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ABSTRACT

In this paper, we describe the evolution of the Federal Reserve's swap lines from their inception in 1962 as a mechanism to forestall claims on U.S. gold reserves under Bretton Woods to a means of extending emergency dollar liquidity during the Great Recession. We describe a number of consequences associated with swap operations. We argue, for example, that swaps calm crisis situations by both supplementing foreign countries' dollar reserves and by signaling central-bank cooperation. We show how swaps exposed the Federal Reserve to conditionality and raised fears that they bypassed the Congressional appropriations process.

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In December 2007, at the Great Recession's onset, the Federal Reserve established swap lines with the European Central Bank and the Swiss National Bank as a way of channeling emergency dollar liquidity through these central banks to foreign depository institutions that lacked access to the Federal Reserve's borrowing facilities. As the global financial crisis unfolded, the lines grew to encompass fourteen central banks, including some key emerging market central banks, and the dollar ceilings on some of the lines vanished.

Central bank swap lines were not new to the Federal Reserve's playbook, but their use had now changed in a fundamental way. What started out as a device to provide central banks with cover for unwanted dollar positions had returned as a way to finance global lender-of-last-resort operations in U.S. dollars.

The funding problems were not limited to the U.S. dollar positions. The European Central Bank, the Bank of Japan, and Swiss National Bank also established emergency swap lines during the crisis to provide liquidity in their currencies beyond their borders—often to emerging market countries. Likewise, since 2000, East Asia has seen an extensive network of swaps develop, offering support should a financial crisis emerge and fostering closer economic integration in the area (Moessner and Allen 2010, 32). The People's Bank of China also extended new swap lines during the financial crisis, in part as a backstop against financial crises, but also to promote the use of the renminbi and other non-dollar currencies in regional trade and investment (Moessner and Allen 2010, 33).

Swap lines have now returned to the modern central bank's tool kit, but what may seem novel to some has a long history.¹ Using previously unavailable data and, heretofore, unexplored Federal Reserve documents, this paper discusses the Federal Reserve's experience with central-

¹ See Hooyman (1993) for an early survey of central bank uses of swaps.

bank swap lines since 1961.² Section 1 explains how swaps provided the Federal Reserve with a mechanism to forestall gold losses during Bretton Woods. During this period swaps also augmented deficit countries' foreign-exchange reserves and allowed the Fed to intervene in the Eurodollar market. Section 2 explains why the Federal Reserve's use of swaps as a mechanism to finance its foreign-exchange interventions largely failed. Section 3 discusses why the Mexican rescue operations in 1994 ended the FOMC's use of swap lines. Section 4 discusses their recent reincarnation as a means of financing global lender-of-last-resort operations in dollars. Section 5 recalls the main benefits and problems that the Federal Reserve encountered in using swaps.

1. The Advent of the Federal Reserve's Swap Lines

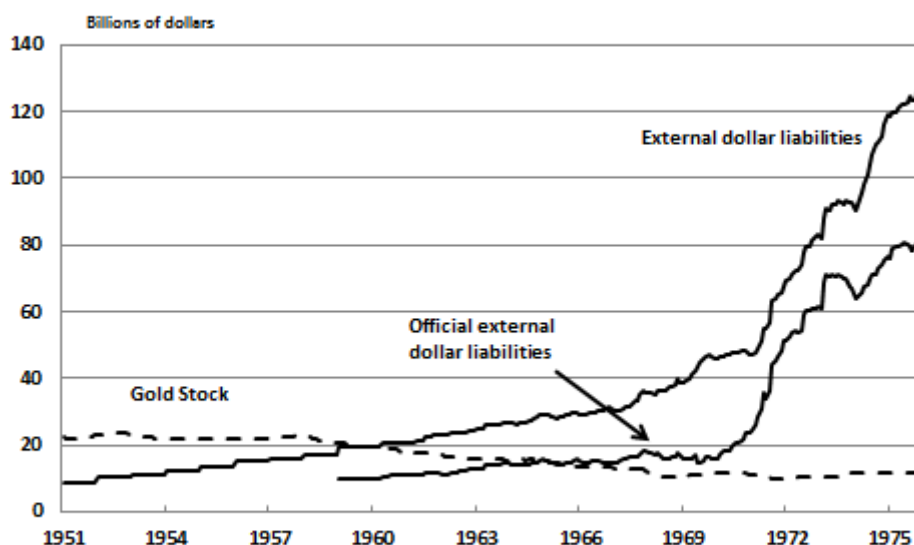
In October 1960, the price of gold in the London market rose well above the U.S. gold-export point of \$35.20 per ounce, greatly increasing incentives for central banks to exchange unwanted dollar reserves for gold with the U.S. Treasury.³ Underlying the price spike was a fear that the United States might devalue the dollar. The United States had run balance-of-payments deficits since 1950 which provided post-war Europe and Japan with needed international reserves. As a consequence, outstanding dollar liabilities to foreigners had been rapidly piling up (figure 1). In August 1960, *total* outstanding dollar liabilities began to exceed the U.S. gold stock, and by December 1965, outstanding dollar liabilities to official institutions, which could exchange them directly with the U.S. Treasury, exceeded the U.S. gold stock. The imbalance indicated that the United States could not fulfill its Bretton Woods commitment to freely exchange dollars for gold at the existing official price of \$35 per ounce (Triffin 1960).

² The U.S. Treasury has established swap lines with foreign monetary authorities on an ad hoc basis since 1936. Typically the Treasury sets up these lines with developing countries to provide short-term bridge loans in anticipation of financing from other sources.

³ Coombs (1976) provides an estimate of the U.S. gold export point.

