the dollar's persistent depreciation, which itself was primarily a symptom of the Great Inflation.

During the early 1960s, the Bretton Woods system constrained US monetary policy and anchored inflation expectations.[3] Under a dollar peg, inflation would worsen the US balance-of-payments position and eventually undermine the official dollar price of gold. Because the private sector understood this constraint, inflation expectations did not respond to shocks, and inflation demonstrated little inertia. This check on US monetary policy was not particularly important during the dollar-shortage period of the Bretton Woods era, roughly 1949 through 1958, since the world needed dollar reserves. As explained in chapter 4, the constraint began to bind around 1960, as the many foreign central banks that held excessive amounts of dollars increasingly demanded gold. The US Treasury and the Federal Reserve undertook many ad hoc policies to limit US gold losses, thereby weakening the constraint and allowing policymakers greater latitude to pursue expansionary policies in pursuit of domestic objectives. Eventually, however, Bretton Woods proved incompatible with these policies, and the fixed-exchange-rate regime collapsed.

America's Great Inflation began in late 1965 and lasted through 1982, when the disinflation policies of the Volcker FOMC finally began to take hold. Inflation started to accelerate in late 1965 and rose above 2 percent on a year-over-year basis in early 1966 (see figure 5.1). In contrast, between 1960 and 1965, inflation had averaged only 1.2 percent per year with relatively little variation. During the Great Inflation, inflation cycled upward in three big movements, first reaching a 6 1/2 percent annual rate in early 1970 before subsiding, then climbing above a 12 percent annual rate in 1974 before again slowing, and finally attaining a 14 1/2 percent annual rate in 1980. As with each cyclical peak, each cyclical trough was higher than its predecessor. According to contemporary accounts, inflation expectations became a problem for policymakers by 1969 (Hetzel 2008, 75). By late 1976, worldwide confidence in the ability and willingness of the Federal Reserve System to control inflation was quickly waning. By early 1977, the dollar, which had depreciated on balance since the inception of generalized floating, came under even stronger downward pressure, and by 1978, international investors were moving funds out of dollar-denominated assets.

The Great Inflation occurred because the Federal Reserve did not pursue a policy of price stability. Instead, monetary policy became exceptionally easy from 1966 through 1968, again from 1970 through 1972, and finally throughout the last half of the 1970s (see figure 5.2). Economic historians have attributed the pursuit of these policies primarily to the adoption of an economic framework that downplayed money's causal role in the inflation process, but a policy preference for low unemployment over low inflation,

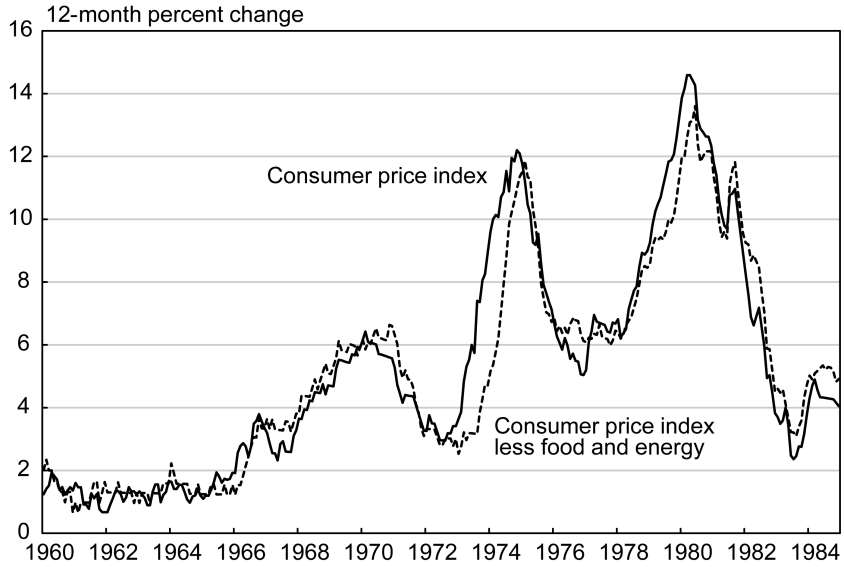

Fig. 5.1 US inflation, 1960–1984

Note: Data are from the US Bureau of Labor Statistics.

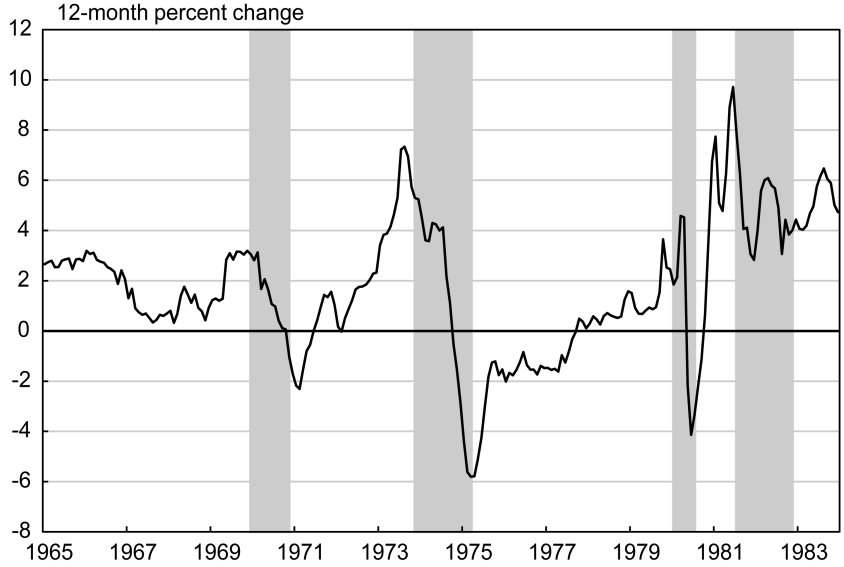

Fig. 5.2 Real federal funds rate, 1965–1983

Notes: The real federal funds rate equals the effective federal funds rate minus the percentage change in the core CPI over the past twelve months. Shaded bars are recessions. Data are from the Federal Reserve, the Bureau of Labor Statistics, and the National Bureau of Economic Research.

mismeasurement, and political pressures also contributed to the nation's policy errors.

With the ascendancy of Keynesian economics by 1960, policymakers began to distinguish between demand-pull inflation and cost-push (or structural) inflation (Hetzel 2008). Demand-pull inflation resulted when aggregate demand, as measured by actual GDP, exceeded aggregate supply, as measured by potential GDP. (Alternatively, aggregate demand exceeded aggregate supply when the unemployment rate fell below its natural rate, generally pegged at 4 percent in the 1960s and 1970s.) According to the then conventional model, if the economy were operating below potential, demand-pull inflation could not be a problem, except possibly for some lingering inertial effects that would eventually dissipate. The proper role of macroeconomic policy was to return GDP quickly to its potential growth path and to restore full employment. As Hetzel (2008) emphasizes, this framework induced a stop-go quality to policy, which decimated inflation expectations.

Mainstream Keynesian economists saw demand-pull inflation as stemming from excess aggregate demand and not from excess money growth per se. Within this framework, either a budget surplus or tight monetary policy could reduce inflation, but because tight monetary policy raised interest rates, whereas tight fiscal policy did not, fiscal policy remained the tool of choice for demand management at least until the early 1970s (Hetzel 2008, 80–81). Monetary policy was to manage interest rates either in support of fiscal policies or in actions like Operation Twist. Beginning around 1970, however, the importance of monetary policy began to rise relative to that of fiscal policy (Hetzel 2008, 79).

Within the conventional model, any inflation that existed when economic activity fell below potential must be of the cost-push variety. Chief among the causes of cost-push inflation were union wage demands, but monopoly-pricing power, commodity-price shocks, dollar depreciations, and myriad other ad hoc price pressures also contributed to cost-push inflation. Demand management—fiscal and monetary policies—could do nothing about cost-push inflation short of pushing the economy into a protracted recession, and should therefore not attempt to offset it. Eliminating cost-push inflation required some type of incomes policy. Consistent with this prescription, the Kennedy administration pursued wage and price guidelines, the Nixon administration used direct price freezes and controls, and the Carter administration attempted price guidelines.

Complicating matters, especially during the 1960s, economists believed that they could permanently lower the unemployment rate by accepting a higher inflation rate (Romer and Romer 2002, 24). According to Mayer (1999, 122–24), many economists and policymakers believed that inflation was not as socially disruptive as unemployment. He attributes this belief partly to economists' experience with the Great Depression and partly to

their lack of experience with peacetime inflations. Hetzel (2008, 65, 67), sounding a similar chord, contends that the social unrest of the 1960s and 1970s had policymakers fearful about high unemployment.[4] They often regarded an unemployment rate high enough to eliminate inflation as politically infeasible (Hetzel 2008, 111).

Policymakers, of course, could only achieve a trade-off between lower unemployment and higher inflation to the extent that the public formed expectations about inflation from past experience and not from beliefs about future economic developments. Policymakers assumed this and initial evidence seemed to confirm it. Given the low and stable inflation rates of the 1960s, inflation expectations were slow to build after 1965. In the early 1970s, however, economists began to amend this view and to worry about inflation expectations.

The Great Inflation proved hard to overcome because heightened inflation expectations eventually increased the output and employment costs of any subsequent disinflationary policy, and the administration and the Federal Reserve became increasingly reluctant to incur these costs. Chari, Christiano, and Eichenbaum (1998) and Christiano and Gust (2000) refer to this as an expectations trap. The greater the concern that a central bank shows for real economic developments, the more likely it becomes that the central bank can fall into the expectations trap.

Basing policy on a split between demand-pull and cost-push inflation requires reliable measurement. Romer and Romer (2002), Orphanides (2002, 2003), and Clarida, Gali, and Gertler (2000) have argued that, in large measure, the Federal Reserve's performance during the Great Inflation was the result of policymakers consistently underestimating the natural rate of unemployment or, equivalently, consistently overestimating the level and growth rate of potential output. Such estimation errors would lead policymakers to underpredict inflation, to incorrectly attribute any observed inflation to cost-push factors, and to pursue a monetary policy that was excessively accommodative.

Two hallmark events of the 1970s undoubtedly contributed to measurement errors. First, sharp hikes in relative oil prices lowered structural productivity growth and potential output.[5] Second, unprecedented shifts in labor participation rates raised the natural rate of unemployment. Together, lower structural productivity growth and a higher natural rate of unemployment would lower potential output. According to current Congressional Budget Office (CBO) estimates, potential GDP grew at an average annual rate of 4.0 percent between 1947 and 1973, but over the next 10 years, potential grew on average at less than half this rate (1.2 percent). Moreover for most of this period, the administration put the natural rate of unemployment at 4 percent, but subsequent CBO estimates indicate that the natural rate continually rose, reaching a peak of 6.3 percent in 1978. Given the substantial relative-price shocks and structural changes taking place in the 1970s, it is

not surprising that policymakers overestimated the nation's potential growth path and underestimated the natural rate of unemployment.

With the perception that the economy was often below potential or that unemployment was too high, the administration often exerted pressure on the Federal Reserve to accommodate fiscal expansions by keeping interest rates low (Meltzer 2005). Chairmen Martin and Burns viewed the Federal Reserve System as independent *within* the government, not independent *of* the government. By this, they meant that the Federal Reserve should not undertake actions that might thwart the administration's ability to achieve its policy objectives, such as low unemployment. As a consequence, the Federal Reserve often delayed tightening monetary policy in the face of rising inflation or reversed direction when the unemployment rate rose substantially to avoid administration and congressional criticism. Not until the Volcker chairmanship in 1979 would the Federal Reserve fully recognize inflation as a monetary phenomenon and clearly assert its independence to pursue price stability. In the meantime, the dollar depreciated broadly in foreign-exchange markets.

5.3 Providing Guidance: US Intervention, 1973–1977

After an initial sharp depreciation in the months immediately following the inception of generalized floating, the dollar remained fairly stable through mid-1977, despite the run-up in US inflation (see figure 5.3). Still, US policymakers regarded floating exchange rates as inherently prone to disorder. In their view, the private-sector information inefficiencies caused excessive exchange-rate volatility and prolonged disparities between observed rates and their equilibrium values as determined by economic fundamentals. Intervention, according to the official view, was necessary to provide market guidance and to calm market disorder.

Exactly how officials thought intervention achieved market calm is unclear; they never clearly articulated a theoretical channel of influence. Although many staff economists discussed intervention within the context of a portfolio-balance model, the foreign exchange desk viewed intervention as having a "psychological" effect on the market that came about because the intervention expressed an official concern for exchange rates. The desk, however, never clearly equated this view with a modern expectations channel, through which the desk might aid price discovery by signaling new private information to the market.

As we will show, the operations seemed wholly out of place with either a portfolio-balance mechanism or an expectations channel (see chapter 1). By and large, the interventions were financed through short-term swap borrowings, which the desk quickly repaid, thereby offsetting any portfolio effect. The desk also kept the transactions small and undertook them covertly out of a fear that private market participants would bet against the Federal

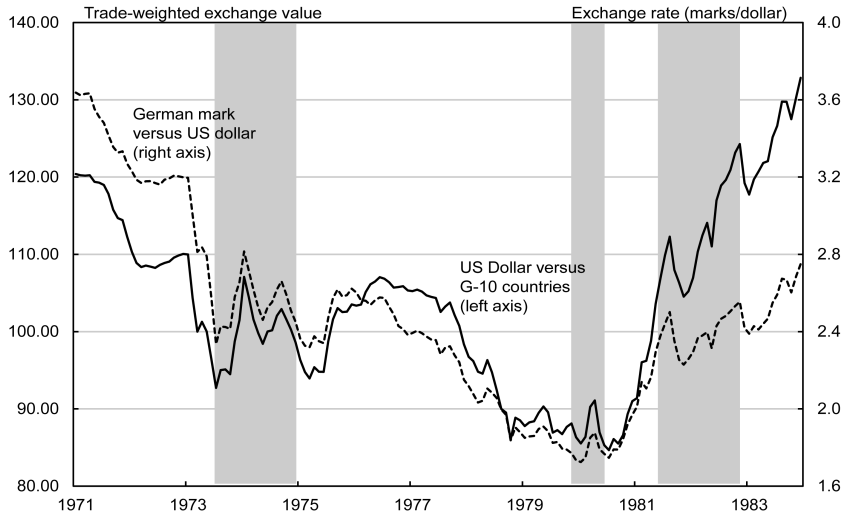

Fig. 5.3 Key exchange rates, 1971–1983

Notes: Shaded bars are recessions. Data are from the Federal Reserve and the National Bureau of Economic Research.

Reserve and possibly overwhelm an operation. If the desk had private information, undertaking small, covert operations seems an inefficient method of transmitting it. At best, the desk may have simply attempted to trick some market participants into believing that others had changed their perceptions, but this does not seem consistent with expressing official concern for exchange rates.

In any event, the operations had some limited effect on exchange-rate movements. Official purchases and sales of foreign exchange did not result in dollar depreciations or appreciations. In fact, market participants could have profitably bet against the foreign exchange desk. The interventions, however, seemed sometimes to smooth dollar movements.

5.3.1 The Advent of Floating

Despite the dollar devaluation in December 1971, the Bretton Woods system continued to unravel.[6] The US balance-of-payments position improved somewhat after the devaluation, but it continued to show large overall deficits. United States inflation had moderated somewhat in 1970 and 1971, but at 3.3 percent in mid-1972, it remained substantially higher than in the early 1960s. By 1973, the US inflation rate was again starting to rise and soon exceeded the inflation rate in Germany—the key European country (see figure 5.4). Cross-border financial flows grew and seemed increasingly sensitive to interest-rate differentials and speculative prospects. Foreign countries—notably Germany and Japan—continued to intervene heavily

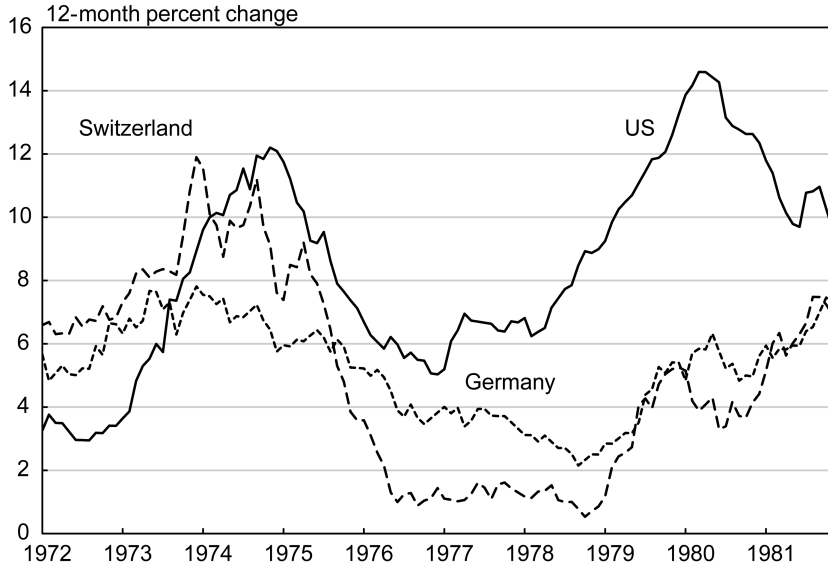

Fig. 5.4 Inflation trends, 1972–1981

Note: Data are from the Deutsche Bundesbank, Swiss Federal Statistics Office, and Bureau of Labor Statistics.

and to amass unwanted dollar reserves, which created for them excessive domestic liquidity. Inflation in Germany was around 5 percent to 6 percent in 1972 and accelerating, while inflation in Japan was quickly approaching double-digit levels.