In March 1962, the Federal Reserve (Fed) established *Reciprocal Currency Arrangements*—a network of swap lines—specifically to forestall any official run on the U.S. gold stock. A year earlier, the Exchange Stabilization Fund (ESF) of the U.S. Treasury had begun intervening in forward foreign-exchange markets to shore up confidence in the dollar. The operations were both successful and profitable, but a lack of resources severely limited the ESF’s ability to expand its operations. The Treasury, therefore, sought the Fed’s participation. The ESF’s budget was limited and subject to Congressional appropriation, but the Fed had a very elastic capacity to acquire foreign exchange. The Fed’s swap lines became the country’s first line of dollar defense.

Figure 1: U.S. Monetary Gold Stock and External Liabilities



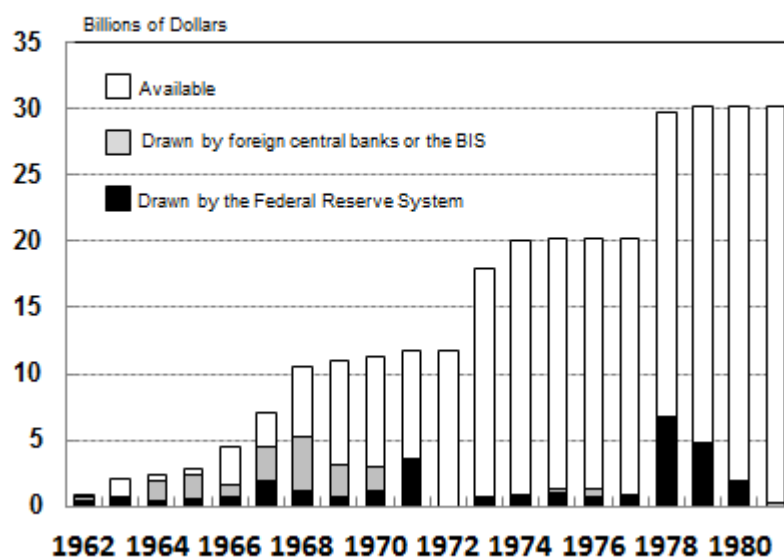
Source: Board of Governors (1976, Tables 14.1 and 15.1)

The intervention operations that followed were stopgap in nature and part of a broader set of expedient U.S. policies. In the early 1960s, U.S. authorities saw the persistent U.S. balance-of-payments deficits as stemming primarily from policies to assist post-war economic

development and to provide military security. In their view, the U.S. balance-of-payments deficits were temporary and not indicative of a fundamental disequilibrium, which might require a real dollar devaluation (Bordo and Humpage 2014).

The Fed established its first swap line with the Bank of France and quickly drew on the line to test its operation. By the end of 1962, the Fed had set up lines with the central banks of nine key countries: Austria, Belgium, Canada, England, France, Germany, Italy, the Netherlands, and Switzerland. Altogether the lines provided up to \$900 million equivalent in foreign exchange (figure 2). The network continued to grow. By the closing of the U.S. gold window in August 1971, the arrangements totaled \$11.7 billion worth of foreign exchange and encompassed 14 central banks, having picked up the central banks of Denmark, Japan, Mexico, Norway, and Sweden over the intervening years. The Fed also established two swap lines with the Bank for International Settlements (BIS), one exclusively in Swiss francs and one in any other key European currency. The FOMC rejected requests for swap lines from Ireland, primarily because that country was too small in terms of its international trade and financial dealings and from Venezuela primarily because that country was not compliant with Article VIII of the IMF Articles of Agreement on currency convertibility (Board Staff 1967; Reynold 1969).

Figure 2: Federal Reserve Swap Lines: 1962-1981



Source: Federal Reserve System

The extensiveness of the swap lines reflected their underlying objective: to forestall U.S. gold losses. Many central banks maintained dollar reserves, which under the rules of the game for Bretton Woods, were convertible on demand for the U. S. gold. From the inception of the swap lines until the closing of the gold window in 1971, the Fed drew \$11.6 billion worth of foreign exchange through the swap lines primarily to provide cover to foreign central banks for temporary, unwanted dollar exposures (table 1). By far the Fed's largest cover operations took place with the Swiss National Bank (SNB). The Swiss franc was a key safe-haven currency, and, consequently, the SNB, which attempted to maintain strict limits on the proportion of its reserves held in dollars, frequently received unwanted dollar inflows.⁴ From 1962 through 1971, the Fed drew nearly \$4.7 billion worth of Swiss francs from its swap lines with the SNB and

⁴ The dollar was the key vehicle currency. When speculators shifted funds, say, out of British pounds and into Swiss francs, they would sell pounds for dollars and dollars for francs, leaving the SNB with dollars.

from the Swiss franc line with the BIS (Task Force Paper #9 1990, 11).⁵ In a cover operation, the Fed sold the foreign exchange that it acquired through the swap to the counterparty central bank for dollars. The two sequential transactions—the spot swap of dollars for foreign currency plus the subsequent dollar purchase—left the foreign central bank holding exactly the same amount of dollars as before the operation. Now, however, the forward leg of the swap—undertaken at a known and guaranteed exchange rate—covered the foreign central bank’s dollar position. By eliminating the bank’s exchange-risk exposure, the swap blunted the foreign central bank’s need to exchange the unwanted dollars for gold (Makin 1971). In providing cover, the swaps then protected U.S. gold reserves.⁶

These operations were only intended to provide cover for temporary—that is, reversible—acquisitions of excessive dollar reserves. The underlying structure of the swap lines emphasized this short-term nature. Drawings initially had a term of three months, but could be renewed once, if both parties agreed. Banks were not to seek a second renewal, nor were they to continuously repay and re-draw on the lines. Under all circumstances, swap drawings were to terminate within a year. The U.S. monetary authorities understood that persistent dollar acquisitions reflected a fundamental disequilibrium that required gold payments or, in the limit, a real dollar depreciation. Over time, however, the term of swap drawings lengthened.