In January and early February 1973, as speculation against the dollar intensified, the foreign exchange desk at the Federal Reserve Bank of New York sold $318.6 million worth of German marks in the New York market, with roughly 15 percent of the total from the US Treasury's account. To finance its portion, the Federal Reserve used up its entire portfolio of $167.4 million equivalent German marks and borrowed $104.6 million worth of marks from its swap line with the Bundesbank. The Federal Reserve also sold $20.4 million worth of its Netherlands guilders. Despite its size, the intervention had little effect, and the situation continued to deteriorate.

On 12 February 1973, the United States devalued the dollar for a second time by raising the official price of gold from $38 per ounce to $42 per ounce. This devaluation brought the total dollar depreciation since 1971 to 15 1/2 percent on a trade-weighted basis against the G10 currencies, an amount that many officials thought sufficient to correct the US balance-of-payments problem (de Vries 1985, 67; Silber 2012, 94). United States officials also indicated that they would phase out controls on financial flows by the end of 1974, about the time that they expected the devaluation to improve the US balance-of-payments position.[7]

Private markets were not so sanguine about the dollar's prospects and speculation against the dollar intensified. As Charles Coombs, the special manager of the Federal Reserve Bank of New York's foreign exchange desk noted, the second devaluation taught all of those holding dollars "a harsh lesson," and they were rapidly positioning themselves not to be caught off guard again (FOMC *Memoranda*, 7 March 1973, 3). Gold, already well above the new official price of $42 per ounce, rose rapidly as markets perceived a good chance for a further dollar depreciation. Adding fuel to the speculative fire, US authorities indicated that they would not intervene in defense of the new parities; they would follow the old Bretton Woods custom of leaving that task to other countries.

In response to the second dollar devaluation, Italy and Japan immediately floated their currencies. On 1 March 1973, the Bundesbank acquired $3.7 billion, the largest amount ever bought or sold by a central bank in a single day, and on 2 March, the Bank of France bought $580 million in just 90 minutes (de Vries 1985, 76). With speculation rampant, the European exchange markets quickly closed.

On 12 March 1973, Belgium, France, Germany, Luxemburg, and the Netherlands agreed to a joint float against the dollar—the snake (Solomon 1982, 218). A year earlier, the six European Economic Community countries had decided to limit fluctuations in their exchange rates to 2 1/4 percent through intervention in each other's currencies—the snake in the tunnel.[8] They would finance their operations through short-term borrowing arrangements with settlement in prescribed reserve assets. A country in the snake would intervene in dollars only when its exchange rate was at the edge of the band; otherwise all intervention was in the constituent currencies. As part of the March 1973 agreement, Germany revalued the mark by 3 percent against the SDR. On 20 March 1973, Norway and Sweden joined the joint float. Although this effectively ended the Bretton Woods system, policymakers at the time viewed the float against the dollar only as a necessary interim mechanism toward the reformation of Bretton Woods. Talks were already underway.

In July 1972, the international financial community had established the Committee of Twenty within the International Monetary Fund to reform the Bretton Woods system.[9] Although participants generally favored a system based on set parities, they knew that any new exchange-rate system would need to be more flexible than its predecessor. Greater flexibility could be achieved within a fixed-but-adjustable rate system through wider margins around the parities and more frequent central-rate adjustments. Indicators based on changes in countries' reserve holdings or on their basic balance-of-payments trends might promote greater flexibility by depoliticizing parity changes and by ensuring that surplus countries shared in the adjustment burden (de Vries 1985, 163–97; Solomon 1982, 235–66).

By early 1973, most monetary officials also expressed a tolerance for—if not an outright acceptance of—temporarily floating exchange rates.[10] In the

current circumstances of heightened speculation, large international imbalances, more fluid financial movements, and excessive worldwide liquidity, fixed exchange rates were simply unworkable. A temporary reliance on floating rates was necessary.

Few, however, believed that an international monetary system based on floating exchange rates was sustainable. Many feared that the uncertainties inherent in floating rates would discourage international trade and investment and would promote the same disruptive policies—protectionism and competitive depreciations—that characterized the 1930s. Some, including Federal Reserve Chairman Arthur Burns, extrapolating these fears, believed that floating would promote the formation of currency blocs or—worse still—would lead to a complete breakdown of international monetary cooperation and financial order among nations (Burns 1973, 510–11).

Nevertheless, in the wake of the oil price shocks of December 1973 and the huge payments imbalances that they portended, the industrial countries were unwilling to commit to parities anytime soon. In January 1974, the Committee of Twenty ceased its reform efforts. With floating rates continuing for the foreseeable future, the IMF set out instead to develop procedures that might maintain a cooperative international monetary environment.

In June 1974, the IMF proposed guidelines for floating exchange rates which, despite their objective, revealed a clear preference for fixed exchange rates and presumed a heavy central bank presence in the market. The IMF guidelines recommended day-to-day or week-to-week interventions to prevent or moderate erratic fluctuations in exchange rates. The guidelines also condoned intermediate-term interventions (month to month or quarter to quarter) to moderate longer-term—but temporary—movements in rates. The IMF, however, objected to aggressive, beggar-thy-neighbor interventions. A central bank was not to buy foreign exchange when its currency was depreciating over the intermediate term nor sell foreign exchange when its currency was appreciating over the intermediate term. The guidelines also recognized that some member countries might operate floating rates within a target-zone framework and suggested that such countries consult with the IMF about the target. In addition, the IMF recommended that member states with floating rates discuss with them the broad objectives for their official-reserve policies. These guidelines, however, were never fully implemented, in part because of different views about how to do so, and in part because some executive directors of the IMF felt that the guidelines put a bigger consultation and information burden on members with floating rates than on members with fixed rates (de Vries 1985, 297–302).

Many nations, particularly France and most developing countries, still favored a return to fixed exchange rates, but events in the mid-1970s continued to overtake reform efforts. By 1975, the US position under Treasury Secretary William Simon, with prodding from the US Congress, was shifting in favor of long-term floating (Solomon 1982, 269). The Rambouillet

meeting of the Group of Seven nations on 15–17 November 1975 became a compromise of sorts between the US and French views. Participants rewrote IMF Article IV, allowing countries to choose floating in the long-term, but leaving open the possibility of a return to a fixed-exchange-rate system with greater flexibility than Bretton Woods. Policymakers, moreover, were quickly eradicating the central role of gold in the international monetary system (Schwartz 1983, 34–36). Gold would not anchor any future fixed-rate system. The Rambouillet communiqué emphasized the need for exchange-rate stability but saw stability as the product of "orderly underlying economic and financial fundamentals." Supportive official actions to counter disorderly market conditions were welcome, but nations should not attempt to impose stability at a particular rate or to "manipulate" exchange rates for advantage (Volcker and Gyohten 1992, 141; Solomon 1982, 274). United States officials saw Rambouillet as requiring the United States to become more active in the foreign exchange market—especially to counter "erratic movements" in rates—and to quickly establish a mechanism for day-to-day consultation (FOMC *Memoranda*, 16 December 1975, 3–6).

5.3.2 Market Failure and the Role of Intervention

Despite their growing approval of a generalized floating regime during the 1970s, US monetary authorities were unwilling to give the private market free rein in determining exchange rates. They considered foreign-exchange markets prone to disorderly conditions, as revealed through price volatility, cumulative or self-propagating exchange-rate movements, wide bid-ask spreads, and fairly persistent exchange-rate deviations from fundamentals. The market, in their view, required official guidance. As Coombs once complained, he had "little hope that market forces can be relied upon to restore orderly markets and to maintain an appropriate exchange rate structure" (FOMC *Memoranda*, 19–20 November 1973, 31).

United States policymakers were never explicit about the exact nature of the underlying market failure. In part—at least initially—they seemed to view the market, particularly the New York market, as being underdeveloped. Greene (1984a, no. 127, 5) pointed out that in late 1974 most US multinationals conducted their exchange business abroad and that most US banks maintained their key foreign-exchange operations abroad. Under Bretton Woods, the dollar became the key international vehicle currency, easily enabling US banks to specialize in providing liquid dollar markets, not foreign-exchange facilities. Moreover, under the parity system, hedging against exchange-rate fluctuations was not the make-or-break priority that it now became under floating. The failures of both the Herstatt and Franklin National banks in 1974 because of foreign-exchange exposures dramatically illustrated to policymakers the problem of learning to operate in the new regime. The Herstatt failure led to a "marked drop in foreign exchange market activity as participants grew wary of credit risk" (Dooley and Shafer

1983, 48). These bank failures caused both bank management and governments to restrict banks' ability to take open positions, contributing—along with a general uncertainty about future monetary policies—to a lack of sufficient stabilizing private speculation (McKinnon 1976). Official guidance seemed necessary in such an underdeveloped market.

More fundamentally, however, US policymakers seemed to believe that information imperfections plagued the foreign-exchange market. In a fairly common description of market activity, the foreign exchange desk at the Federal Reserve Bank of New York observed that, "Traders ignored fundamental factors that would normally favor the dollar" (*Bulletin*, December 1977, 1049). From the desk's view, information imperfections—like traders' ignorance of fundamentals—caused exchange rates to deviate from their equilibrium values, created excessive volatility, and fostered destabilizing speculation. Tests undertaken at the Board of Governors in 1976 seemed to reject the martingale model of exchange rates, suggesting that market participants did not use information efficiently (Dooley and Shafer 1983).

Although US monetary officials believed that intervention could repair these reoccurring market failures, the FOMC never discussed a transmission mechanism in public documents like the FOMC *Minutes*, or the *Bulletin*'s reports on "Treasury and Federal Reserve Foreign-Exchange Operations." Theoretically, intervention can affect exchange rates through a monetary mechanism, a portfolio-balance channel, and an expectations effect, as explained in chapter one.

Economists have often wondered if central banks during the early floating exchange rate period completely sterilized their operations, since only then could intervention operate independently of monetary policy. In the 1970s, both the staff and the FOMC understood the important distinction between sterilized and nonsterilized intervention, and the Federal Reserve routinely sterilized all foreign-exchange operations (Morton and Truman 1979, 12; Truman 1980, 10; Adams and Henderson 1983, 1; Greene 1984a, no. 127, 16). As Truman (1980, 10) explained: "If the Federal Reserve intervenes to counteract [a] rise in the exchange value of the dollar, it will buy marks and sell dollars. The dollars sold will add to the public's holdings of US Treasury securities because the intervention's potential expansionary impact on the US money supply is automatically offset in daily open market operations." In the case that Truman describes, the desk would sell Treasury securities to the public to offset its injection of dollar reserves. "[T]he net effect of the intervention is to increase the supply of dollar-denominated assets and decrease the supply of mark-denominated assets available to private asset holders" (Truman 1980, 10). Desk foreign-exchange operations during the early dollar float did not affect reserves in the US banking system.

Complete sterilization, as Adams and Henderson (1983, 1) emphasized, "leaves the monetary liabilities of *both home and foreign authorities* unchanged" (emphasis added). Truman (1980, 10) assumes, "that the Bundesbank also takes action to keep the German money supply unchanged." But,

prior to the 1980s, many industrialized countries, including Germany, did not have well-developed money markets and did not conduct monetary policy through open-market operations. They relied instead on discount-window operations. Consequently, these banks may not have been able to sterilize foreign-exchange operations on a day-to-day basis. Indeed, as our narrative indicates, foreign central banks were often worried about the excess liquidity resulting from official US intervention sales of their currencies. Consequently, some temporary or partial monetary transmission mechanism may often have been in play.

Sterilized intervention can affect exchange rates independent of monetary policy through a portfolio-balance channel. Truman (1980) and the studies accompanying the Jurgenson Report indicate that the staff recognized the possibility of a portfolio-balance mechanism during the early floating-rate period.[11] Adams and Henderson (1983), for example, offer a definition of sterilized intervention that strictly conforms to a portfolio-balance mechanism. What ultimately matters in their definition is a change in central banks' holdings of net foreign assets. Neither the specific type of foreign-currency transaction nor its motive carries much weight in their definition. The net effect of an intervention, as Truman (1980, 10) explained, is to alter the relative stocks of dollar-denominated and foreign-currency-denominated securities that the public holds. If the public views these securities as imperfect substitutes, they might only alter their portfolios if offered a risk premium for the more abundant security. This risk premium could easily come about from a change in the spot exchange rate in the desired direction (see chapter one).

Whereas the board's economic research staff seemed to describe intervention as possibly operating through at least two macroeconomic mechanisms—the monetary and portfolio-balance channels—the foreign exchange desk never mentioned them. The desk only referred to intervention's effect on market psychology. The FOMC *Memoranda* provide an example: "the basic objective, Mr. Coombs observed, would be to influence market psychology, by providing evidence of official interest and concern . . . [W]ith some good fortune, [Federal Reserve] System operations could make a very important contribution" (FOMC *Memoranda*, 9 July 1973, 8). This and similar statements seem broadly consistent with a modern expectations channel, through which monetary authorities convey private information useful to price discovery, but the desk's statements typically relied on a show of "official interest and concern," or on "evidencing a sense of responsibility for the dollar" rather than on the transmission of new information (FOMC *Memoranda*, 9 July 1973, 13). Moreover, both Coombs and Federal Reserve Bank of New York President Alfred Hayes thought intervention needed to be part of an unspecified broader program that relied heavily on direct controls over financial flows (FOMC *Memoranda*, 7, March 1973, 8–12). Consequently, why they thought sterilized US intervention offered the United States an independent policy instrument with which to affect exchange rates remains unclear.

5.3.3 The United States Returns to the Market

On 16 March 1973, the G10 finance ministers agreed that foreign-exchange intervention was useful to maintain orderly markets within a regime of floating exchange rates.[12] The Europeans thought that US participation was particularly important for the success of such efforts. For its part, the United States remained decidedly lukewarm about the prospects of intervention, but agreed in principle to such operations. The United States had not intervened since the closing of the gold window on 15 August 1971, except for a brief operation in July 1972, and the aforementioned support operations prior to the 12 February 1973 dollar devaluation. Neither of these actions was particularly successful, but the United States' current concern about intervention centered on its financing, not on misgivings about its recent effectiveness.

Holding the United States back was the lack of a clear arrangement for risk sharing under the existing swap facilities (FOMC *Memoranda*, 19–20 March 1973, 63–64). In March 1973, the United States held virtually no foreign-exchange reserves and would need to draw on its swap lines to finance its interventions (see figures 5.5 and 5.6). Given the growing magnitude of cross-border financial flows, an expansion of the swap network also seemed necessary. In March 1973, Charles Coombs recommended an increase of roughly 50 percent to the $11.7 billion network (FOMC *Memoranda*, 19–20 March 1973, 73) (see figure 5.7).

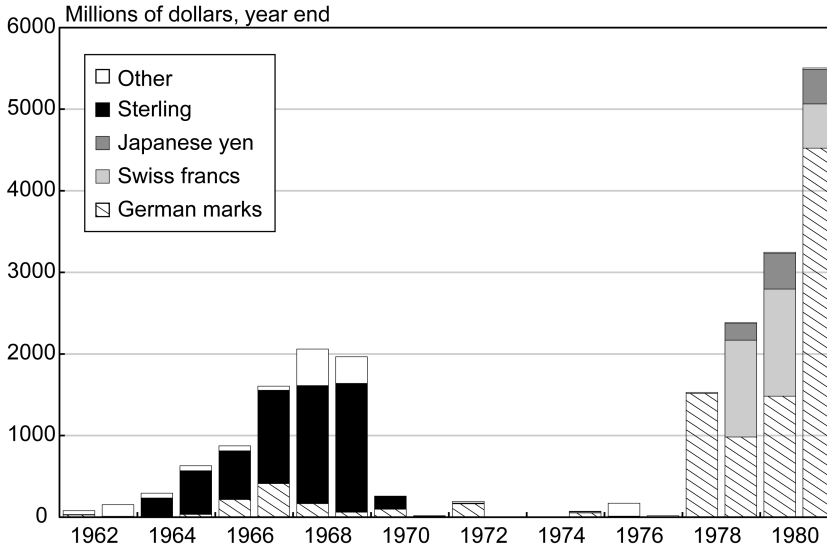

Fig. 5.5 Federal Reserve foreign currency balances, 1962–1981
Note: Data are from the Federal Reserve.