⁵ The Swiss franc line with the BIS existed to overcome Swiss laws that limited the SNB’s lending to foreign central banks. This included swap amounts.

⁶ Early central-bank swaps were usually done on a “flat” basis. The spot and forward exchange rates were equal to the rate then quoted in the spot market. The interest rates paid to the creditor country and on any balance held by the debtor country were equal and typically based on U.S. Treasury bill yields.

**TABLE 1: DRAWINGS ON THE FEDERAL RESERVES SWAP LINES:
1962 - 1971**

	Initiated by the United States		Initiated by Other Countries	
	\$ - millions	%	\$-millions	%
Austria	50	0	50	0
Belgium	1662	14	723.5	5
Canada	20	0	517.6	3
Denmark	0	0	150	1
England	835	7	8650	57
France	72	1	1155	8
Germany	1368	12	0	0
Italy	1400	12	1450	9
Japan	0	0	80	1
Mexico	0	0	0	0
Netherlands	1475	13	246.6	2
Norway	0	0	0	0
Sweden	0	0	0	0
Switzerland	3773	33	0	0
BIS (SF)	898	8	0	0
BIS (Other)	0	0	2266	15
TOTAL	11553	100.0	15289	100

Source: Federal Reserve System

Facing relatively short maturity dates on its swap drawings, the Fed quickly looked for opportunities to acquire the necessary foreign exchange to repay the swaps, but this often proved difficult. The problem arose because the FOMC precluded the Fed's foreign-exchange desk from purchasing foreign currencies that were trading above their parity values. This, however, was often the case for the currencies of those central banks acquiring unwanted dollar balances. Obtaining a currency above its parity value might push it higher and expose the Fed to a

valuation loss should the outstanding swap be at a lower exchange value. Persistent losses from its foreign-currency operations might expose the Fed to Congressional accusations of mismanagement.⁷ (Almost all of the Fed's profits accrue to the U.S. Treasury.) When the needed foreign currency was trading above its parity value, the Fed would attempt to acquire it off-market from a foreign central bank—typically the counterparty to the swap. Foreign central banks—especially the swap counterparty—were reluctant to do so, because it resulted in their holding even more unwanted, uncovered dollars. In this case the Fed often attempted to renew its swap drawing.

Ultimately, if the Fed could not pay down a swap drawing, the U.S. Treasury, which had a clearer legal mandate for foreign-exchange operations than the Fed, stepped in by offering foreign-currency-denominated certificates and, later, Roosa bonds to foreign central banks and then selling the proceeds to the Fed.⁸ The Fed used the foreign funds to pay down its swap. These operations, however, only shifted the foreign-currency debt and exposure to the U.S. Treasury's books, albeit with a longer maturity. This backstopping agreement with the Treasury resulted in frequent consultations between the Fed and Treasury officials about the operations. As the swap evolved from a short-term financial mechanism to a broader, longer-term operation, the Treasury had more at stake. This threatened the Fed's independence.

Operations to provide cover to foreign central banks persisted until the closing of the gold window in August 1971. Despite encountering frequent problems in unwinding its positions, the Fed's swap drawings often succeeded in preventing countries from converting temporary inflows

⁷ The Fed's authority for foreign-exchange operations was unclear in the 1960s and 1970s. The Monetary Control Act of 1980 gave the Fed authority to invest its foreign-exchange holdings in foreign-government securities, which implied Congressional consent for the Fed's various foreign-currency operations. On the Fed's legal authority see Todd (1992).

⁸ Roosa bonds were non-marketable foreign-currency-denominated bonds issued by the U.S. Treasury.

of unwanted dollar reserves into Treasury gold. According to Solomon (13 August 1971, 3 – 4), between 1962 and 1969, Fed swap drawings totaled \$7 billion equivalent. In general, subsequent financial outflows from foreign countries enabled the Fed to purchase foreign exchange and repay approximately three-fourths of its swap drawings. Repayments out of gold amounted to only \$186 million. The issuance of U.S. Treasury foreign-currency securities and U.S. drawings on the IMF financed the remainder. Although comparable data do not exist, between the end of 1969 and 12 August 1971, the Fed drew \$4.5 billion in foreign currencies through the swap lines. Bretton Woods had entered its crisis phase. Suggestive of the deteriorating position of the dollar, the Treasury had to finance most of the repayments through the sale of reserve assets.

Besides providing financing for cover operations, the Fed's non-Swiss-franc swap line with the BIS allowed the Fed to intervene in the Eurodollar market. Starting in 1966, the Fed occasionally acted to minimize disturbances associated with seasonal stresses, particularly if they threatened exchange-market stability, or occurred during international crises. Typically, the Fed drew on the BIS swap lines and had the BIS deposit the dollars that it received with European banks when increases in Eurodollar interest rates threatened to put downward pressures on the British pound at an unpropitious time. The Fed feared that if Britain devalued the pound, speculative pressure would turn against the dollar. Previously, the Fed had sometimes asked foreign central banks to deposit dollar reserves in the market. Although this activity is not well documented, it appears to have continued into 1973.

The Fed's swap lines were reciprocal, meaning that foreign central banks could initiate drawings on the lines when they needed temporary increases in their dollar liquidity. In this way, swaps augmented countries' official reserves without adding to the U.S. balance-of-payments deficits. Between 1962 and 1971, nine foreign central banks initiated drawings

totaling \$15.3 billion (table 1). The United Kingdom, whose currency was often under pressure to devalue, accounted for more than one-half of these drawings. By temporarily augmenting countries' reserves, swaps were supposed to prevent transitory reserve losses from encouraging speculation that might snowball. Still, the FOMC did worry that the swap lines might substitute for reserves, that is, encourage central banks to hold fewer dollar reserves than otherwise might be the case (Board Staff 1967, 4, 7).

Besides temporarily augmenting reserves, swaps also signaled cooperation among central banks as to the goal of defending the Bretton Woods parity grid. Often during the Bretton Woods era, the announcement of an increase in the available credit under a swap line proved as effective in stemming speculative sales of a deficit-country's currency as the actual use of the line. Such announcements often coincided with crises. The mere existence of the lines raised the potential cost of continued speculation against a deficit country's currency. In many years during the Bretton Woods era, a substantial amount of the available swap lines went unused, attesting to their signaling quality (figure 2).

On 15 August 1971, the Nixon administration refused to henceforth convert the dollar balances of foreign central banks into U.S. gold. This action created problems for the Fed which had recently acquired outstanding swap obligations of \$3.0 billion in U.K. pounds, German marks, Swiss francs, and Belgium francs (Task Force Paper #10, 1990, 21).⁹ Most foreign central banks did not want the Fed to buy their currencies, which were then appreciating in the foreign-exchange market, to repay the debts. They preferred instead to roll over any existing swap obligations until new parity values were established and financial flows reversed course (FOMC Memorandum, 16 November 1971, 15; Bulletin September 1971, 787). The dollar's

⁹ The U.S. Treasury had outstanding obligations of nearly \$1.8 billion (Task Force Paper #10, 1990, 21).

subsequent devaluations in December 1971, under the Smithsonian agreement, and in February 1972 failed to restore confidence in the parity system and created substantial uncertainties about outstanding swap obligations.

The swap lines included revaluation clauses that protected the country that initiated a drawing in case the creditor country revalued its currency. In such cases, the creditor country was to provide the debtor country with sufficient funds at the pre-revaluation exchange rate to extinguish the drawing. The upward drift of many currencies and the Smithsonian agreement created uncertainty as to whether, and to what extent, the dollar had been devalued or the foreign currencies had been revalued. In 1972, the position emerged that a broad-based appreciation of foreign currencies against the dollar implied a dollar devaluation (FOMC Memorandum 19 - 21 March 1973, 63). Hence the revaluation clauses did not apply and the Fed faced substantial losses on its outstanding swap obligations.

The Fed quickly paid down its outstanding German mark and British pound swaps through on- and off-market currency purchases but encountered serious difficulties extinguishing its Belgian and Swiss franc obligations. Both central banks wanted the Fed to refrain from buying their currencies, which were relatively strong at the time. The Fed was able to acquire some Belgian and Swiss francs in 1972 and 1973, but stopped at the request of the U.S. Treasury in late 1973. The Treasury did not want the Fed to make further payments on its Belgian and Swiss franc swap debts until these countries agreed to a risk-sharing agreement for the United States' outstanding, pre-1971 obligations. In the end, it took the Fed and the U.S. Treasury seven and one-half years to pay off their pre-August 1971 swap debts. The Board of Governors later estimated the losses on the Fed and Treasury swaps at \$989 million and \$1.5 billion, respectively (Task Force Paper #10 1990, 25).

2. Swaps and the Early Float

By March 1973, most of the key currencies were reluctantly floating against the dollar. At the time, monetary authorities viewed floating exchange rates as inherently prone to disorder. They seemed to believe that information inefficiencies created excessive exchange-rate volatility and often drove exchange rates away from their equilibrium values for prolonged periods. In this atmosphere, the G10 finance ministers agreed, official foreign-exchange-market interventions, particularly on the part of the United States, could provide market guidance and calm disorderly conditions.

The United States remained ambivalent about intervention, but agreed in principle to such operations.¹⁰ Holding the United States back was a lack of clear arrangements for risk sharing under the existing swap facilities (FOMC Memorandum 19 – 29 March 1973, 63 – 65). At the time, the United States held virtually no foreign-exchange reserves and would need to borrow funds for intervention through the swap lines. On 8 July 1973, as an inducement to U.S. intervention, Belgium, France, Germany, the Netherlands, and Switzerland agreed to risk sharing arrangements with the United States (Task Force Paper #9 1990, 6).¹¹ In the future, when the Fed drew on a swap line for intervention purposes, it would share any valuation profit or loss equally with the creditor central bank. The risk-sharing arrangement did not apply to foreign-central-bank drawings (Task Force paper #9 1990, 6). If a foreign central bank drew on the line, it bore the foreign-exchange risk alone. As a consequence, no G10 foreign central bank drew on the U.S. swap lines between 1973 and 1980.

¹⁰ During Bretton Woods, the United States generally viewed currency intervention as the responsibility of foreign central banks. Although the U.S. monetary authorities occasionally intervened, their only obligation was to buy and sell gold.

¹¹ Risk sharing agreements ended in December 1980. Henceforth countries drawing on the swap assumed all of the risk.

With the risk sharing settled, the Fed negotiated increases in the G10 swap lines on 10 July 1973 from \$11.6 billion to nearly \$17.8 billion and renewed its foreign-exchange intervention. Now swaps became the instrument to finance foreign-exchange interventions by substituting for U.S. foreign-exchange reserves. The Fed negotiated additional increases in the swap lines with the G10 countries to \$19.8 billion in 1974 and to \$29.4 billion in 1978 as the dollar came under intense pressures.¹²

Between 8 July 1973 and 17 April 1981, the Fed frequently bought and sold foreign exchange. Almost all of the U.S. interventions over this period were undertaken against the German mark, the linchpin of the European Exchange Rate Mechanism, and nearly 85 percent of U.S. swap drawings involved German marks. The total amount that the Fed drew on the lines was always substantially less than the amount available; the lines continued to signal cooperation among central banks and the Fed's capacity to resist speculative pressures. During this period, however, the Fed usually only intervened to offset downward pressure on the dollar in a leaning-against-the-wind fashion (Bordo, Humpage, Schwartz 2012).