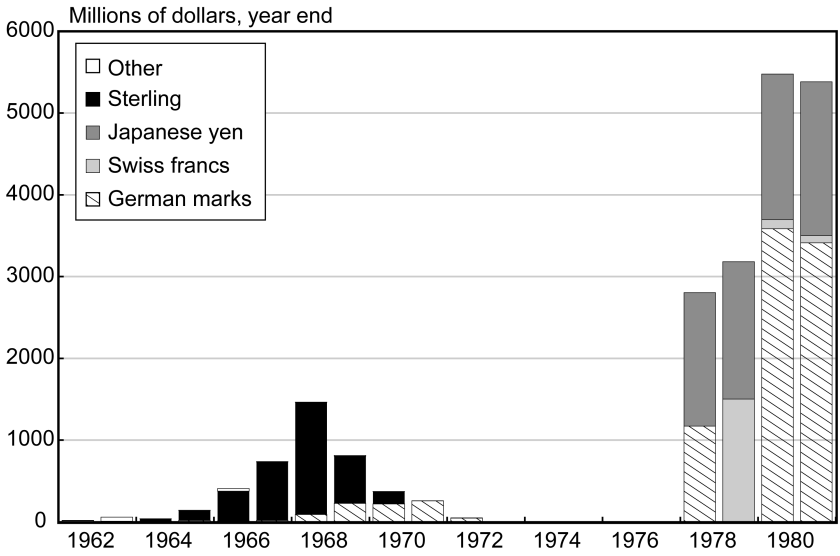

Fig. 5.6 US Treasury foreign currency balances, 1962–1981
Note: Data are from the Federal Reserve.

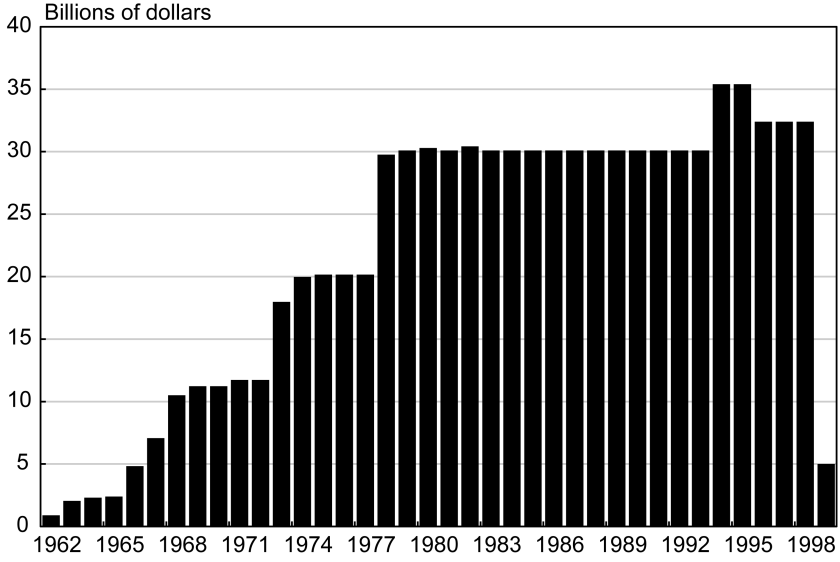

Fig. 5.7 Federal Reserve authorizations for swap drawings, 1962–1999
Note: Data are from the Federal Reserve.

For the most part, the swap lines had remained dormant because of continuing disagreements about the distribution of currency losses associated with the dollar's devaluation and with the move to floating.[13] The swap lines traditionally maintained revaluation clauses, which protected debtor countries should the creditor country revalue its currency, but the swap lines contained no clear provisions for losses resulting from a general dollar devaluation—a change in the official gold price—or from the adoption of a float. Consequently, the United States conceivably faced large losses on Belgian franc, British sterling, German mark, and Swiss franc drawings outstanding prior to 15 August 1971.

On 8 July 1973, as an inducement to undertake intervention, Belgium, France, Germany, the Netherlands, and Switzerland agreed to risk sharing arrangements with the United States (Task Force 1990f, Paper no. 9, 6).[14] Henceforth, when the Federal Reserve drew on a swap line for intervention purposes, it would share any valuation profit or loss equally with the creditor bank. With the risk-sharing issue settled, the Federal Reserve increased the swap lines on 10 July 1973 from $11.7 billion to nearly $19 billion and renewed its intervention operations.[15]

The risk sharing arrangement did not apply to foreign central bank drawings on the swap lines (Task Force 1990f, Paper no. 9, 6). When a foreign government drew on the line, it bore the entire risk.[16] In January 1974, officials at the Bank of Italy sought an increase in their swap line from $2 billion to $3 billion. Concerned about the international ramifications of the recent oil price hikes, Chairman Burns supported the increase, but he suggested that under the new line, the Bank of Italy assume all of the exchange risk. Moreover, Burns suggested—apparently with the US Treasury's approval—that the Federal Reserve announce its willingness to expand the swap lines of other countries under the same terms (FOMC *Memoranda*, January 21–22 1974, 33–51). In March 1974, Britain asked for a $1 billion increase in its swap line to $3 billion and agreed to assume all of the exchange risk associated with its subsequent drawings (FOMC *Memoranda*, 18–19 March 1974, 54–65).

As with the use of the swap lines, the objective and mechanics of US intervention under a floating exchange-rate regime would necessarily be substantially different than foreign-exchange operations had been under Bretton Woods. United States operations under the Bretton Woods system primarily sought to provide central banks with cover for their dollar exposures and thereby to dissuade them from converting unwanted dollar balances into gold with the US Treasury. The task of intervening to keep specific exchange rates within their Bretton Woods parity bounds usually fell to foreign central banks (see chapter 4). After 15 August 1971, protecting the gold stock was not an issue, and with the advent of generalized floating, calming market disorder became the oft-stated objective of intervention.

Between 12 March 1973 and 17 April 1981, the desk operated on both sides of the market, but by and large, it only *actively* intervened to allevi-

ate downward pressure on the dollar. By actively intervened, we mean that the desk transacted with the clear intention of affecting dollar exchange rates. The desk conducted the lion's share of this intervention against German marks but occasionally undertook small operations in Belgian francs, French francs, Japanese yen, Netherlands guilders, and Swiss francs. The German mark acted as the linchpin of the snake, so an intervention that altered the mark-dollar rate might easily affect all of the European currency rates vis-à-vis the dollar.

Because the United States financed most its intervention sales of foreign exchange by borrowing via the swap lines, soon after an operation, the desk needed to repurchase foreign exchange to pay down outstanding US obligations. For the most part, the desk did not consider these purchases to be interventions: "[W]hen the Desk was acquiring currencies to repay debt, it tried to avoid having any noticeable influence on the market. Operations conducted with a view to influencing market psychology in the hope of affecting exchange rates might more properly be described as 'intervention.'" (FOMC *Memoranda*, 15 July 1975, 8) Likewise, after 1979, the desk began to buy foreign exchange explicitly to build a larger reserve portfolio. Although the desk did not undertake transactions to pay down debt or to accumulate reserves with the goal of affecting exchange rates—and therefore, did not *actively* intervene in these cases—the desk often timed these operations to minimize or maximize their impact in the market. The desk might avoid or delay transacting in the market by acquiring foreign exchange off-market with some other central bank or by rolling over the swap drawing. By timing the market transaction, the desk *passively* intervened, as Adams and Henderson (1983) explain.[17]

The foreign exchange desk operated in close consultation with the board and FOMC. Early in the day, the desk informed the board staff of any plans for intervention, and throughout the day, it maintained close communications. If the interventions were large, the desk also solicited the subcommittee's views on the operation. The subcommittee was responsible to the entire FOMC (FOMC *Memoranda*, 20 May 1975, 17–18). The FOMC, which was ultimately responsible for intervention, issued instructions to the desk. A foreign-currency authorization set overall limits on the Federal Reserve's net open position, and procedural instructions spelled out how the desk might approach its overall limits. Informal limits also governed how much of specific currencies the desk might hold within the overall authorization, and the Treasury and the desk maintained "implicit tactical day-to-day limits" (FOMC *Transcripts*, 21 October 1981, 7).

The desk also cooperated closely with other central banks, particularly after the Rambouillet agreement. Each day beginning in December 1975, a central bank from a European community country called the Federal Reserve Bank of New York at 11:00 a.m. with a summary of exchange rates, intervention, and market conditions in Europe. The desk immedi-

ately relayed that information to the Bank of Japan—through its New York office—and the Bank of Canada. At the close of the New York market, the desk sent all of these central banks a cable informing them of New York closing exchange rates, US. intervention, and market commentary (FOMC *Memoranda*, 16 December 1975, 5–6). The desk also worked out the upper limit of its intervention amounts with the appropriate central banks.

The Federal Reserve Bank of New York adopted various techniques for intervention, depending on the degree of secrecy that the desk wanted to maintain, its budget for intervention, and the market effect that the desk hoped to achieve.[18] During the 1970s, the desk appears to have conducted most of its interventions covertly (Hooper 1977, 7). This was especially true before 1979. Early on, the United States usually intervened on a relatively limited scale because of its small portfolio of foreign exchange. The operations remained secret because the desk feared that with only a limited portfolio, market participants could easily take a position against the Fed and foil the intervention operation if they knew that the Fed was in the market. If knowledge of the Federal Reserve's operations spread, the effect would be all the more intense and might actually force the desk to withdraw from the market (Hooper 1977, 8).

Ironically, however, the covert operations that Hooper describes seem inconsistent with the desk's stated view that interventions were useful to affect market psychology by demonstrating "official interest and concern" for the dollar or by "evidencing a sense of responsibility for the dollar." At best, except for their small scale, these operations seem more consistent with a portfolio-balance channel of influence. As noted, the desk and the FOMC never clearly articulated how they thought sterilized intervention worked.

In New York during the early 1970s, most foreign-exchange transactions—including interventions—went through the brokers' market. Brokers maintained direct telephone lines with the largest foreign-exchange trading banks. They did not undertake transactions for their own accounts, but matched bids and offers in a highly competitive market for small fixed commissions. Consequently, the transactions costs of operating in the brokers' market for both the Fed and private traders were significantly less than dealing on a bilateral basis.

When the Federal Reserve wanted to undertake a covert operation, it asked a trader at a commercial bank to act as the agent for the desk in the New York brokers' market. The broker arranged a trade and only afterward revealed the buying and selling parties—in this case, only two commercial traders, one of whom confidentially acted on behalf of the desk. This mode of operation not only kept the desk's identity secret, but it lent the Federal Reserve the expertise of a day-to-day commercial practitioner, and the commercial bank assumed the credit risk associated with the transaction. In return, the Federal Reserve typically paid the commercial bank a small commission (0.003 percent) on the value of the transaction (Hooper 1977, 6). Hence a typical intervention of $15 million yielded the trader $45 thousand.

In the 1970s, the Fed normally intervened through one of twenty-five major US dealing banks out of the roughly 200 banks that operated in the New York brokers' market (Hooper 1977, 3). The Federal Reserve maintained direct telephone contacts with these banks. When intervening, the central bank usually operated only with an individual bank for a single day (Hooper 1977, 4). The frequency with which the Federal Reserve called on a particular bank reflected the quality of its service, which consisted mainly of providing the desk with current market information. The desk generally felt that these correspondents offered much better information than it acquired through its more routine telephone contacts with dealers. In addition to maintaining anonymity and providing information, operating in the brokers' market through a commercial bank allowed the desk to settle in federal funds, whereas operating directly with a broker would require the desk to settle in clearinghouse funds (Hooper 1977, 7).

The apparent intent of a covert operation was simply to trick one side of the market about the intensity of private actions on the other side of the market; that is, to make one side of the market believe that the other was trading on new information. The conjecture apparently was that traders are more likely to respond favorably to a stabilizing transaction if they believe that the demand emanates from the private sector rather than from US monetary authorities. As noted in the quote at the beginning of this chapter, the market sometimes interpreted official intervention transactions as evidence of fundamental weakness in a currency. Given that the desk generally worked with individual banks for a single day, intervention lasting for a long number of days was likely to become widely known in the market—at least among the key banks (Hooper 1977, 4). Hence, to remain secret, most intervention operations needed to be of fairly short duration.

The desk often finessed its transaction amounts and its pricing strategy to get the biggest bang for its buck. Pardee (1973) discussed a number of strategies. When the dollar was depreciating, for example, the desk might probe the strength of demand for a foreign currency by placing an offer (to sell) somewhat above the typical offer rate and then observing how bidders (to buy) responded. If traders take the high offer, it suggests a stronger demand for the foreign currency than if they reject or counter the offer. The desk also varied the size of its transactions to the same end, but unusually large transactions ran the risk of tipping the Federal Reserve's hand to the market (Pardee 1973, 6). Typically the desk acted to counter market trends or "lean against the wind," but it sometimes sought to reinforce or to reverse them. The possibilities and permutations were large, as Pardee (1973) suggests. As discussed below, in early 1981, the desk even attempted to bracket the dollar's volatility by simultaneously placing bid and offer prices in the market, and it sometimes operated on both sides of the market even on a single day.[19]

On some occasions in February 1975 and frequently after 1979, the desk wanted the market to know that it was actively trading, particularly if it

sought to intervene forcefully. Then, the desk placed large orders with the brokers' market or directly with particular banks. Pardee (1973, 6) reports that, "This knowledge alone can have a profound psychological effect, and could move the dollar to stronger ground without heavy intervention on our part." By late 1977, as we will see below, the desk began intervening more openly and in larger amounts. On 4 January 1978 and for a few days hence, the desk placed orders to sell marks directly with several New York commercial banks, and the mark depreciated immediately without the desk actually selling a single mark (*Bulletin*, March 1978, 166). In addition, the desk sometimes tried to enhance the operation's effects by timing the transactions to coincide with a favorable news item or economic release, or by also announcing the operation to the press. Unfortunately, as we will see, the desk's actions did not always conform to the underlying thrust of US monetary policy. So it is not always clear whether the desk added signal or noise to the market.

Commercial banks that acted as agents for the desk also could benefit in terms of their own transactions from their knowledge of the Federal Reserve's intervention (Task Force 1990g, Paper no. 5, 13). The desk expected banks that executed its transactions to do so promptly, to maintain confidentiality, and not to undertake offsetting transactions. As we will see, however, the evidence suggests that banks often seemed to interpret desk sales of foreign exchange as a signal to buy.

As noted, in addition to pure intervention, the desk undertook two other types of foreign-exchange transactions in the market. The desk bought foreign exchange to repay swap borrowing and to build foreign-exchange reserves. (Often the desk bought foreign exchange directly from foreign central banks or from other correspondents off-market for this purpose.) The desk also executed market transactions for foreign correspondents that maintained accounts with the Federal Reserve Bank of New York. When not going off-market, the desk usually dealt directly with commercial banks when undertaking these types of transactions for two reasons: Often these transactions did not occur in the standard amounts that the brokers' market handled, and if the Federal Reserve entered the brokers' market directly, it might have been forced to acknowledge and reject the credit risk associated with a specific commercial bank. The number of banks that the desk dealt with for these nonintervention transactions included the twenty-five US banks through which the Federal Reserve intervened, plus five other foreign-owned banks that resided in the United States (Hooper 1977, 8–10).

5.3.4 Were US Interventions between March 1973 and September 1977 Effective?

Although US inflation generally rose and the dollar tended to depreciate between March 1973 and September 1977, the dollar's overall downward trend was quite modest, and confidence in the dollar remained fairly firm

for the most part. The October 1973 OPEC oil embargo and the associated price hikes generally seemed to bolster the dollar even though they prompted a recession and a sharp easing in US monetary policy during 1974. After rising precipitously throughout much of 1973, the real federal funds rate fell sharply in the wake of the oil shock and remained negative throughout much of 1977 (see figure 5.2). Observers, however, generally thought that the United States would be less susceptible to the adverse effects of oil-price shocks than other industrialized countries, and this perception often bolstered demand for the dollar. For one thing, OPEC priced oil in dollars. Since demand for oil was inelastic, particularly in the short term, the demand for dollars to pay for oil would rise. In addition, many thought that the dollar would likely benefit more than most other currencies from the recycling of oil revenues. The oil price increase also caused foreign central banks to hold more dollars in their portfolios, thereby reducing the dollar "overhang" that followed the August 1971 closing of the US gold window.

Despite the overall confidence in the dollar, the desk intervened fairly frequently. In addition, the period witnessed some very sharp swings in the dollar, particularly relative to the German mark, that prompted the desk to undertake four sizable intervention episodes (see figures 5.8 and 5.9). The specific events that triggered these four key intervention episodes were: a revaluation of the German mark within the European joint float in late June 1973 that led to intervention during the following month, the liberalization of barriers on financial flows in January 1974 that resulted in operations from February through April of that year, a rapid easing of US monetary policy in October 1974 that led to a subsequent six-month episode of intervention, and further European joint-float problems in early 1976 that induced intervention in January and February of that year. Table 5.1 empirically describes these operations.[20]

These first four early interventions were much smaller in scale than the active US interventions after September 1977 and not very persistent, with the exception of the operations in early 1975 (see table 5.1). The desk initiated each of these actions and undertook almost all of the interventions for the central bank's own account. While the Treasury consented to the Federal Reserve's actions, it rarely participated.[21] The desk intervened primarily against German marks, but it also transacted in Belgian francs, French francs, Swiss francs, Netherlands guilders, and, on only two occasions, Japanese yen. The desk usually undertook interventions in non-German European currencies because of developments in the European joint float. In early 1975, for example, when the German mark was at the bottom of the European joint float, the Bundesbank did not want the desk to undertake heavy mark sales, so the desk transacted primarily in Netherlands guilder and Belgian francs, which were then at the top of the joint float (FOMC *Memoranda*, 20 May 1975, 13). The Bundesbank participated in all of these operations, typically buying substantially more dollars than the Federal Reserve System.

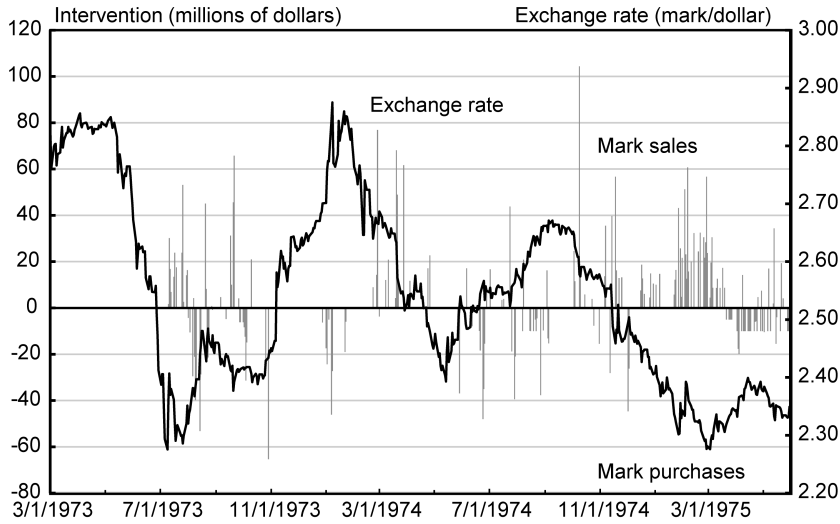

Fig. 5.8 US intervention against German marks, 1 March 1973–31 May 1975
Note: Data are from the Federal Reserve.

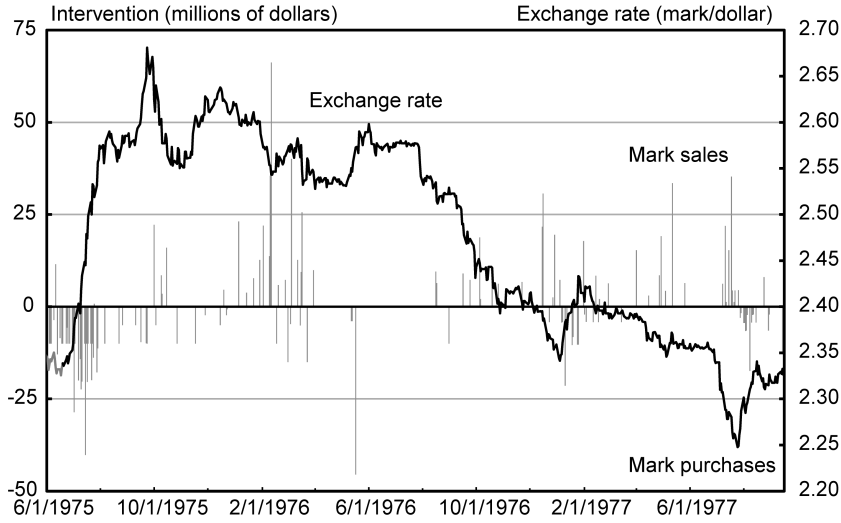

Fig. 5.9 US intervention against German marks, 1 June 1975–14 September 1977
Note: Data are from the Federal Reserve.

Table 5.1 **Intervention to support the dollar**

A.

Episodes	Total days[a] (#)	Exchange-rate change DM[b] (%)	Exchange-rate change MCI[c] (%)	US intervention against German marks Total[d] ($ mill.)	US intervention against German marks Mean[e] ($ mill.)	US intervention against German marks Count[f] (#)
1st Sub-period						
7/10/73–7/31/73	16	–0.4	1.1	220.5	18.4	12
2/1/74–4/30/74	63	–10.8	–5.7	373.4	29.0	13
10/1/74–3/31/75	122	–11.6	–3.9	978.2	21.8	52
1/5/76–2/11/76	28	–3.2	–1.0	184.7	23.1	8
2nd Sub-period						
9/30/77–10/31/78	265	–24.4	–15.9	5,203.3	55.5	97
11/1/78–12/31/78	40	3.8	4.2	5,662.5	202.4	28
6/15/79–10/5/79	79	–7.9	–2.5	9,101.1	207.3	44
4/8/80–7/11/80	68	–11.8	–10.1	3,964.8	120.7	26

B.

Episodes	US intervention against other currencies Total ($ mill.)	US intervention against other currencies Mean[d] ($ mill.)	Count[f] (#)	Bundesbank intervention against US dollars Total[d,g] ($ mill.)	Bundesbank intervention against US dollars (DM mill.)	Ratio[h]
1st Sub-period						
7/10/73–7/31/73	52.9	8.8	6	270	630	1.2
2/1/74–4/30/74	43.5	25.3	2	222	581	0.6
10/1/74–3/31/75	291.5	12.1	26	1,246	3,028	1.1
1/5/76–2/11/76	19.6	19.6	1	200	517	1.1
2nd Sub-period						
9/30/77–10/31/78	395.2	13.2	30	1,171	2,432	0.2
11/1/78–12/31/78	914.9	47.0	20	2,791	5,282	0.5
6/15/79–10/5/79	145.1	27.0	6	2,720	4,948	0.3
4/8/80–7/11/80	370.8	33.7	11	731	1,312	0.2

Sources: Board of Governors of the Federal Reserve System, Deutsche Bundesbank, Truman (1980).

[a] Business days between first and last intervention.

[b] German marks per US dollar.

[c] Board of Governors' Major Currency Index, negative value indicates dollar depreciation.

[d] Positive and negative values are net purchases and sales of dollars, respectively.

[e] Average number of dollars purchased over days in episode.

[f] Number of days on which dollars were purchased during episode.

[g] Converted to dollars using average daily exchange rate for the period.

[h] Ratio of Bundesbank purchases of dollars to US purchases of dollars.

Because the Federal Reserve had exhausted its German mark balances in early 1973, it financed these mark sales primarily by drawing on its swap line with the Bundesbank. Consequently, as figures 8 and 9 illustrate, the desk had to quickly acquire dollars to pay down its swap obligations once market conditions improved. The desk acquired almost all of the marks for this purpose in the market, but was also able to obtain the needed currency off-market at various times from central banks (Greene 1984a, no. 127, 14–15).

Between 2 March 1973 and 14 September 1977, the United States intervened on 337 days against German marks (see table 5.2). On 161 of these intervention days, the United States sold marks, and on 176 days, the United States bought marks. By and large, the mark purchases were passive interventions. A typical (median) daily mark sale amounted to nearly $14 million equivalent, with the largest sale equal to $104 million. Roughly one-half of these operations lasted only a single day. Almost all lasted less than three consecutive days, but one operation persisted for a consecutive thirteen days. A typical mark purchase was slightly smaller than a sale. The median equaled $10 million, with the largest equal to $65.3 million. As with mark sales, most operations to buy marks lasted only a single day, with almost all persisting less than four days. The longest operation lasted fifteen consecutive days.

We evaluate the effectiveness of these US interventions in table 5.2 according to three success criteria: The first asks if US sales or purchases of German marks on a specific day were respectively associated with a same-day dollar appreciation or depreciation against the mark. The second criterion asks if US interventions moderated movements in the dollar relative to the previous day. Were, for example, official US sales of German marks on a specific day associated with a slower rate of dollar depreciation over that same day as compared with the dollar's depreciation on the previous day? The third success criterion combines the previous two into a single measure. (Appendix 2 contains mathematical descriptions of these three criteria along with a detailed discussion of our analytical methodology.)

These success criteria seem consistent with the stated objectives of intervention during the early dollar float, especially the second criterion. Managers from the Federal Reserve Bank of New York's foreign exchange desk often indicated that they did not try to defend a specific exchange rate. They instead only tried to moderate their movements or limit their fluctuations (Pardee 1973; Greene 1984a, no. 127, 8; FOMC *Memoranda*, 19–20, March 1973, 67; FOMC *Memoranda*, 17 April 1973, 58). We count the number of successes under each criterion and compare that count with the number that we would randomly anticipate given the volatile nature of day-to-day exchange-rate movements.

Only 45 (or 28 percent) of the 161 US sales of German marks prior to 14 September 1977 were associated with a same-day dollar appreciation against the mark. The observed number of successes falls well below two

Table 5.2 Success counts for US intervention, 2 March 1973 to 14 September 1977

German marks	Total (#)	Intervention successes (#)	(%)	Expected[a] successes (#)	Standard[a] deviation (#)
Mark sales & dollar appreciation	161	45	28.0	74	4
Mark purchases & dollar depreciation	176	67	38.1	83	5
Total	337	112	33.2		
Mark sales & smaller dollar depreciation	161	34	21.1	21	2
Mark purchases & smaller dollar appreciation	176	45	25.6	24	2
Total	337	79	23.4		
Mark sales & dollar appreciation or smaller depreciation	161	79	49.1	94	6
Mark purchases & dollar depreciation or small appreciation	176	112	63.6	107	7
Total	337	191	56.7		
Japanese Yen					
Yen sales & dollar appreciation	0	0	na	0	0
Yen purchases & dollar depreciation	2	2	100.0	1	1
Total	2	2	100.0		
Yen sales & smaller dollar depreciation	0	0	na	0	0
Yen purchases & smaller dollar appreciation	2	0	na	0	0
Total	2	0	na		
Yen sales & dollar appreciation or smaller depreciation	0	0	na	0	0
Yen purchases & dollar depreciation or small appreciation	2	2	100.0	1	1
Total	2	2	100.0		

Note: See appendix 2 for detail.

[a] Assumes that the success count is a hypergeometric random variable.

standard deviations from the expected number, suggesting that US intervention sales of German marks were a fairly reliable signal that the dollar would *depreciate* against the mark, and implying—as the adage at the start of this chapter suggests—that market participants generally could have profited from selling dollars against marks, if they knew that the Federal Reserve was intervening. Indeed, during each of the four active intervention episodes of German-mark sales reported in table 5.1, the dollar depreciated against the

German mark and, with the exception of the 1973 episode, the dollar also depreciated on a trade-weighted basis against the currencies of the major developed countries.

Our analysis of the 176 official US purchases of German marks is little different than that of sales. As already noted, the desk typically undertook mark purchases over this period to repay swap loans, although US authorities timed these transactions to minimize any unwanted exchange-rate effects. Our analysis of their successes—67 or 38 percent of the transactions—suggests again that market participants who knew of the intervention could have profitably bet against the desk on average.

When we evaluate US interventions over this period in terms of moderating movements in the dollar, the picture is substantially more favorable to the idea that intervention can affect exchange rates. Of the 161 US sales of German marks prior to 14 September 1977, thirty-four (or 21 percent) were associated with a slower pace of dollar depreciation on the day of the intervention relative to the previous day. This count is more than two standard deviations above the number (twenty-one) that we expect to randomly observe. Our analysis of the largely passive forty-five US purchases of German marks produces similarly favorable results. All in all, roughly 23 percent of the interventions successfully smoothed exchange-rate movements. Still, this is a fairly small proportion of the total 337 interventions.

When we combine these two criteria into a single success count, only 49 percent of the active interventions to support the dollar and only 64 percent of the passive interventions to acquire German marks appear successful. Neither of the success counts is statistically different than random. Overall, US interventions during this period have a very limited impact on mark-dollar exchange rates.

Coombs, in a postoperation assessment of the July 1973 episode, suggested that he was limited in his activities (FOMC *Memoranda*, 21 August 1973, 14–17). He feared that interventions in excess of $50 million on any given day would weaken the Treasury's support for the Federal Reserve's operations. Indeed, as shown in table 5.1, a typical intervention in July 1973 ($18.4 million) was well below this amount. He felt that the scale of operations "on certain days" should have been $100 to $125 million. Subsequent operations before 1977 increased somewhat in their dollar amounts, but they did not approach the level Coombs thought necessary.[22]

Coombs may have been right; larger interventions—particularly open and closely coordinated ones—may have increased the chances for success. Still, the key problem with the active, dollar-support operations over this period was that they conflicted with the general tenor of US monetary policy. At the same time that the desk sold German marks and other foreign currencies to prop up the dollar, the FOMC maintained an excessively easy monetary policy that fueled the Great Inflation.

5.4 The Dollar in Crisis, October 1977 through July 1980

The years 1977 through 1981 were some of the most turbulent in the Federal Reserve's postwar history, culminating in a major change to monetary policy and in serious questions about the efficacy of foreign-exchange-market intervention. Between late 1977 and mid-1980, US intervention unsuccessfully attempted to mitigate the exchange-rate consequences of a rapidly rising US inflation rate. Inflation in the United States increased over these years, while inflation in many other key developed countries—notably Germany—moderated (see figure 5.4). In response, the Federal Reserve System raised its key policy rates beginning in 1977, but overall the Federal Reserve "remained sensitive to the possibility that a rapid firming in interest rates might prematurely put at risk the economic expansion" (Greene 1984b, no. 128, 7). Consequently, the real federal funds rate remained near zero until late in 1979 and dipped below zero again in mid-1980 when economic activity contracted (see figure 5.2). As confidence in the Federal Reserve's efforts to rein in inflation eroded, the pace of the dollar's depreciation quickened.

Over this period, the foreign-exchange market was expanding, becoming increasingly sophisticated, and more globally integrated.[23] Multinationals were centralizing their exchange-rate decisions at their headquarters, typically in the United States. Consequently, the US foreign-exchange market was growing rapidly. United States banks expanded their foreign-exchange operations and many foreign banks opened branches in the United States. Daily turnover in the global foreign-exchange market, which averaged only $5 billion in April 1977, increased more than fourfold to $23 billion by 1980 (Greene 1984b, no. 128, 12).

As the market expanded and as pressures on the dollar intensified, the desk intervened more forcefully, increasing the size, frequency, and persistence of its operations. The US Treasury began to participate with the Federal Reserve and often announced specific interventions. In addition, the desk now frequently intervened directly with commercial banks, rather than through a broker (Greene 1984b, no. 128, 12–13). Despite changing tactics, the interventions proved no more successful than in earlier years.

A lack of foreign-currency reserves continued to hinder the desk's ability to undertake large, sustained dollar-support operations. At the end of 1977, the combined foreign-currency balances of the Federal Reserve and the Treasury stood at less than $10 million equivalent—only enough for a couple of days. In addition, the United States had outstanding foreign-currency obligations, resulting from swap drawings and securities, of roughly $2 1/2 billion equivalent (Task Force 1990h, Paper no. 8, 9–10). Since the inception of floating, the United States had financed interventions primarily by borrowing on swap lines, but German authorities grew increasingly reluctant to extend further credits without changes in US macroeconomic policies

(Task Force 1990h, Paper no. 8, 10). In response, US monetary authorities decided to acquire a portfolio.

5.4.1 Dollar Free Fall, 30 September 1977–5 October 1979

In late 1977, the dollar's depreciation quickened amid persistently high US inflation and reports that OPEC was diversifying out of dollars and into German marks and Swiss francs (FOMC *Transcripts*, 17–18 October 1977, 32). By then, market participants believed that the US administration actually favored a dollar depreciation to correct the trade deficit (Greene 1984b, no. 128, 12–13; Solomon 1982, 345–46). Although the Federal Reserve had tightened monetary policy somewhat, the real federal funds rate remained near zero, and the central bank's anti-inflation credibility was quickly eroding. European governments, notably the Swiss and Germans, encouraged the Federal Reserve to intervene more forcefully (FOMC *Transcript*, 17–18 October 1977, 30). Although the desk began to intervene more frequently, at this point its tactics generally had still not changed: "the Federal Reserve's approach to the market remained covert and passive: the [Desk] worked through the agent of a different commercial bank each day that placed the Desk's offers of currency into the brokers market, and the amounts offered were no larger than those usually traded in the brokers market" (Greene 1984b, no. 128, 17).

The Federal Reserve's lack of enthusiasm may have stemmed from Arthur Burns's growing doubts about the usefulness of intervention. Burns, whose tenure as chairman was slated to end on 17 January 1978, believed that the dollar's depreciation reflected fundamentals, including the lack of a US energy policy, a stubbornly high rate of US inflation, and the absence of tax incentives for investment.[24] Without appropriate policy changes, he regarded intervention as futile. While he accepted that, at best, intervention had some "psychological benefits," Burns did not believe that it had permanent effects. He was, nevertheless, willing to intervene "for the sake of better relations with foreign countries," but Burns contended that many foreign governments actually did not favor heavy US intervention, because they could not adequately deal with the excess liquidity that such intervention created in their own markets. For these reasons, he did not want the desk to "overdo it," and he claimed to have been limiting the amount and frequency of the desk's activities.[25]

Burns's changing attitude also reflected a deeper, noneconomic concern. He suggested that if the Federal Reserve intervened on a much larger and more persistent scale, the administration and Congress would "indefinitely postpone" more permanent corrective actions (FOMC *Transcripts*, 17 January 1978, 11). He was referring to budgetary and energy policies. At the 28 February 1978 FOMC meeting, Burns said, "There are differences within the Government about steps that can and should be taken to deal with the dollar problem. The more active our intervention is, the more excuses others

within this government have for not taking some of the bridging steps, or some of the more fundamental steps that need to be taken to restore the integrity of the dollar in foreign exchange markets" (FOMC *Transcripts*, 28 February 1978, 14). He recommended that the Federal Reserve cut back on the scale of intervention.[26] In addition, he did not want the desk to intervene without the Treasury taking a more active role. He seemed to have felt that without additional policy actions, intervention was doomed to failure, and he did not want the Federal Reserve held solely accountable.