Financing its intervention through the swap lines created serious operational problems. Swaps remained a short-term financing mechanism for intervention. Consequently, shortly after the Fed drew on a line to finance an intervention, it had to acquire the funds to repay the drawing. Moreover, it had to time the transactions to minimize unwanted impacts on dollar exchange rates (Adams and Henderson 1983).

Undertaking intervention in this manner, however, conflicted with the then prevailing theoretical transmission mechanism for intervention—the portfolio-balance channel. The portfolio-balance channel suggested that sterilized intervention offered central banks an

¹² These numbers exclude lines with the Bank of Mexico.

additional policy tool with which to permanently affect exchange rates while leaving their monetary policies free to pursue domestic objectives. The act of sterilizing the intervention altered the outstanding stocks of publically held government debt and, if these securities were imperfect substitutes in private portfolio, could alter the risk premiums on this debt. The risk-premium changes were manifested as changes in spot exchange rates. If the Fed, however, quickly followed a sterilized intervention to support the dollar with a sterilized purchase of foreign exchange to repay the swap, it must negate any portfolio-balance mechanism.¹³

As the volume of intervention increased in the late 1970s, the Fed's strategy of relying on swap drawings to finance intervention, instead of holding foreign-currency reserves, began to change. At the end of 1978, following massive—largely unsuccessful—interventions to support the dollar, the Fed 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.¹⁴ Most of this was in German marks. The Fed was incurring substantial losses on these drawings.

In early 1979, the FOMC considered increasing the Fed's portfolio of foreign exchange reserves largely to avoid the growing conditions that countries—notably Germany—were attempting to attach to U.S. swap drawings (Task Force paper #8, 1990, 11). The Bundesbank complained that the dollar's depreciation reflected an inappropriately easy U.S. monetary policy and worried that marks created through the swap drawings contributed to inflation in Germany. In addition, the Bundesbank wanted changes in its swap agreement, primarily the risk sharing

¹³ Although the Board of Governors discussed intervention in terms of a portfolio-balance mechanism, traders at the Federal Reserve Bank of New York's foreign-exchange desk only referred to intervention's "psychological" effect on the market. The modern expectations channels were not prominent until the early 1980s. Edison (1993), Baillie et al. (2000) and Sarno and Taylor (2001) discuss the transmission channels for sterilized intervention.

¹⁴ The Treasury issued foreign-currency-denominated Carter bonds to borrow funds for intervention. Carter bonds were marketable, whereas Roosa bonds were non-marketable.

arrangement, which forced Germany to assume one-half of the loss (Holmes and Pardee, 1978, 4). At a minimum, the Bundesbank wanted the United States to quickly finance its repayments through IMF drawings or the sale of SDRs.

In this manner, swaps allowed foreign central banks considerable influence over U.S. exchange-market operations. Largely as a consequence of Germany's threatened conditionality, after 1979, the Fed began buying foreign exchange, whenever possible, to build larger reserves of German marks and Japanese yen. Initially, the Fed used the funds so acquired to pay down its swap debts, but the Fed stopped financing its foreign-exchange interventions via swap drawings in 1980. The swap lines remained in place but neither the Fed nor any other G10 central banks—with one, brief exception—drew on them.¹⁵ By the mid-1990s, various FOMC members looked to terminate the swap lines, in part because they were outmoded, but mainly because they were a threat to the Fed's independence and, therefore, the credibility of monetary policy.

3. The Mexican Swap Line

FOMC participants always worried that if Congress viewed the Fed's use of the swap lines as an attempt to contravene its appropriation process for foreign-policy-type initiatives, it might restrict the Fed's ability to act independently. This problem, although a perennial worry, never seriously confronted the FOMC until the Mexican peso crisis of 1994 - 1995.

The Fed established a \$130 million swap line with Mexico in 1967, its only line with an emerging market economy, because of Mexico's close economic and financial ties with the United States. The FOMC increased the line over the years to \$700 million by 1979. In the 1970s, Mexico often drew down the full amount of the line to supplement its reserves for intervention purposes but regularly repaid its obligation quickly.

¹⁵ The Bank of Sweden was the last foreign central bank to draw on the line in February 1981. The Bank repaid the drawing in April 1981.

During the 1980s, the Fed augmented Mexico's swap line on two occasions explicitly to help that country deal with its international debts. The FOMC offered Mexico a special \$325 million line in August 1982 and a \$125 million line in September 1989. In 1988 and 1993, Mexico and the United States considered additional short-term borrowing facilities, including extensions of Fed swaps, but mutually terminated the initiatives (Maroni 1994). Mexico drew on these lines frequently throughout the 1980s, but had stopped drawing on the lines and paid down outstanding balances by 1991. The swap line was then valued at \$700 million.

In early 1994, after the conclusion of the North American Free Trade Agreement (NAFTA) and in anticipation of the Bank of Mexico's independence, the Mexican government requested an increase in its existing swap lines with the Fed and the U.S. Treasury. The proposal rekindled perennial debates within the FOMC about the nature and uses of swaps and their potential implications for the Fed's independence at the 22 March 1994 FOMC meeting (FOMC Transcripts 22 March 1994, 2 - 15). Chairman Greenspan, however, noted that participation in such policies with the Treasury gave the Fed influence over them. If the Fed did not participate in the enlarged swap line with Mexico, it would lose its influence over a policy that would nevertheless go forward in some form.