Events were already moving in the direction that Burns wanted. Governor Gardner acting on behalf of the FOMC reached an understanding with the US Treasury about intervention. The Treasury, which now felt compelled to express some concern for the dollar, agreed to acknowledge that Federal Reserve operations were undertaken with the close consultation and concurrence of the Treasury. In addition, the Exchange Stabilization Fund would henceforth participate with the Federal Reserve in US operations. Assistant Treasury Secretary Solomon and Governor Gardner went to the US Congress and explained that the Treasury would establish a $1 billion swap line with the Bundesbank for the purpose of intervening (FOMC *Transcripts*, 17 January 1978, 2–3). On 4 January 1978, the Treasury and the Federal Reserve announced their intention for joint intervention "to check speculation and reestablish order in the foreign exchange markets" (*Bulletin*, January 1978, 60). The Treasury publicly announced the existence of its swap line with the Bundesbank, but not its size (Task Force 1990f, Paper no. 9, 13).

Armed with political cover against failure, the desk's operations became more forceful and open (see figures 5.10 and 5.11). Sometimes the desk even attempted to achieve a dollar appreciation, instead of moderating the dollar's depreciation. Sometimes the desk even quoted both bid and offer rates—buying and selling on the same day—to narrow spreads (Greene 1984b, no. 128, 18–22).

Prior to reactivating its swap line, the Treasury had no German mark balances. Over the first four months of 1978, the Treasury drew $1 billion worth of marks on its swap line with the Bundesbank to finance interventions (see figure 5.12). On 13 March 1978, the US Treasury also announced that it was prepared to sell $730 million of special drawing rights (SDRs) to Germany and to draw on its reserve position at the International Monetary Fund to acquire additional currencies for intervention (*Bulletin*, June 1978, 449). Between May 1978 and October 1978, the Treasury obtained $716 million equivalent marks through off-market transactions with central banks, which may have included SDR sales. In addition, the Treasury acquired $169 million worth of German marks from the Federal Reserve System. The Treasury used these funds, along with some purchases in the market, to repay part of its initial $1 billion swap drawings. Late in the period, however, the Treasury seemed to be in a particularly difficult position. With the dollar still depreciating, it was using funds acquired through swap lines

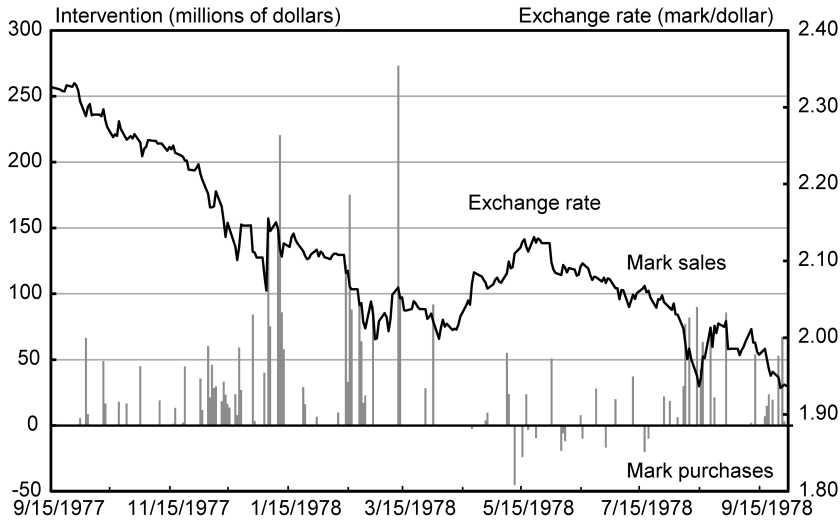

Fig. 5.10 US intervention against German marks, 15 September 1977–30 September 1978

Note: Data are from the Federal Reserve.

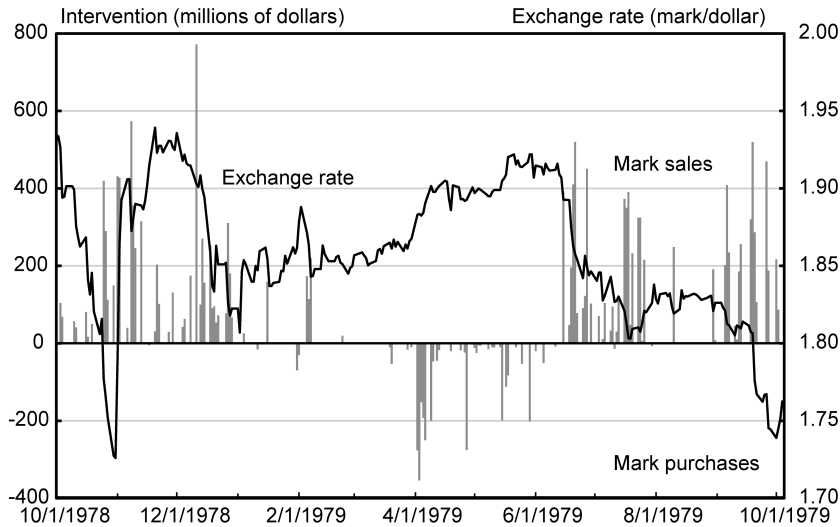

Fig. 5.11 US intervention against German marks, 1 October 1978–5 October 1979

Note: Data are from the Federal Reserve.

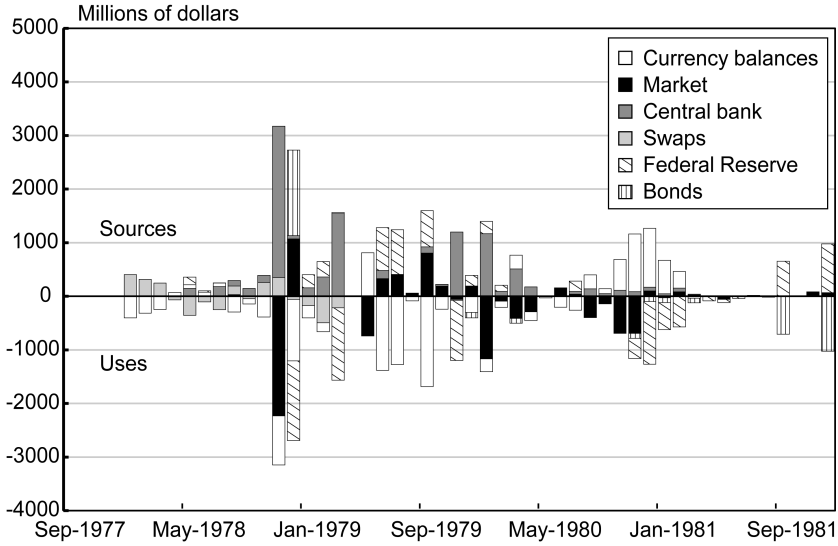

Fig. 5.12 US Treasury sources and uses of German marks, September 1977–December 1981

Notes: "Central bank" contains "exceptional items." Data do not include unexplained items or profits. Data are from the Federal Reserve System.

and through off-market transactions with central banks not only to finance further interventions, but also to repay earlier swap drawings. It was often borrowing from Peter to pay Paul.

The Federal Reserve began drawing on its own swap line in October 1977 and by the end of March 1978, the central bank had drawn $1.8 billion worth of German marks (see figure 5.13). On 13 March 1978, the Federal Reserve negotiated a $2 billion increase in the swap line with the Bundesbank, thereby doubling the facility. Initially, the additional $2 billion was not to be continuously available to the central bank. Once the Federal Reserve repaid amounts drawn on the extended line, the facility was to have reverted to $2 billion (FOMC *Transcripts*, 10 March 1978, 4–5).[27]

Over the one-year period ending on 31 October 1978, the desk intervened on ninety-seven days, purchasing on average $55 million worth of German marks on each day (see table 5.1). This average amount was substantially greater than in previous intervention episodes. Roughly one-third of these purchases were for the Treasury's account. The Federal Reserve also bought other foreign currencies on thirty days. Foreign central banks, notably the Germans, made substantial dollar purchases over this period. The Bundesbank alone bought $1.1 billion. Despite the heavy intervention, the dollar continued to depreciate, falling 24 percent against the German mark and nearly 16 percent on a trade-weighted basis.

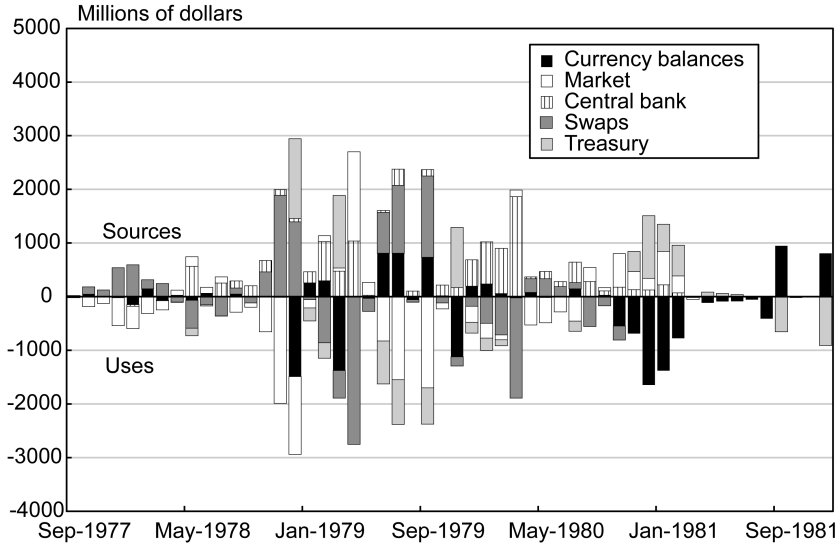

Fig. 5.13 Federal Reserve sources and uses of German marks, September 1977–December 1981

Notes: "Central bank" contains "exceptional items." Data do not include unexplained items or profits. Data are from the Federal Reserve System.

During this period, the Japanese asked the United States to intervene against the yen, which was appreciating sharply relative to the dollar (FOMC *Transcripts*, 21 March 1978, 26). Heretofore, the desk had never intervened in Japanese yen for the Federal Reserve's account.[28] The FOMC showed little support for this request in part because intervention against yen would require more resources, but also because trade restraints and other limits to foreign competition in Japanese markets bolstered that country's trade surplus. In addition, the FOMC feared that selling yen would probably result in large losses for the United States since the yen tended to appreciate (FOMC *Transcripts*, 18 July 1978, 2–3). Nevertheless, New York Federal Reserve President Volcker and Governor Wallich predicted that such interventions might happen as a concession to the Japanese on some other negotiation, as on trade or summit issues (FOMC *Transcripts*, 18 July 1978, 3).

Their prediction was accurate. In August 1978, Chairman Miller began talking about activating the Japanese swap line. The Japanese had agreed to a 50-50 risk sharing proposal and reaffirmed their $2 billion swap limit. The Federal Reserve was still negotiating interest rates on the swaps. By late October 1978, the central bank was ready. "For some time, the Federal Reserve Bank of New York had been intervening in the New York market for the account of the Japanese authorities. It was agreed that this would continue and that the U.S. authorities would join in this intervention using their own resources" (*Bulletin*, March 1979, 208).

Despite more forceful tactics in September and October 1978, the dollar's situation only worsened. Underlying the depreciation was a persistent current-account deficit, but more fundamentally, inflation in the United States was rising while inflation abroad had moderated. By mid-October, the depreciation accelerated and, in the desk's view, overshot a level consistent with fundamentals (*Bulletin*, March 1979, 201). On 24 October 1979, President Carter announced a new anti-inflation program calling for voluntary price and wage guidelines (*Bulletin*, March 1979, 202). Markets were not impressed, and "the selling of dollars reached near-panic proportions, and dollar rates plummeted to record lows against several major currencies" (Greene 1984b, no. 128, 28; Solomon 1982, 349).

On 1 November 1978, the administration in conjunction with the Federal Reserve System announced a massive dollar defense package consisting of a 1 percentage point increase in the discount rate to a historic high of 9 1/2 percent, a $30 billion increase in foreign-currency resources, and closer cooperation with Germany, Japan, and Switzerland, whose export-dependent economic growth the dollar's depreciation had crimped. The foreign currency package included a $7.6 billion increase in the Federal Reserve's swap lines with these countries. The Treasury would draw $3 billion from the US reserve position with the IMF and would sell $2 billion equivalent SDRs to acquire German marks, Japanese yen, and Swiss francs. The Treasury would also issue up to $10 billion in German mark and Swiss franc denominated securities, so-called Carter bonds (*Bulletin*, December 1978, 940–41) (see figure 5.14). The Treasury issued Carter bonds in Swiss and German securities markets, rather than to foreign central banks as was the case with Roosa bonds. Consequently, interventions financed with Carter bonds did not complicate foreign monetary policies by adding liquidity to foreign money markets. Carter bonds automatically sterilized the interventions that they financed.

The temporary, August 1978 increase in the Federal Reserve's swap line with the Bundesbank was now permanent, and the facility had jumped again to $6 billion—a $4 billion increase in less than one year. The Federal Reserve's swap line with Japan increased from $2 billion to $5 billion on 1 November 1978, and the swap line with the Swiss National Bank increased from $1.4 billion to $4 billion. This brought the Federal Reserve's entire swap facility to $29.8 billion equivalent (see figure 5.7). The Federal Reserve hoped that the increase offered a formidable warning to speculators.

The Federal Reserve quickly drew $2 billion worth of German marks from the swap line with the Bundesbank and sold nearly all of this in the market. In December, the Federal Reserve drew an additional $1.4 billion worth of German marks from the swap line and, again, sold all of these in the market. The Treasury drew $2.8 billion from the IMF and $400 million on its swap line with the Bundesbank. Most of these funds went initially into the Treasury's foreign-exchange balances, but the ESF quickly sold nearly $1 billion worth of marks into the market during November. In December,

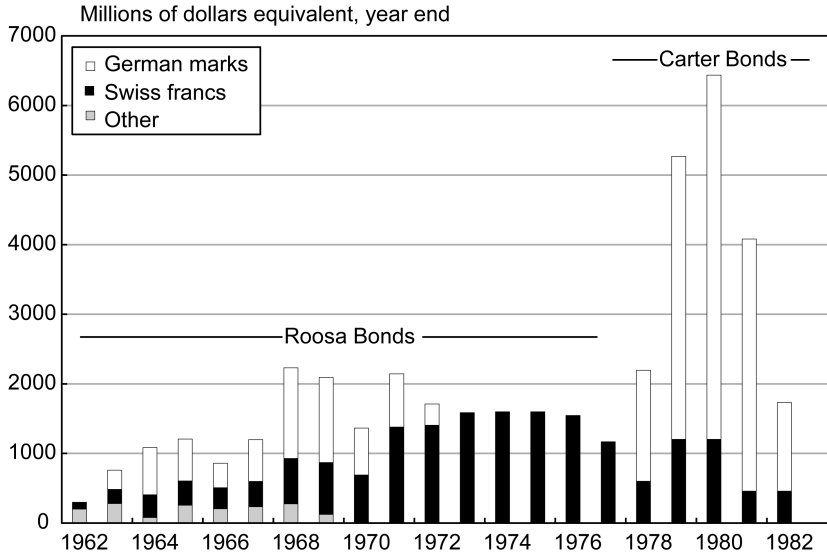

Fig. 5.14 Treasury foreign currency securities, 1962–1982

Notes: Data for 1978 include $600.4 million in Roosa bonds. Data are from the Federal Reserve System.

the Treasury drew down its balances and sold an additional $1.1 billion worth of marks. By the end of December, the United States had sold $5.7 billion worth of German marks. The Treasury accounted for approximately one-third of the total.

The dollar immediately appreciated following the 1 November 1978 announcement, especially against the German mark. Subsequent official interventions in German marks, Japanese yen, and Swiss francs were large and coordinated (*Bulletin* March 1979, 202). Over the next two months, the desk intervened on twenty-eight out of forty business days (table 5.1). The average daily amount was $202 million equivalent. The desk also intervened on twenty occasions in other foreign currencies, with an average intervention in them equal to $47 million.[29] At the end of December, the dollar was higher than at the beginning of November, a rare outcome for intervention during the early floating era.

The appreciation may have been an initial reaction to the change in intervention policy and to the temporary tightening of US monetary policy.[30] At this time, the real federal funds rate briefly started to rise. Over this period, the Bundesbank acted in concert with the United States, purchasing nearly $2.8 billion—a very substantial amount. Other central banks also intervened. In addition to signaling cooperation, which may have affected the dollar through an expectations channel, the intervention added to liquidity in European markets.

Federal Reserve Bank of St. Louis President Lawrence K. Roos wondered if the large increase in foreign-currency holdings implied a change in strategy from reacting to disorderly markets to something on the order of pegging. Holmes responded that no one was attempting to peg a rate. He said that the November 1978 program was based on the administration's, the Treasury's, and the Federal Reserve's belief that the dollar had "gone [down] too far" (FOMC *Transcripts*, 17 April 1979, 36–37). This statement suggests, however, that the Federal Reserve and Treasury were not just smoothing a decline in the dollar exchange rate, as had generally been the case in the past. United States monetary authorities were now attempting to stop the decline and hopefully reverse it (Greene 1984b, no. 128, 29).

In early 1979, pressures on the dollar subsided amid some evidence that US policymakers might focus on inflation. Those foreign central banks that intervened heavily to defend the dollar—notably the Bundesbank, the Swiss National Bank, and the Bank of Japan—used the occasion to drain liquidity (*Bulletin*, March 1979, 202). The dollar strengthened after OPEC announced another oil price hike, because market participants again believed that the United States—like the United Kingdom and Canada—was less vulnerable to oil shocks than many other countries.

With the dollar remaining firm, the Federal Reserve acquired sufficient German marks to repay outstanding swap obligations and to build balances of nearly $2.4 billion worth of marks by May 1979. The Federal Reserve purchased most of its German marks off-market from correspondents, but the desk also bought currencies in the market when the dollar was "particularly strong," suggesting passive intervention designed to stem the dollar's appreciation, or at least not encourage a depreciation (*Bulletin*, September 1979, 722).

The Treasury retired its outstanding swap debt with the Bundesbank by March 1979, when marks previously warehoused with the Federal Reserve became available.[31] The Treasury also acquired German marks through off-market transactions with a foreign central bank. In March 1979, the US Treasury held a portfolio of nearly $1.2 billion worth of German marks. The Treasury also held $1.6 billion worth of Japanese yen, which it drew from the IMF in November 1978.

The desk liquidated the Federal Reserve's yen swap debts by February 1979 and shortly acquired a portfolio of $195 million worth of yen. Throughout 1979, the yen depreciated against the dollar. By May 1979, the US Treasury, the Japanese Ministry of Finance, and the Bank of Japan were encouraging the Federal Reserve to undertake concerted and publicly announced yen purchases. The plan called for the Federal Reserve to add roughly $800 million equivalent yen to its current balances of approximately $1 billion worth of yen. The Treasury, which already held $1.6 billion equivalent yen, would acquire $200 million yen (FOMC *Transcripts*, 22 May 1979, 41). In November 1979, the Japanese wanted to draw on the swap

line, even though they held a very large portfolio of reserves (presumably in dollars). They believed that a drawing would demonstrate US support for their operations (FOMC *Transcripts*, 20 November 1979, 4–5). The Federal Reserve had initiated a drawing on the yen swap line in November 1978, but no further drawings were ever undertaken. Moreover, the Federal Reserve undertook no additional yen interventions until March 1980.

By late spring 1979, attitudes toward the dollar again started to change. Inflation in the United States exceeded inflation in Germany and continued to rise. Foreign countries were tightening monetary policies faster than in the United States, and interest-rate spreads vis-à-vis short-term mark-denominated assets moved against the dollar (Greene 1984b, no. 128, 8–10). President Carter's energy speech on 15 July 1979 resulted in further dollar depreciation.

In mid-June, the desk began forcefully intervening to support the dollar, but the dollar continued to depreciate. In a telephone conference call on 17 July 1979, FOMC participants discussed the merits of intervening relative to the benefits of increasing the federal funds rate. Paul Volcker, president of the Federal Reserve Bank of New York, did not think intervention would work; he favored tightening monetary policy. Volcker worried that the "Bundesbank may well get very restive soon about the amounts of liquidity there—we're creating in their markets. I think they've been . . . quite cooperative up to now but they haven't been doing very much and we're going to be getting into complaints very soon. Gretchen [Margret Greene, assistant vice president to the desk manager] kind of had some grumbling this morning and it looks like it is pretty big. So I think it is a little bit of an illusion, if this continues, to think that we can rely on intervention" (FOMC *Transcripts*, 17 July 1979, 5).

Inflation was rising sharply and the Federal Reserve was rapidly losing credibility across the globe. As Volcker noted, "After years of failed or prematurely truncated efforts to deal with inflation, markets had developed a high degree of cynicism about the willingness of what they dismissed as 'Washington' in general, or the Federal Reserve in particular, to stand firm" (Volcker and Gyohten 1992, 165–66).

The desk intervened on forty-four of the seventy-nine business days between 15 June 1979 and 5 October 1979, selling a massive $9.1 billion worth of German marks or $207 million worth of German marks on average each intervention day (table 5.1). Slightly more than one-half of the transactions were for the Treasury's account. The desk also sold a small amount of other currencies, but it did not intervene against Japanese yen even though some transactions occurred overnight in the Far East (*Bulletin*, September 1979, 723). The Bundesbank bought $2.7 billion, on par with its previous purchases.

These interventions against German marks were, on average, the largest to date. For the first time in the early float period, foreign central banks

seemed to be losing confidence in US monetary policy and becoming weary of the domestic liquidity created from buying large amounts of US dollars. Although the desk was attempting to prevent a further dollar depreciation, the dollar depreciated nearly 8 percent against the German mark and 2.5 percent on a trade-weighted average basis between 15 June 1979 and 5 October 1979.

Over this period, the Federal Reserve drew nearly $4 billion from its swap line with the Bundesbank and used these funds to finance its interventions. (The Federal Reserve did make small repayments on its swap lines in most months.) The Federal Reserve also drew down $2.4 billion from its balances and acquired another $765 million worth of German marks from central banks. The Treasury financed one-half of its interventions from marks previously warehoused with the Federal Reserve, and 38 percent by drawing down its balances of German marks. The Treasury also acquired a small amount of marks through off-market transactions with foreign central banks.

5.4.2 Were US Interventions between 15 September 1977 and 5 October 1979 Successful?

After September 1977, US interventions became more aggressive than they heretofore had been. The desk now intervened in substantially larger amounts and much more frequently than it had over the earlier floating-rate period. The Treasury became an active participant in the operations, often announcing major interventions, and the other central banks acted in closer concert with the desk. In addition, the operations were more visible, and therefore more consistent with an expectations approach. While the desk continued to operate frequently through the brokers market, it also began conducting a larger number of transactions directly with commercial banks. The strategy also changed. While the desk often strove to moderate movements in the dollar, at times it now attempted to prevent a further depreciation, to achieve a dollar appreciation, to reinforce the momentum of a dollar rise, or to moderate bid-ask spreads (Greene 1984b, no. 128, 19–20).

Despite the changes in amounts, frequency, objectives, and openness, US operations between 15 September 1977 and 5 October 1979 were no more effective than the earlier US interventions. As in the pre-1977 period, they demonstrated some tendency to moderate exchange-rate movements (see table 5.3).

Of the 175 US sales of German marks, only forty-three (or 25 percent) were associated with a same day dollar appreciation against the German mark. We would expect to find severnty-two successes purely by chance (see appendix 2). Because the observed number of successes is more than two standard deviations below the expected, the result suggests that US intervention sales of German marks were a reliable signal that the dollar would depreciate—not appreciate—against the mark. As in the earlier episode,

Table 5.3 Success counts for US intervention, 15 September 1977 to 5 October 1979

German marks	Total (#)	Intervention successes (#)	(%)	Expected[a] successes (#)	Standard[a] deviation (#)
Mark sales & dollar appreciation	175	43	24.6	72	4
Mark purchases & dollar depreciation	58	16	27.6	31	3
Total	233	59	25.3		
Mark sales & smaller dollar depreciation	175	49	28.0	31	3
Mark purchases & smaller dollar appreciation	58	12	20.7	6	1
Total	233	61	26.2		
Mark sales & dollar appreciation or smaller depreciation	175	92	52.6	103	6
Mark purchases & dollar depreciation or small appreciation	58	28	48.3	36	4
Total	233	120	51.5		
Japanese yen					
Yen sales & dollar appreciation	10	6	60.0	5	2
Yen purchases & dollar depreciation	19	5	26.3	9	2
Total	29	11	37.9		
Yen sales & smaller dollar depreciation	10	1	10.0	1	0
Yen purchases & smaller dollar appreciation	19	6	31.6	2	1
Total	29	7	24.1		
Yen sales & dollar appreciation or smaller depreciation	10	7	70.0	6	2
Yen purchases & dollar depreciation or small appreciation	19	11	57.9	11	3
Total	29	18	62.1		

Note: See appendix 2 for detail.

[a] Assumes that the success count is a hypergeometric random variable.

market participants with information about US intervention—like those banks that often operated on behalf of the desk—could have profited, on average, from selling dollars.

Our analysis of official US purchases of German marks is again no different than that for sales. As already noted, however, the desk typically undertook mark purchases over this period for the purpose of paying down outstanding mark obligations. The desk undoubtedly timed these purchases

to minimize any adverse impact on the dollar. Of the fifty-eight purchases of marks, sixteen were associated with same-day dollar depreciations. Again, market participants who knew of the operations could have profited on average by selling marks for dollars.

When we evaluate US intervention over this two-year period in terms of moderating the dollar's depreciations or appreciations, the picture is again substantially more favorable to the idea that intervention affected the rate. Of the 175 sales of German marks in support of the dollar, forty-nine (or 28 percent) were associated with a slower rate of dollar depreciation on the day of the intervention as compared to the day prior to the intervention. This success count is more than two standard deviations greater than the anticipated number of successes. Of the fifty-eight purchases of German marks, twelve (or 20.7 percent) were associated with a slower pace of dollar appreciation on the day of the intervention as compared with the previous day. The number of observed successes is also more than two standard deviations larger than the expected number. The interventions tended to moderate same-day movements in the dollar.

When we combine the two criteria into a single criterion—presuming that we do not know which of them the desk was attempting to achieve on any specific day—the results suggest that intervention had no better than a random impact on exchange-rate movements. At best only about one-half of the interventions influenced the dollar-mark exchange rate in a manner consistent with the objectives of the US policymakers. This is an abysmal success rate.

Over this same period, the desk sold Japanese yen on ten days and bought yen on nineteen days. This amount seems too few to draw firm conclusions about the effectiveness of intervention against Japanese yen. Nevertheless, in no case is the actual success count statistically greater than the count we would anticipate purely by chance.

By and large over this entire period, the dollar continued to depreciate against the German mark and on a trade-weighted basis. In her detailed analysis of the operations, Greene concluded:

> Evolving U.S. efforts to provide more effective and forceful intervention support for the dollar did, at least in the first instance, help to demonstrate . . . that the U.S. government was concerned about the large and rapid decline in the dollar and was willing to try to do something about it. But when intervening actions were not soon followed up with consistent and effective measures to deal with the underlying causes of the dollar's weakness, any positive short-run impact of the intervention faded. (Greene 1984b, no. 128, 40)[32]

Her conclusion suggests that the desk viewed the effects of *sterilized* intervention to be ephemeral and ultimately not a tool with which to alter exchange rates independent of monetary policy.

5.4.3 Monetary-Policy Change

On 29 September 1979, Paul Volcker, who became the Federal Reserve chairman on 14 August 1979, went to the IMF/World Bank meeting in Belgrade, where he also conferred with German officials about the dollar's depreciation and the continuing US inflation problem. Helmut Schmidt "left no doubt that his patience with what he saw as American neglect and irresolution about the dollar had run out" (Volcker and Gyohten 1992, 165–68).[33] Volcker left the Belgrade meeting early, which raised expectations of a major change in US monetary policy. He set up a special confidential meeting of the FOMC for Saturday, 6 October 1979, ten days ahead of the scheduled meeting.

At the quickly called meeting, the Federal Reserve announced major changes in monetary policy, including a 1 percent point hike in the discount rate to 12 percent, and the imposition of an 8 percent marginal reserve requirement on increases in managed liabilities. "In addition the Federal Reserve announced that it would place greater emphasis on the supply of bank reserves in its open market procedures and less emphasis on the federal funds rate in seeking to reach its objective for the monetary aggregates." (*Bulletin*, December 1979, 954). The dollar strengthened immediately following the announced changes in policy.

The policy change initiated a temporary dollar appreciation. By mid-February, US interest rates were rising faster than foreign interest rates and the dollar moved upward. On 14 March 1980, President Carter authorized the Federal Reserve to impose credit controls (*Bulletin*, June 1980, 456; Schreft 1990). Concerns about credit controls pushed US rates higher and foreign funds moved into dollars. As the dollar appreciated, foreign central banks began selling dollars to support their currencies (*Bulletin*, June 1980, 455). "By late March [1980], the bidding for dollars had become so generalized that demand pressures, which had previously been concentrated more heavily in markets abroad, began erupting at any time during the 24-hour trading day. To counter disorderly conditions, the Desk entered the New York market in March and the first week of April [1980] as a buyer of German marks on 13 occasions, of Swiss francs on 4 occasions, and of Japanese yen on 10 occasions. In early April, the Desk also intervened on one occasion to purchase marks in the Far East" (*Bulletin*, June 1980, 456). The desk was, for the first time, *actively* intervening to limit the dollar's appreciation.

The United States used these funds, along with marks acquired through off-market transactions with other central banks, to liquidate the Federal Reserve's swap obligations with the Bundesbank and to make interest payments on outstanding foreign currency-denominated securities (*Bulletin*, June 1980, 455–56).

Despite the 6 October 1979 policy changes and the tightening of monetary policy, the nominal federal funds rate fell and the real federal funds

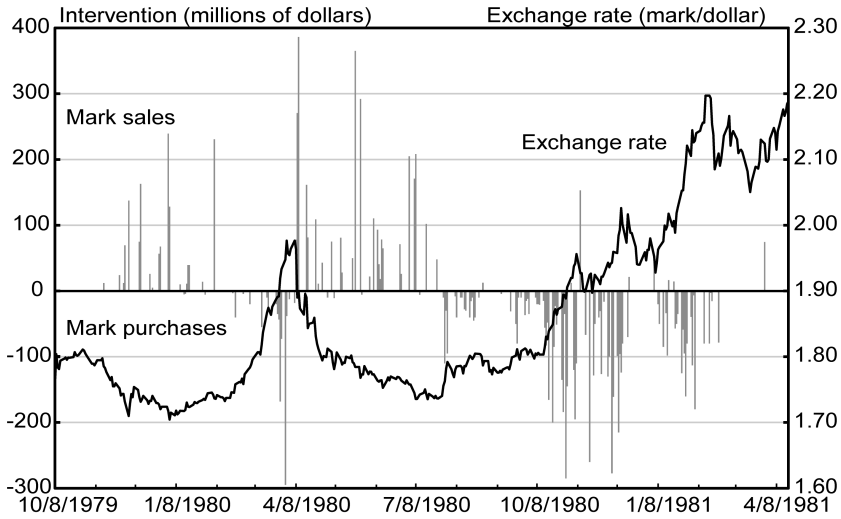

Fig. 5.15 US intervention against German marks, 8 October 1979–8 April 1981
Note: Data are from the Federal Reserve.

rate again turned negative in early 1980. Uncertainty about Volcker's prospects for reducing inflation and keeping it low with the economy now in recession and the unemployment rate rising sharply probably explains the dollar's twelve percent depreciation between 8 April 1980 and 11 July 1980. In response, the United States intervened. The desk sold German marks, but it also sold French francs to avoid aggravating the weakness of the mark relative to the franc in the EMS (*Bulletin*, June 1980, 456). The Federal Reserve sold $159.6 million worth of French francs, which it financed by drawing on its swap line with the Bank of France. The central bank continued with large periodic interventions through mid-July.

The desk intervened, buying an average of $121 million worth of German marks on each of twenty-six days during the sixty-eight-day period (see table 5.1 and figure 5.15). The average size of a transaction was smaller than in the previous two intervention episodes. On eleven days the desk bought other foreign currencies, mostly French francs ($160 million) and Swiss francs ($144 million). Despite the intervention, the dollar depreciated nearly 12 percent against the German mark and 10 percent on a trade-weighted basis.

5.4.4 Were Interventions between 8 October 1979 and 17 April 1981 Successful?

Despite the change in US monetary policy, the US interventions between 8 October 1979 and 17 April 1981 were no more successful than in earlier periods (see table 5.4). Of the fifty-five sales of German marks, only fifteen

Table 5.4 Success counts for US intervention, 8 October 1979 to 17 April 1981

German marks	Total (#)	Intervention successes (#)	(%)	Expected[a] successes (#)	Standard[a] deviation (#)
Mark sales & dollar appreciation	55	15	27.3	28	3
Mark purchases & dollar depreciation	114	41	36.0	50	4
Total	169	56	33.1		
Mark sales & smaller dollar depreciation	55	17	30.9	7	1
Mark purchases & smaller dollar appreciation	114	25	21.9	17	2
Total	169	42	24.9		
Mark sales & dollar appreciation or smaller depreciation	55	32	58.2	35	4
Mark purchases & dollar depreciation or small appreciation	114	66	57.9	68	5
Total	169	98	58.0		
Japanese yen					
Yen sales & dollar appreciation	1	1	100.0	1	1
Yen purchases & dollar depreciation	10	4	40.0	4	1
Total	11	5	45.5		
Yen sales & smaller dollar depreciation	1	0	0.0	0	0
Yen purchases & smaller dollar appreciation	10	1	10.0	1	0
Total	11	1	9.1		
Yen sales & dollar appreciation or smaller depreciation	1	1	100.0	1	0
Yen purchases & dollar depreciation or small appreciation	10	5	50.0	6	2
Total	11	6	54.5		

Note: See appendix 2 for detail.

[a] Assumes that the success count is a hypergeometric random variable.

(27.3 percent) were associated with a dollar appreciation, well below the expected number. Again, US intervention sales of German marks provided a reliable signal that the dollar would depreciate. Seventeen of these mark sales, however, were associated with a slower pace of dollar depreciation on the day of intervention than on the previous day, suggesting some tendency to dampen dollar depreciations. When we combine the two criteria into a single criterion, the number of successes was no better than random.