On 24 March 1994, fearing market turmoil following the assassination of a Mexican presidential candidate, the United States provided Mexico with a temporary increase in the Mexican swap line to \$6 billion. The Fed and the U.S. Treasury equally split their contributions. On 26 April 1994, the United States made the Mexican swap lines permanent and extended a \$2 billion swap line to Canada as part of the North American Framework Agreement (a financial counterpart to NAFTA). All lines were reciprocal, but any Mexican drawings required FOMC approval and any Mexican drawing above \$1 billion required additional collateral.

Mexico did not immediately draw on the line but continued instead to defend the peso, which was under pressure to devalue, from the Bank of Mexico's reserves. On 20 December 1994, with its reserves depleted, Mexico devalued the peso and two days later allowed it to float. The action precipitated a financial crisis. In response, both the Fed and the Treasury provided Mexico with a second temporary increase in their swap lines, bringing the combined facility to \$9 billion. The Fed's permanent swap remained at \$3 billion.

The Clinton administration asked the U.S. Congress to provide \$40 billion in loan guarantees to Mexico. When the Congress refused this request, the Treasury fell back on a previous contingency plan for providing Mexico with aid in case a Congressional refusal to pass NAFTA precipitated financial flight from Mexico. Under that arrangement, the Fed would provide Mexico with its regular \$3 billion swap line and a temporary \$3 billion swap line. Mexico could draw on these lines for a 12 month period. The Treasury promised to take the Fed out of any loan exceeding twelve months, implying that the Treasury ultimately assumed the full credit risk. At the latest, final payments were due on 31 January 1997.

In addition, however, the Treasury anticipated a \$20 billion package of loans and loan guarantees. To finance these, the Treasury asked the FOMC for a \$20 billion swap line with the Fed.¹⁶ At the time, the Treasury held \$19.5 billion worth of German marks and Japanese yen, which it intended to swap with the Fed to finance the bailout. Fed staff warned the FOMC that Treasury drawings on this line could take up to ten years to repay (FOMC Transcripts, 31 January & 1 February 1995, 59 – 75, 117 – 144).

¹⁶ These Fed-Treasury swaps are typically described as the Fed's warehousing facility, through which the Fed temporarily warehouses foreign exchange for dollars (Bordo, Humpage, Schwartz, forthcoming 2015, chapter 6)

At least four FOMC participants objected to increasing the swap lines with Mexico and especially to offering a \$20 billion swap line to the U.S. Treasury. If the situation did not represent a clear systemic risk to the U.S. financial system, they contended, the Treasury should finance the operation through the appropriations process. They primarily worried that Congress, which clearly did not favor a Mexican bailout, would view the Fed's participation, particularly the \$20 billion swap line with the Treasury, as a clear subversion of its will. Moreover, that the Fed took action seemingly under the direction of the Treasury did not speak well of its independence.

At the 28 March 1995 FOMC meeting, Federal Reserve Bank of Richmond President J. Alfred Broadus, complained about the fiscal nature of the swap with the Treasury. When the Treasury used the dollars that it obtained through its swap with the Fed, the latter sterilized the operation by selling Treasury securities from its own portfolio. The operation increased the debt held by the private sector, just as if the Treasury funded the operation by issuing debt to the private sector. The only difference, Broadus noted, was that the Fed's action kept the operation off budget. This participation in a Treasury fiscal operation threatened the Fed's independence and, one step removed, its monetary-policy credibility (Broadus and Goodfriend 1996, Goodfriend 1994, 2013). Chairman Greenspan acknowledged Broadus's concern, but justified the action as necessary because of the Fed's responsibility "to ensure the safety and soundness of the financial system" (FOMC Transcripts 28 March 1995, 5). The potential for spillovers to U.S. financial markets became the justification for the action, thereby setting a precedent for future actions to stem financial crises.

In the end, Mexico drew only \$1.5 billion on the Fed's swap line and repaid its obligation by January 1996. The Treasury never drew on its swap line with the Fed. The dissatisfaction

with the Mexican experience, however, encouraged those FOMC participants who saw swaps as anachronistic and dangerous to Fed independence to suggest their termination. On 17 November 1998, because of their long disuse, the FOMC eliminated all of its standing swap facilities with the mutual agreement of the counterparty central banks in anticipation of the adoption of the euro. The FOMC maintained its NAFA swap lines with Canada and Mexico but expressed a hope that these would soon terminate (FOMC Transcripts 17 November 1998, 34 – 36).

In the discussion that led up to the elimination of the swap lines, most FOMC participants agreed that swap lines were no longer needed for their traditional use, exchange-market intervention. Nevertheless, many favored a mechanism capable of providing emergency dollar liquidity in the event of a payments-system meltdown (Fisher, Kohn, Truman 1996, FOMC Transcripts 2 -3 July 1996, 96 – 112). The Board staff and the Federal Reserve Bank of New York recommended, with uncanny prescience, that the swap lines be modified or replaced with an alternative arrangement to “provide a mechanism whereby the Fed could provide dollar liquidity ... to foreign monetary authorities, who may in turn need to provide dollar liquidity to their banks in the event that dollar funding of their banks’ is suddenly (and unexpectedly) withdrawn” (Fisher, Kohn, Truman 1996, 8).

4. Lender of Last Resort

As the global financial crises spread in 2007, the Fed did just that. The FOMC reestablished its swap lines and provided dollar liquidity on an unprecedented scale. The Fed’s decision to finance global lender-of-last-resort operations reflected its fear that disorder in foreign money markets could spill over into the United States, thereby further complicating

monetary policy, and the Fed's perceived responsibility as issuer of the world's key international currency.¹⁷

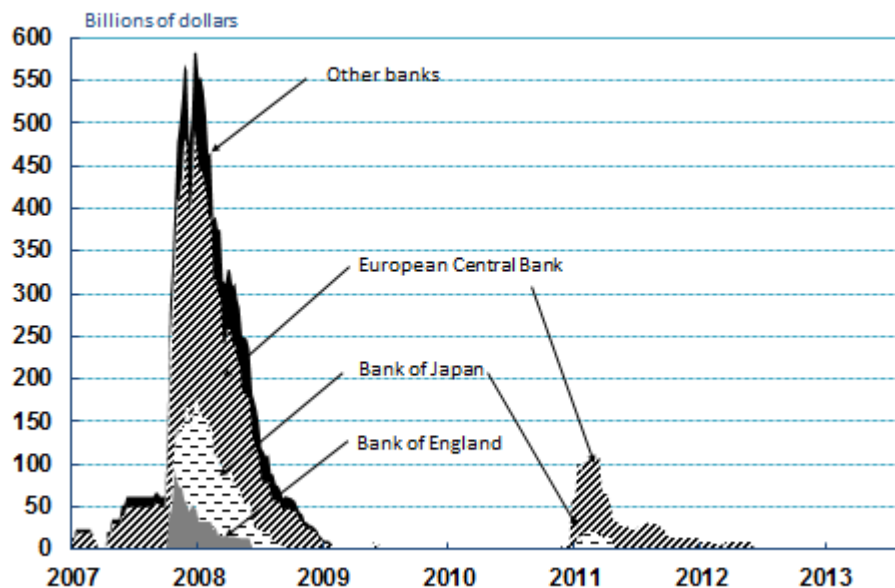
Over the past fifteen years, financial-market innovation and sustained globalization have spurred foreign banks' acquisitions of dollar-denominated assets. Banks fund these dollar positions in short-term, wholesale markets either by borrowing dollars or borrowing local currencies and converting them into dollars via foreign-exchange swaps (McQuire and von Peter 2009). The resulting maturity mismatches leave banks vulnerable to roll-over disruptions, as occurred by late 2007.

The global financial crisis that year heightened credit risks, causing dollar funding to dry up by year's end. Banks not only found it increasingly difficult to rollover their exposures, but many acquired additional dollar assets as they backstopped structured investment vehicles (Fleming and Klagge 2010). Maturity mismatches lengthened, and a severe dollar shortage emerged. U.S. branches of foreign banks that held reserves could borrow directly from the Fed, but most foreign banks could not.

On 12 December 2007, the Board of Governors established the Term Auction Facility for U.S. depository institutions, and the FOMC set up special liquidity swap lines with the European Central Bank (ECB) and the SNB. These swap lines essentially extended the Term Auction Facility's reach beyond U.S. borders by financing the term dollar funding facilities of foreign central banks (figure 4).

¹⁷ Following the 11 September 2001 terrorists' attacks, the Federal Reserve set up similar swap lines with the European Central Bank (\$50 billion) and the Bank of England (\$30 billion), and expanded its existing swap with the Bank of Canada (\$10 billion). The lines expired after 30 days (Bulletin December 2001, 761).

Figure 4: Dollar Liquidity Swaps



Source: Federal Reserve System.

As with previous central-banks swaps, parties conducted the spot and forward legs of any transaction at the same exchange rate. The ECB and the SNB drew on these swap lines initially at one or two-month terms as they extended dollar liquidity to eligible commercial banks in their jurisdictions. The loans that the ECB and the SNB made to commercial banks were collateralized, and the interest rates on dollar funds initially were equal to the lowest acceptable auction rate under the Fed's Term Auction Facility. Unlike under past swaps, the Fed held the British pounds and Swiss francs in non-interest bearing accounts in the respective foreign central banks, and the foreign central banks paid the Fed the same interest that they earned on their loans to commercial banks.

Under this arrangement, the foreign central banks acted as the lender of last resort; the Fed acted as the financier. Foreign central banks assumed all of the credit risk associated with providing dollar liquidity to foreign financial institution, since they could best assess the quality

of the financial institutions' balance sheets. The Fed did, however, face some moral hazard risks. To minimize these, the interest cost of the dollar liquidity would eventually become prohibitive as funding markets improved and risk premiums declined (see below). In addition, the swap lines remained limited, and their extensions remained uncertain.

The swap lines with the ECB and the SNB quickly increased from \$20 million and \$4 million, respectively, to \$55 million and \$12 million, respectively, just prior to the Lehman Brothers collapse on 15 September 2008. During this period the Fed sterilized the impact of its swap (and other) operations on its balance sheet, but after the Lehman Brothers collapse the Fed's balance sheet rapidly expanded.

The dollar funding problems greatly intensified following the Lehman Brothers failure, and the FOMC expanded the special liquidity swap facilities in conjunction with foreign central banks' dollar liquidity operations. By the end of 2008, the Fed offered swaps to nine central banks, and the total facility had grown from \$24 million to \$620 million. By late October 2008, the Fed eliminated the overall limit on the facilities for the Bank of England, the Bank of Japan, the ECB and the SNB, so these banks could offer "full allotments" of dollar liquidity—that is, as much as local commercial banks desired—at a fixed interest rate equal to 100 basis points over the OIS rate. As the turmoil abated in 2009 and market rates no longer exceeded the OIS rate by more than 100 basis points, central banks dollar lending facilities were no longer advantageous to financial institutions and swap drawing fell off in turn.