Between 8 October 1979 and 17 April 1981, the desk bought German marks on 114 days. As noted, sometimes the desk actively sought to slow the dollar's appreciation, but on most occasions the desk only wanted to acquire German marks to pay off debts and to accumulate a portfolio of German marks. (We discuss the acquisition of the portfolio in the next section.) Even when the desk bought German marks to pay down debts or to acquire a portfolio, it conducted passive interventions. Of these 114 purchases of German marks, forty-one (36 percent) were associated with a same-day dollar depreciation. This number was again substantially fewer than we would randomly anticipate. Twenty-five of these 114 purchases of German marks, not atypically, were associated with a smaller same-day dollar appreciation relative to the previous day. This amount was greater than anticipated and—as in previous episodes—suggests some capacity to slow the pace of a dollar appreciation. When we combine the success criteria, however, the count was no better than random.

Over this same period, the United States bought Japanese yen on 10 occasions and sold Japanese yen on only one day. While the number of interventions was too small to draw strong conclusions, the success counts were never better than the number that we would randomly anticipate, given the variable nature of day-to-day exchange-rate movements.

5.5 Foreign Currency Debt and the Decision to Increase the US Portfolio[34]

Between 1973 and 1977, the Federal Reserve never held more than $170.6 million worth of foreign exchange and never more than $51.6 million worth of German marks, its main intervention currency (figure 5.5).[35] These amounts were generally smaller than the amounts that the Federal Reserve held between 1962 and 1972. Moreover, between 1973 and 1977, the Treasury held virtually no balances of foreign exchange (figure 5.6). In large part this aversion to balances reflected the US view—a remnant of the Bretton Woods period—that foreign central banks would undertake most of the intervention (Axilrod and Holmes 1979, 1). Consistent with this view, between 1973 and 1977, the United States accounted for only about 5 percent of the total exchange-market intervention that the major central banks undertook against the dollar (Morton and Truman 1979, 3).

This lack of ready reserves forced the United States to rely heavily on borrowed funds to finance its interventions during the early dollar float. As we have shown, in order to meet their subsequent debt obligations, both the Federal Reserve and the Treasury needed to expeditiously buy back the foreign exchange that they previously sold and timed these buybacks to have the best possible effect on the market.

In early 1979, the FOMC considered increasing the Federal Reserve's portfolio of foreign exchange reserves.[36] The key reason for doing so was to avoid the growing conditions that countries—notably Germany—were

attaching to swap drawings (Task Force 1990h, Paper no. 8, 11). As the amount and persistence of US interventions increased in late 1977, so did the debt obligations of the United States. At the end of 1978, for example, the Federal Reserve had a record $5.5 billion in outstanding swap obligations, and the Treasury had $890 million in swap obligations and nearly $2.2 billion in outstanding Carter bonds (Task Force1990h, Paper no. 8, table IV.b.). Any foreign-imposed conditions could limit the United States' ability to conduct future interventions quickly and efficiently.

In part, countries increasingly imposed conditions on borrowing because the nature of intervention and the risks associated with repayment had changed. Under Bretton Woods, countries presumably borrowed to finance temporary balance-of-payments shortfalls not reflecting fundamentals. Monetary authorities viewed such debts as largely self-liquidating and easily repayable when financial funds flowed back into the borrowing country (see chapter 4). Now, however, with intervention becoming larger, more persistent, and aimed at smoothing longer-term movement in exchange rates, rather than financing temporary and reversible balance-of-payments problems, the previous conceptualization of self-liquidating debt was no longer valid. Confidence in countries' ability to quickly repay their debts had ebbed (FOMC *Transcripts*, 20 April 1976, 2–4). The United States itself had occasionally placed conditions on the swap drawings of other countries to insure their timely repayment. In 1976, for example, the United States conditioned a swap loan to Britain, requiring that country to subsequently obtain foreign exchange from the International Monetary Fund (*Bulletin*, December 1976, 1005).

The conditions that countries—notably Germany—wanted to place on the United States, however, had more to do with a pessimism about US monetary policy than about the country's ability to repay. Prolonged interventions, after all, were a symptom of a US policy failure, and Germany, which was reducing its inflation at the time, wished to limit the spillover effects. As Holmes and Pardee (1979, 4) explained: "[In 1978,] the Bundesbank went so far as to limit our use of the swap lines because of its concern that the marks so created would contribute to a potentially inflationary expansion of the monetary base in Germany." If Germany and other countries limited quick access to borrowed funds, the United States needed a larger portfolio of foreign exchange to pursue a strategy of smoothing longer-term movements in the dollar (Axilrod and Holmes 1979, 1).[37]

Another important motive for increasing the portfolio centered on the Federal Reserve's relationship to the US Treasury concerning intervention. From 1973 through 1977, the Treasury rarely intervened; it essentially continued its traditional role of promising to backstop the central bank's swap borrowings. The Federal Reserve had essentially free rein in running US intervention policy. In November 1978, the Treasury expanded its role in terms of both its overall resources and its willingness to engage in day-

to-day operations. By 1979, the Treasury had a substantial portfolio of $3.2 billion in foreign exchange, largely by issuing Carter bonds (Task Force 1990h, Paper no. 8, table 1).

The Federal Reserve's staff worried that if US interventions increased in size and frequency, and if the Treasury's portfolio of foreign exchange continued to expand relative to the Federal Reserve's, the FOMC would lose its influence over US intervention policies. Although the Treasury had relinquished much of its authority to the Federal Reserve in recent years, it continued to have primary responsibility over exchange-rate policies. While the central bank had legal authority for its own intervention, its exact role vis-à-vis the Treasury remained ambiguous but clearly secondary (see chapter 4). Beyond its technical expertise, the Federal Reserve acquired much of its authority through the resources that it brought to the venture. Now its relative influence seemed threatened.

The FOMC also worried about Congress's response to the acquisition of foreign exchange. In 1979, Congress did not seem to favor the accumulation of additional reserves (Morton and Truman 1979, 7). Many of the FOMC's concerns mirrored those that it had faced when it initially began intervening in 1962 (see chapter 4). Some FOMC members wanted clear congressional and Treasury approval before the Federal Reserve acquired a larger portfolio and a greater exposure to foreign-exchange risk (FOMC *Transcripts*, 17 April 1979, 35–45).

Holmes and Pardee (1979, 9) suggested that, "A good cushion to begin with would be 2 to 3 days' worth of heavy intervention." That seemed to translate into $1 billion worth of German marks, $400 million worth of Swiss francs, and $300 million worth of Japanese yen. These were the key international currencies, and the staff thought that these currencies' dollar exchange rates had wider effects on markets and sentiments than other currencies' dollar exchange rates. In addition, the staff recommended $100 million worth (each) of French francs, Netherlands guilders, and Belgian francs (Holmes and Pardee 1979, 9). These amounts would increase the Federal Reserve's informal limits on currencies from $500 million equivalent to $2 billion equivalent.

As the dollar began to stabilize in 1979, the Federal Reserve and the Treasury began to acquire foreign currencies, but they needed these funds initially to pay down outstanding debts rather than to build reserve balances. At the end of 1979, the United States had, on net, outstanding foreign currency obligations totaling nearly $2.9 billion equivalent, mostly in German marks. The Federal Reserve held nearly $2.4 billion in foreign currency assets, but it had $5.3 billion in outstanding foreign currency obligations, including warehoused funds and swap debts. The Treasury held nearly $5.3 billion in foreign currency assets, including a substantial amount warehoused with the Federal Reserve. Against these assets the Treasury had roughly an equal amount of outstanding Carter bonds.[38] On balance, the United States had

net foreign currency obligations in 1979. United States monetary authorities had maintained a negative net open position in foreign currencies (net liabilities) in nearly every year since interventions began in 1962 (Task Force 1990h, Paper no. 8, table I).[39]

After October 1979, as the dollar appeared to bottom out, and especially after September 1980 as the dollar began a sustained appreciation, the desk took advantage of opportunities to buy foreign currency and pay down outstanding debts. Because the desk remained concerned about sparking another dollar depreciation through its foreign currency purchases, it operated on both sides of the market. The desk bought foreign currency when conditions permitted (passively intervened) and actively intervened when markets were disorderly.[40] It did so in close proximity, even during the same day: "On several occasions, operations of both types were conducted at different times or in different markets within a day" (Greene 1984c, no. 129, 12).

The desk also began considering commercial bank offers to sell foreign exchange directly to the United States. "In general, banks came to the Desk with offers to sell currencies when there were few other buyers—such as when the dollar was moving up sharply or after the bulk of trading had subsided for the day—or when they had an order they felt was too large for the market to absorb" (Greene 1984c, no. 129, 12).[41]

The United States began acquiring foreign exchange to pay down its debt to foreign central banks, especially the Bundesbank. The Bundesbank sold the desk marks off market and also acted as its agent in the Frankfurt market. The desk also operated in the Far East (Greene 1984c, no. 129, 13–14).

The US strategy was to pay down short-term debts—swap lines—before paying off longer-term obligations, like Carter bonds. Since all of the Federal Reserve's debts were short term, the Federal Reserve paid them off by 15 October 1980. The Treasury was debt free by 5 December 1980 (Task Force1990h, Paper no. 8, 11–12).

After paying down or covering their obligations, the Federal Reserve and the Treasury continued to take advantage of the dollar's appreciation and to acquire foreign currencies. By the end of 1980, the United States held a positive net open position of $2.5 billion equivalent, its first since 1962. When these operations ended in February 1981, the Federal Reserve held approximately $4.5 billion in German marks and roughly another $1 billion in other currencies. The Treasury held $3.5 billion in German marks and roughly $2 billion in other currencies (Task Force 1990h, Paper no. 8, 12, and tables II.b. and II.c.). At the end of 1981, the United States held a net open position equivalent to $6.8 billion.

Technically, acquiring such a portfolio was not very difficult, but investing it in earning assets posed problems for the central bank. Prior to 1980, the Federal Reserve did not have very good options for investing its foreign-currency balances. The Federal Reserve Act did not allow the desk to invest in foreign government securities; it only allowed the desk to place funds in

interest-bearing deposits with other central banks and in bills of exchange. Holmes claimed, however, that the Federal Reserve lacked authority to invest in foreign government securities only because few such securities existed in 1914. The Federal Reserve Act listed things in which the central bank could invest, and if government securities existed, he claimed that they would have been included. Holmes offered that government securities were not "prohibited"; they just were not "listed" (FOMC *Transcripts*, 17 April 1979, 38–39).

Because of the legal restrictions against holding foreign government securities, the desk invested currency balances in deposit accounts at central banks or with the Bank for International Settlements prior to 1980.[42] If a central bank paid interest on Federal Reserve deposits, they based the rate on a nonmarket rate, such as the bank's discount rate. Sometimes the funds simply earned no interest. The Federal Reserve often placed funds with the BIS to gain interest earnings if a central bank paid none, or to accommodate foreign central banks' desire to keep funds in the market for monetary-policy considerations (Task Force1990h, Paper no. 8, 17–18).

As suggested, some central banks—notably the Bundesbank, whose currency constituted the bulk of the Federal Reserve's foreign-exchange holdings—were not legally allowed to pay interest on deposits or even to offer the Federal Reserve deposits. To earn a return on US holdings of German marks, the United States established a double-forward facility with the Bundesbank in 1978. Accordingly, the United States sold its mark holdings forward to the Bundesbank and simultaneously bought the marks back forward with the exchange rates structured to yield the United States a return. The instruments typically matured in three months. The Treasury also placed mark balances acquired through the sale of Carter bonds in securities that the German Finance Ministry issued. These had limited transferability and marketability (Task Force 1990h, Paper no. 8, 18–19).

The Monetary Control Act of 1980 allowed the Federal Reserve to invest foreign currency balances in securities that foreign governments issued or guaranteed (Task Force 1990h, Paper no. 8, 13). This allowed the Federal Reserve to invest in an array of instruments, some more liquid than others.

5.6 Warehousing

Warehousing refers to a foreign-currency swap between the Federal Reserve System and the US Treasury that gives the Exchange Stabilization Fund (ESF) temporary access to dollars. In a typical warehousing transaction, the ESF sells foreign currencies spot to the Federal Reserve and simultaneously buys them back for delivery at a specific future date, generally within one year. Because both the spot and forward legs of the swap occur at the same exchange rate, neither party incurs foreign-exchange risk from warehousing, but the foreign currency can still sustain valuation gains or

losses vis-à-vis the market, which then fall to the ESF. The Federal Reserve places the warehoused foreign exchange into an appropriate interest-earning instrument and derives a return over the interim of the operation, while the ESF has use of the dollars so acquired. Warehousing typically has occurred at the Treasury's initiative, but unlike with the monetization of gold or special drawing rights (SDRs), the Federal Reserve is not obliged to warehouse funds for the Treasury. The FOMC must give its approval to the operations and annually sets an overall authorization for warehousing.

As with any foreign-exchange operation, the Federal Reserve stands ready to offset unwanted changes in bank reserves that may result from warehousing. Should the ESF subsequently buy foreign exchange with its newly acquired dollars, the desk will drain any unwanted increase in dollar reserves. Often, however, the ESF will not immediately purchase additional foreign exchange and instead will temporarily "lend" the funds to the Treasury by acquiring a Treasury security. In this case, the Treasury's account at the Federal Reserve Bank of New York increases. If the Treasury subsequently draws down this account, the desk can easily sterilize the resulting increase in bank reserves. Likewise, the Federal Reserve will sterilize any unwanted drain on bank reserves that might arise when the ESF repays its warehousing obligation to the Federal Reserve System.

Over the years, warehousing-type transactions have served four functions. In the main, warehousing has temporarily augmented the limited dollar resources of the ESF. As explained in chapter three, the ESF has financed its foreign-exchange operations over the years from an initial congressional appropriation and from the periodic monetization of SDRs, which the ESF acquired either through IMF allocations or from other countries (Schwartz 1997). Initially, however, warehousing-like operations served a second purpose. As detailed below, they provided the Treasury with a means of covering its foreign-currency exposure on outstanding debt obligations that did not entail selling foreign exchange to the Federal Reserve, and thereby shifting that exposure to the Federal Reserve. On a couple of occasions, warehousing functioned in reverse: The Federal Reserve initiated a warehousing operation to acquire needed foreign exchange. Last, warehousing may have occasionally provided the US Treasury with a means of acquiring temporary dollar funding that avoided the federal debt limit. When the ESF parks the dollars that it has acquired through warehousing in US Treasury securities, the Treasury can reduce the amount of debt that it sells to the public and the amount of debt subject to the Congressional debt ceiling (Stevens 1989).

5.6.1 The Evolution of Warehousing

In 1963, the FOMC gave the desk authority to buy foreign exchange in the market and to sell it to the Treasury, which then held it as cover for outstanding foreign-exchange obligations. This authorization became the basis for future warehousing. At the end of 1963, the Treasury had outstanding lira

securities amounting to nearly $200 million and wanted to cover its exposure by buying lira, but the Treasury lacked sufficient resources to do so. At the time, the lira was trading somewhat below par, making lira purchases especially propitious (FOMC *Minutes*, 12 November 1963, 1–10). Charles Coombs, special desk manager, recommended that the Federal Reserve System acquire Italian lira spot and sell it forward to the Treasury. The forward sale eliminated the Federal Reserve's lira exposure, but still gave the desk a lira asset that became available when the forward contract expired. Coombs sought authority for $100 million equivalent.

Coombs viewed the current situation as a "rather special one" and sought authorization only for lira. The Treasury had outstanding debt obligations in other currencies, and Coombs assumed that he could seek further specific authorization should the need arise. However, the president of the Federal Reserve Bank of Boston, George H. Ellis, thought that a routine facility would help in redeeming Treasury foreign-currency securities and might also make them more saleable (FOMC *Minutes*, 12 November 1963, 7). The resulting foreign currency directive stated:

> The Federal Reserve Bank of New York is also authorized and directed to make purchases through spot transactions, *including purchases from the U.S. Stabilization Fund*, and concurrent sales through forward transactions to the U.S. Stabilization Fund, of any of the foregoing [authorized] currencies in which the U.S. Treasury has outstanding indebtedness, in accordance with the Guidelines and up to a total of $100 million equivalent. Purchases may be at rates above par, and both purchases and sales are to be made at the same rate. (FOMC *Minutes*, 12 November 1963, 10) (emphasis added)

In allowing the desk to buy foreign exchange spot from the ESF and sell it back forward to the ESF, the directive authorized warehousing. The FOMC *Minutes*, however, do not reveal how the insertion of the critical phrase "including purchases from the U.S. Stabilization Fund" came about.[43]

The mechanism of these initial lira purchases, of course, did not conform to a warehousing operation as it would eventually be understood. In January and March 1964, the desk purchased $83 million lira spot from a foreign central bank and sold it forward to the Treasury. The authorization also constrained the operations by specifying that warehousing transactions be limited to currencies in which the Treasury had an outstanding indebtedness.

In March and April 1966, the desk used such operations to provide cover against the Treasury's Swiss franc and German mark obligations and quickly began running out of authority. Coombs proposed an increase to $150 million for such operations, but " some members suggested that the limit might be removed entirely, or set at a level considerably higher than Mr. Coombs proposed, since the operations under discussion were riskless and helpful to the Treasury" (FOMC *Minutes*, 12 April 1966, 6–7). The Committee

authorized $200 million, but the actual amount of marks and francs that the Treasury held under this authority never exceeded $75 million equivalent (Morton 1977, 1) (see figure 5.13).

In July and August 1966, the Federal Reserve also sold over $100 million British pounds on a "swap basis" to the US Treasury—essentially warehousing in reverse. One of these transactions was for a single day, designed to reduce the Federal Reserve's balances on a statement day, while the other extended until January 1967.[44] These were not to cover Treasury debt obligations, and hence, not subject to the November 1963 authorization. The Federal Reserve, however, had frequently transacted in foreign exchange on a spot and forward basis even prior to the 1963 authorization. The reason for the November 1963 authorization was that covering the Treasury's outstanding debt had little to do directly with exchange-market stabilization, and so might seem to require a separate FOMC approval.

In November 1967, as part of an international aid package for Britain, the United States agreed to buy $500 million in "guaranteed sterling." Afraid that the transaction would leave the ESF cash strapped and hoping to give the central bank a bigger stake in the associated policy decisions, Coombs recommended that the Federal Reserve warehouse—in the traditional sense—an additional $150 million in guaranteed sterling for the ESF.[45] The Federal Reserve had authority to warehouse up to $200 million in currencies for which the Treasury had an outstanding indebtedness, but the Treasury did not have an outstanding indebtedness in British pounds. Hence, in addition to increasing the warehousing authority to $350 million, Coombs also asked the FOMC to delete the provision in the authorization that restricted warehousing to currencies in which the Treasury had outstanding indebtedness (FOMC *Memoranda*, 14 November 1967, 18–19). After all, the desk had already engaged in such transactions without a clear authorization.

The Federal Reserve's share of the US aid package to Britain was $100 million. Coombs thought that he could explain the Federal Reserve's holding of this amount of British pounds as necessary to meet its "needs for market operations." In fact, however, the United States was trying to prevent a devaluation of the pound—not looking to defend the dollar. Policy makers viewed the $500 million as an extended credit. The Federal Reserve Act justified foreign-exchange operations "undertaken to deal with such problems as short-run disturbances in the foreign exchange market. An extension of longer-term credit by the Federal Reserve to the Bank of England—even if ultimately for the purpose of safeguarding the value of the dollar—was of a character quite different from open-market operations" (FOMC *Memoranda*, 14 November 1967, 34). Warehousing an additional $150 million worth of British pounds for the Treasury allowed the Federal Reserve to help extend credits to the Bank of England without appearing to violate its mandate for intervention and, perhaps more importantly, gave the Federal Reserve more weight in the policy decision.

The FOMC raised the authorization to $350 million at its November meeting, but the Federal Reserve did not undertake any warehousing until June 1968. Then it warehoused $200 million worth of guaranteed sterling for the Treasury until August 1968. In September 1968, the FOMC raised the authorization for warehousing to $1 billion to facilitate further credits to Britain (Morton 1977, 2). The Treasury, however, did not ask to reuse the facility, and the Federal Reserve warehoused no foreign exchange until May 1969.

Implicit in the November 1967 authorization was an understanding that the $150 million increase in the overall authorization pertained only to British pounds and that the central bank could only warehouse $200 million—the April 1966 limit—in other currencies. In mid-1969, the Treasury expected France to sell it gold. While the Treasury could monetize gold with the Federal Reserve to pay for the transaction, it preferred to wait, because the Treasury expected the IMF to exercise an outstanding claim on the US gold stock. Instead, the Treasury hoped to bridge the two possible gold transactions by warehousing foreign currencies with the Federal Reserve. In June 1969, the FOMC agreed to liberalize the "informal understanding governing use of the existing authority to warehouse" so that the ESF could use the entire facility for general purposes. The need, however, did not materialize until December 1969 when the Federal Reserve warehoused francs and lira.

In May 1969, the Federal Reserve began warehousing British pounds for the ESF. By August, the central bank held $300 million equivalent. The ESF had also undertaken a series of gold purchases that depleted its funds. By year's end, following an additional $500 million gold purchase, the Federal Reserve's warehousing operations reached $975 million, and in early January they briefly hit the $1 billion limit. At that point, the Federal Reserve had warehoused $675 million in British pounds, $200 million worth of French francs, and $125 million equivalent Italian lira. The Treasury subsequently monetized $1 billion of gold and paid off its warehousing obligations to the Federal Reserve.

After this, the warehousing facility remained dormant for the next eight years, except for one warehousing-like transaction that the Federal Reserve initiated. In July 1972, the central bank intervened in the foreign exchange market against German marks. At the time, the Federal Reserve held very few German marks, and the Treasury had suspended the swap lines. To finance its intervention, the Federal Reserve bought $2.5 million worth of marks on a swap basis from the US Treasury and sold them back forward—a Federal Reserve–initiated warehousing operation.

On 17 January 1977, at the request of Treasury Secretary William Simon, the FOMC raised the warehousing authorization to $1.5 billion, and agreed to warehouse up to one-half of this amount for twelve months and the remainder for six months. The FOMC allowed the more generous ware-

housing authorization to help finance the Treasury's participation in another credit facility for the Bank of England, but the Treasury never drew on the line.[46]

On 14 December 1978, the FOMC again altered its authorization, increasing the limit to $1.75 billion and now allowing the Federal Reserve to warehouse foreign currencies directly with the US Treasury as well as the ESF.[47] The committee took this action in conjunction with the 1 November 1978 dollar support program, which we previously discussed. The Federal Reserve was a strong advocate of a large active dollar-support program, and viewed warehousing as a necessary contribution to the operation. Five days later, the committee raised its warehousing limit to $5 billion with a standard twelve-month term. This would allow the Treasury to exchange foreign currencies acquired through the issuance of Carter bonds with the Federal Reserve for dollars. The Treasury issued nearly $1.6 billion German-mark-denominated bonds in December 1978 and immediately warehoused almost that entire amount.[48] The Treasury also issued $1.4 billion in Swiss franc Carter bonds in January 1979, and likewise warehoused nearly all of the proceeds with the Federal Reserve. By May 1979, the central bank had warehoused nearly $3.5 billion for the Treasury, and by June 1981, the Treasury had warehoused $4.2 billion with the Federal Reserve. The Federal Reserve continued to warehouse these currencies for the Treasury through mid-1983 (see figure 5.16).

5.6.2 Financing Public Debt

An important aspect of warehousing is that it provided the Treasury with funds that were not subject to the congressional limits on public debt. When the ESF did not immediately use the dollar proceeds from a warehousing operation to purchase foreign exchange, it placed those funds in Treasury securities. As a consequence, the Treasury issued less debt to the public—debt subject to a statutory limit. The Federal Reserve had no control over how the Treasury or the ESF used the dollar funds that it acquired through warehousing, but clearly understood the issue at hand.

In late January 1969, Holmes suggested warehousing foreign exchange for the Treasury as a way to help the Treasury avoid breaching the statutory debt ceiling. At the time, the Treasury simply needed cash. "The Treasury's current problem," according to Holmes, "is not related in any way to current developments in the international situation" (Hackley 1969, 2–3).

Board of Governors General Counsel Howard Hackley pointed out that the Federal Reserve had legal authority to warehouse since purchases of foreign exchange from the Treasury were tantamount to open-market operations and that the Federal Reserve had no control over how the Treasury used the dollar funds: "the fact that their purpose may appear to be solely to provide the Treasury with additional cash does not affect their legality" (Hackley 1969, 3). Hackley cautioned, however, that open-market opera-

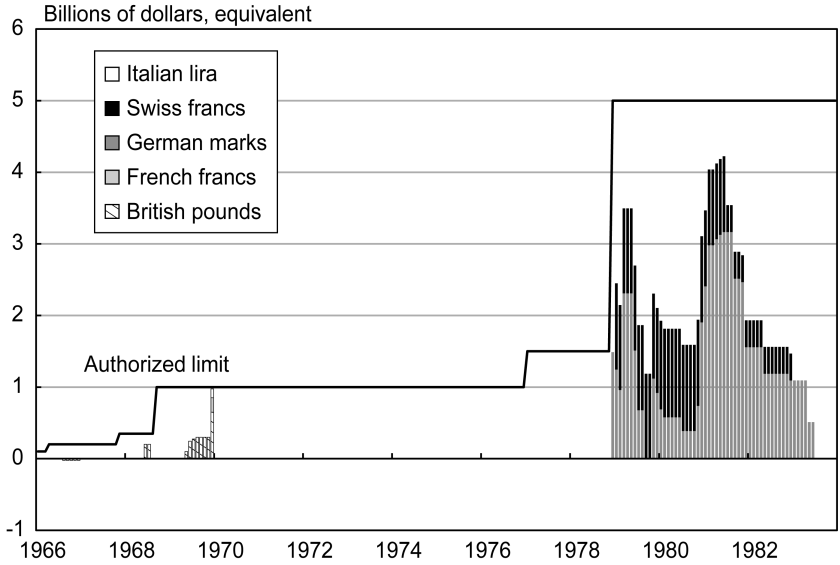

Fig. 5.16 Warehousing: Foreign currencies held at the Federal Reserve, 1966–1982
Note: Data are from the Federal Reserve.

tions should be used "to accommodate commerce and business with regard to their bearing on the general credit situation" (Hackley 1969, 3). At that time, General Counsel Hackley suggested that such a use of warehousing would be legally acceptable, because to do otherwise might affect the general credit situation of the country and the value of the dollar. This was particularly likely, Hackely reasoned, if the Treasury otherwise sought cash by selling off a substantial part of its foreign-exchange portfolio (Hackley 1969, 3–4).

Hackley, however, understood the precarious position that using warehousing to avoid the debt limit could pose for the Federal Reserve System:

> It must be recognized that adoption of the proposed arrangement could subject the [Federal Reserve] System to criticism. It might be charged, for example, that the proposed warehousing transaction would constitute a direct extension of credit to the Treasury by the Federal Reserve and would be contrary to the spirit if not the letter of the law, particularly in view of the express provisions contained in section 14(b) of the Federal Reserve Act for direct borrowing by the Treasury from the Federal Reserve within prescribed statutory limits. However . . . I believe that the transactions would be legally defensible as not being designed primarily to aid the Treasury but as intended to avoid developments that would have an adverse impact upon the "credit situation of the country." (Hackley 1969, 4–5)

Until the British pound support program in May 1969, the Federal Reserve did not warehouse any foreign exchange for the Treasury. An improvement in the Treasury's cash flow relieved the immediate debt-limit problem (FOMC *Memoranda*, 4 February 1969, 16). Still the central bank understood that warehousing financed Treasury expenditures:

> During the six-month period [August 1978 to January 1979], the Federal Reserve "warehoused" foreign currencies by taking foreign exchange acquired by the Treasury that was not immediately needed to finance foreign exchange intervention in return for dollars *that were needed by the Treasury in its own domestic operations*. (*Bulletin*, March 1979, 219) (emphasis added)

Congress raised the US statutory debt limit in August 1978. By December, outstanding eligible debt was rapidly approaching the new limit. All else constant, the Treasury would have breached the debt limit in March 1979 had it not warehoused funds with the central bank.

The situation became more problematic for the Federal Reserve after December 1978, when the FOMC extended warehousing directly to the Treasury—as opposed to only the ESF. The warehousing with the Treasury was less defensible than warehousing with the ESF. Volcker seemed to appreciate the distinction:

> [warehousing] could be construed as a form of Treasury borrowing from the Federal Reserve which isn't covered by the other prohibitions on their borrowing [the debt limit]. We need the justification that it is the Exchange Stabilization Fund's lack of assets, not a general lack of funds on the part of the Treasury, that gives rise to this [warehousing]. (FOMC *Transcripts*, 18–19 December 1980, 26)

The Federal Reserve did not want to appear to finance Treasury borrowing in breach of the appropriations process and congressional limits on public debt.

As explained in chapter six, authorization for warehousing would eventually reach $20 billion. The parallels between warehousing foreign exchange for the ESF and lending directly to the Treasury, in conjunction with concerns about the Federal Reserve's independence, would be a key factor in eventually terminating US intervention.

5.7 A Minimalist Approach

By late February 1981, as the dollar continued to appreciate, the United States had effectively stopped intervening.[49] On 17 April 1981, Treasury Secretary Donald Regan announced that henceforth the United States would follow a minimalist strategy with respect to intervention. Over the next four years, the United States rarely intervened in the foreign-exchange market.

Undersecretary of the Treasury for Monetary Affairs, Beryl Sprinkel, the architect of the policy change, explained the Treasury's reasons to the US Congress Joint Economic Committee on 4 May 1981 (Sprinkel 1981). His analysis of intervention was strikingly modern for the time. Sprinkel understood that the dollar's depreciation since 1973 mainly reflected the rising US inflation rate, and he noted that the United States primarily intervened to slow the rate of the dollar's depreciation. The US inflation rate had exceeded the German inflation rate consistently since 1974. This type of intervention—particularly the heavy interventions after 1978—did not address the fundamental underlying economic problem; it only "treated the symptoms." Sprinkel pointed out that sterilized intervention did not affect the macroeconomic determinants of exchange rates. He suggested that in such cases intervention "merely encourages disarray in the exchange market" (Sprinkel 1981, 12–13).

Sprinkel did not deny that exchange markets occasionally became disorderly, but he believed that the exchange market had evolved over the years of generalized floating and had become "more efficient in evaluating and adjusting to new information." As this observation suggests, he viewed intervention as potentially operating through a broad expectations (or signaling) channel—a more modern version of the desk's "psychological" effect—and he took this interpretation to its logical, and uncomfortable, conclusion: "Significant and frequent intervention by governments assumes that relatively few officials know better where exchange rates should (or shouldn't) be than a larger number of decision makers in the market, and that public funds should be put at risk on the basis of that assumption" (Sprinkel 1981, 13).

The Undersecretary also suggested that heavy, persistent intervention could make it "more difficult to follow the correct domestic monetary policy" (Sprinkel 1981, 13). He did not elaborate, but since 1979, the desk had been acquiring foreign exchange—selling dollars—while the FOMC was attempting to tighten monetary policy. The Federal Reserve sterilized this intervention, but such contradictory activities complicates policy making and, if observed by the markets, must weaken central-bank credibility. This exact issue would arise again in the late 1980s and early 1990s and would prove the key reason for ending the United States' long involvement in intervention.

5.8 Conclusion

From the inception of generalized floating through the middle of 1980, the dollar depreciated 54 percent against the German mark, the key target of US interventions over this period. The dollar's depreciation was a symptom of the Great Inflation, which chiefly resulted from a policy framework that downplayed the role of money in the inflation process and from a policy

preference for low unemployment over low inflation. During almost all of this time, the real federal funds rate was either negative or close to zero, and inflation in the United States exceeded inflation in Germany, often by a substantial margin. By 1977, confidence in the FOMC's ability and willingness to subdue inflation was rapidly evaporating. The dollar's depreciation quickened and did not reverse until mid-1980, after the FOMC substantially changed its monetary-policy approach and demonstrated a willingness to maintain a disinflationary stance despite severe economic weakness.

As one might expect in an inflation-charged atmosphere, US foreign-exchange interventions over this period were largely ineffectual in halting the dollar's decline. Overall, private market participants could have made money by following the adage at the beginning of this chapter and betting against the desk's operations. Still, on 25 percent of the days over which the desk sold German marks, the dollar experienced a smaller depreciation than on the previous day. This percentage is greater than we would anticipate given the random nature of day-to-day exchange-rate movements, and it suggests that the desk had a limited short-term capacity to lean against the wind. This narrow competency, however, could not quell a growing skepticism about the operations' effectiveness, which led to their termination in early 1981.

Besides inflation, the absence of a clear theoretical framework surely hampered the operations. Such a framework never guided the desk's actions. The desk claimed a general "psychological effect," but their interventions—covert, and small—were wholly inconsistent with the view that officials might provide the market with information useful for price discovery. Quite the contrary, a fear that the market might learn about an intervention, bet against it, or totally overwhelm it, drove the desk's operations, at least through 1977. Instead of providing new information to the market, the desk attempted to trick those market participants who were selling dollars into thinking that a market-based force was emerging to buy dollars. The desk's operations also seemed out of sync with academic thinking. At the time, most economists, including the Board's research staff, viewed intervention as operating through a portfolio-balance mechanism. A policy of borrowing foreign exchange to finance relatively small dollar support operations, but then quickly reversing course to repay the loans, would not have a significant lasting effect on the outstanding stock of dollar-, and mark-denominated assets nor on any risk premia. Hence, the operations could not affect exchange rates through a portfolio-balance channel. At best, the operations may have had an occasional temporary effect by creating unwanted liquidity in German money markets, but the Bundesbank, like the Federal Reserve System, was attempting to reduce inflation. For that reason, Germany grew increasingly reluctant to fund dollar support operations through swap lines.

In the end, as Sprinkel seemed to understand, foreign exchange intervention during the early dollar float did not provide US monetary authorities with a means of consistently affecting exchange rates independent of mone-

tary policy. Intervention did not offer a way around—or at least a way to dampen the effects of—the fundamental trilemma of international finance. During the next fifteen years or so, FOMC participants would come to see that intervention not only failed to provide a way to evade the fundamental trilemma, but that the operations were detrimental to sound monetary policy.