In October 2008, the FOMC also extended swap lines to five emerging market central banks—the Bank of Brazil, the Bank of Korea, the Bank of Mexico, the Bank of New Zealand, and the Monetary Authority of Singapore. The Fed considered these emerging market economies large enough to have significant spillover effects to the rest of the world should they

face a serious financial crisis. Aizenman and Pasricha (2010) suggest that the Fed primarily extended swap lines to those emerging market economies in which U.S. banks had a high exposure. Other emerging market countries apparently asked for similar swap lines, but broadening such access could saddle the Fed with credit risk vis-à-vis the foreign central bank and could increase moral hazard concerns.¹⁸

Some controversy arose over the extension of the swap lines to countries that held a substantial amount of reserves, like Japan and Korea. At the very onset, William Poole, the President of the Federal Reserve Bank of St. Louis, voted against establishing swap lines with the ECB and the SNB. He viewed the lines as unnecessary given the size of the dollar-denominated reserves that these institutions held (FOMC Transcripts 6 December 2007, 16, 18, 45; FOMC Transcripts 11 December 2007, 12, 14). In the end, however, most of the countries that received swap lines (in dollars or in other currencies) did not seem to hold sufficient reserves to meet the liquidity demand of the financial crisis (Moessner and Allen 2010; Obstfeld, et al. 2009).

Augmenting foreign-exchange reserves with temporary dollar liquidity, however, was not the sole purpose in extending the swap lines. As previously noted, swap lines have always had a significant impact by signaling central banks cooperation toward a goal. The financial crisis was no exception. In addition, using dollar reserves would require foreign central banks to sell U.S. Treasury securities and other dollar-denominated assets when markets were distressed. Most important, however, using reserves would not increase liquidity in the market, which became important after the Lehman Brothers collapse. Selling reserve assets would remove dollar

¹⁸ On foreign-central-bank access, see Prasad (2014, 207 – 209).

liquidity from the market and lending it would only re-inject that liquidity. Only the Fed could increase dollar liquidity. After 15 September 2008, the Fed sought to do so.

Unlike earlier swaps, the post-2007 lines were not reciprocal; the United States could not draw on them. In April 2009, the Fed established parallel swap lines with the Bank of Canada, the Bank of England, the Bank of Japan, the ECB, and the SNB that allowed the Fed to draw foreign currencies against dollars should U.S. banks experience liquidity problems in foreign currencies. The Fed never drew on these lines.

At the programs peak in December 2008, outstanding swap drawings totaled more than \$580 billion and accounted for over 25 percent of the Fed's total assets (figure 4) (Fleming and Klagge 2010, 5). The ECB, whose outstanding drawings reached \$300 billion in late 2008, was the biggest single user of the facility, followed by the Bank of Japan and the Bank of England. Although swap borrowing fell off in 2009, funding markets continued to differentiate between strong and weak financial institutions (Goldberg, et al. 2010, 19-20). After a couple of extensions, the initial swap lines expired on 1 February 2010. Brazil, Canada, New Zealand, and Singapore never drew on their swap lines. By most accounts, the swap operations successfully provided dollar liquidity and calmed markets (Goldberg, et al. 2010).

The February 2009 hiatus was short-lived. On 9 May 2010, as the European debt crisis roiled financial markets, the Fed re-established swap lines with the Bank of Canada, the Bank of England, the Bank of Japan, the ECB, and the SNB at a rate of 100 basis points over the OIS. With the exception of the Bank of Canada, which maintained a \$30 million limit, all of the other swap lines were again open-ended. On 30 November 2011, to make the facilities more attractive to commercial banks, participating central banks lowered the interest rate on dollar funding to 50 basis points over the OIS rate. In addition, the Bank of Canada, the Bank of England, the Bank

of Japan, the ECB, and the SNB extended temporary swaps to each other so that emergency liquidity was available in all of the currencies of the participating central banks. Thereafter these swap lines were periodically extended. At its 29-30 October 2013 meeting, however, the FOMC made the liquidity swap lines with the five key central banks into a standing facility, that is, available indefinitely.

5. Assessment

The Fed has used swaps for many different purposes since their inception in 1962. They initially forestalled U.S. gold losses, offering a useful stopgap, but not a fundamental solution to the situation. They next proved an ineffective way of financing U.S. foreign-exchange interventions, negating any portfolio-balance effect and exposing the Fed to conditionality. They have since evolved as a mechanism to supplement the dollar reserves of foreign governments during crises periods. They have the advantage that, unlike foreign exchange reserves, in a liquidity crisis swap drawings can increase the aggregate amount of dollar liquidity in markets. They can, if the FOMC chooses, expand the Fed's balance sheet—an important lender-of-last-resort function. Their contribution in these situations, however, has gone well beyond the quantity of funds that they have offered. Often the lines are not completely drawn down. Sometimes they are not used. A key benefit of swaps is their capacity to signal central-banks cooperation, which seems a crucial element of restoring market confidence. This aspect of swaps goes a long way to explain their recent reintroduction.

The Fed has used swaps for many different purposes since their inception in 1962, but their applications have always been controversial. Of the various controversies one has persistently reappeared: From their beginning, many FOMC participants have argued that swaps bypass the Congressional appropriations process and, therefore, represent an abuse of the Fed's

off-budget status. FOMC participants expressed this concern in 1962, when the Fed's legal authority for foreign-exchange operations was unclear, but it came to the fore most clearly with the Mexican crisis, when the Fed helped to finance a bailout after Congress refused. Swap extensions to foreign monetary authorities have often been coordinated with the U.S. Treasury and have supplemented the latter's resources. The Treasury is subject to the appropriations process. Congress, however, has never seriously challenged or constrained the Fed's swap activity on this score. They seem to accept the Fed's justification: modern uses of swaps have addressed crises that posed a systemic risk to the U.S. financial sector and, therefore, are a legitimate use of Fed policy. Still, swaps have historically often brought the Fed into the sphere of the Treasury, an association that has sometime proved uncomfortable for monetary policy.

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