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The Federal Reserve's Swap Lines: Lender of Last Resort on a Global Scale

Nathan Sheets

Edwin (Ted) Truman

Clay Lowery

RESPONDING to the GLOBAL FINANCIAL CRISIS
What We Did and Why We Did It

The Federal Reserve's Swap Lines: Lender of Last Resort on a Global Scale

Nathan Sheets, Edwin (Ted) Truman, Clay Lowery[1]

Note: The views expressed in this draft are strictly those of the author(s).

[1] Nathan Sheets served as Director, International Finance Division, Federal Reserve Board; Edwin (Ted) Truman was Counselor to Secretary Timothy F. Geithner; and Clay Lowery was Assistant Secretary for International Affairs, US Department of the Treasury. The authors thank Karen Johnson, Mike Leahy, Nellie Liang, Trish Mosser, Tracy Truman, and David Wessel for their excellent comments. George Jiranek provided expert research assistance.

Introduction

During the annual meetings of the World Bank and International Monetary Fund in October 2008, Guillermo Ortiz—the longtime and influential governor of the Bank of Mexico—approached Federal Reserve officials with an urgent request. Mexico was being hit by a double shock. First, like many of its emerging-market peers, the country was feeling the contractionary effects of the global financial crisis. Second, several large Mexican corporates, in what at the time were regarded as routine liquidity management operations, had taken sizable foreign-exchange positions against the US dollar rising in value; these firms were sustaining mounting losses as the dollar strengthened, and this threatened to further undermine confidence and trigger capital outflows. Taken together, these factors posed intense risks to Mexico's financial system and economy. Governor Ortiz indicated that Mexico would use its international reserves to respond to the immediate shock. But he made the case that concluding a dollar-liquidity swap line with the Fed would buttress confidence in Mexico's economy and provide space for the country to manage through the financial crisis.[2]

The Fed had already approved such swap lines with nine central banks, beginning with the European Central Bank (ECB) and the Swiss National Bank (SNB) in December 2007.[3] But these arrangements were with central banks in advanced economies, for which there were decades of precedent. Fed officials recognized that providing this type of swap line to Mexico amounted to crossing the Rubicon. Was the Federal Reserve moving into the rightful territory of the IMF? Would a swap line with an emerging-market counterparty entail a higher level of risk to the Fed than the FOMC—or Congress—might be comfortable with? On the other hand, Mexico and other well-managed emerging-market economies were feeling powerful effects from disruptions in developed-country financial markets, and these contagion effects were manifesting themselves in extraordinary ways, including sharply higher interest rates on international borrowing, reduced access to short-term financing, and weaker demand for exports. Moreover, the Fed had a long history of fostering a close relationship with its Mexican counterpart.

Fed policymakers were forced to make difficult judgments as they sought to balance their explicit domestic mandate, the constraints of historical precedent, and their commitment to the stability of the global financial system as the issuer of the world's premier reserve currency. The key connection between these considerations was inescapable evidence that, without Fed action, disruptions abroad would feed back into the US economy. The swap line program—with developed and developing countries alike—reflected the Fed's efforts to balance these considerations.

The Fed's international crisis-fighting efforts extended beyond its swap lines. It participated actively in the G-20, the G-7, meetings at the Bank for International Settlements, and global regulatory bodies. In addition, the Federal Reserve's monetary

[2] "Big Currency Bets Backfire: Huge Losses from Dollar's Gains Surface at Companies in the Developing World," *Wall Street Journal*, October 22, 2008. "Meeting of the Federal Open Market Committee on October 28-29, 2008," 39-40.

[3] The Federal Reserve did have a $3 billion swap line with Mexico under the North American Framework Agreement (NAFA), but the dollar-liquidity lines that had been introduced over the previous year were much larger and, as we will argue, better suited for the difficulties at hand.

policy actions and domestic crisis-response efforts had important international implications, which it sought to manage and explain. The Fed also worked closely with the US Treasury on issues regarding the dollar. But the swap lines were a core part of the Fed's international response and, arguably, its most effective and important initiative in that sphere.

In addition to the substantial provision of dollar liquidity, the swap lines gave central banks a powerful—and very visible—mechanism for working together. Fed officials took pains to coordinate their communication with foreign central banks. Efforts were made to adopt common language in describing the dollar-liquidity problems that were faced and the policy actions that were put in place. In addition, these measures were typically announced in parallel by all participating central banks. This common communication, which emphasized the determination of central banks to work together to resolve the crisis, was a second important channel through which the swap lines helped soothe stresses in global markets.

I. What Was Done and Why?

The story of the swap lines divides neatly into three segments: first, the ramping up of the program—from the approval of the first lines to the collapse of Lehman (December 2007 to mid-September 2008); second, the intense crisis-fighting phase (after the collapse of Lehman); and third, distinct but related, swap lines with the central banks of four major emerging market countries.

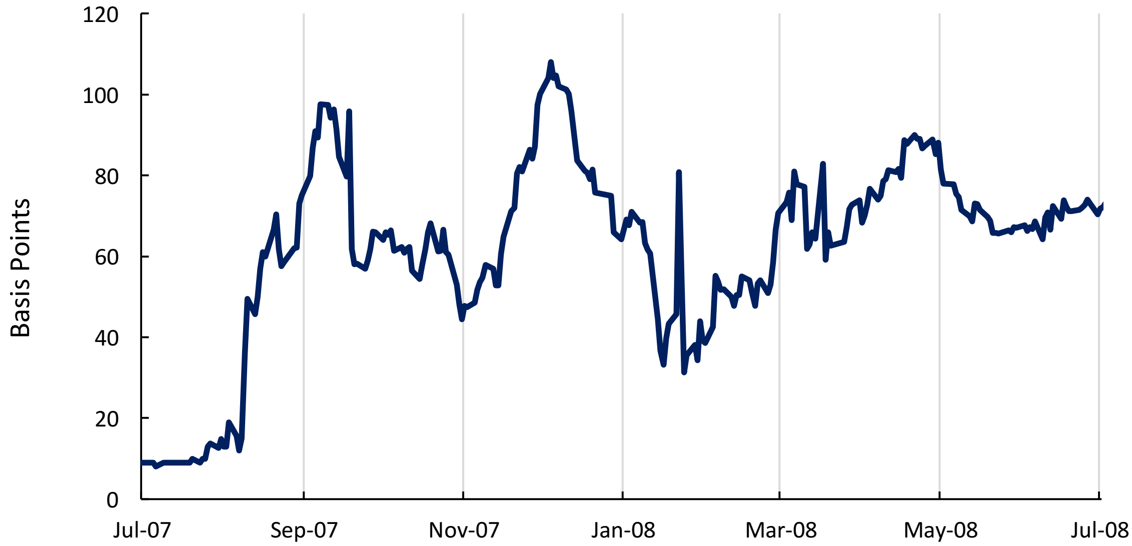
Ramping Up the Program

As the financial crisis erupted in the summer of the 2007, dollar funding markets tightened significantly. As shown in the upper panel of Figure 1, the 3-month Libor-OIS spread[4] shot up during the summer, retreated some during the fall, and then rose again through late November and early December. Roughly in parallel, foreign exchange swap markets tightened as well. These developments had unwelcome implications for US institutions as they struggled to obtain financing, but the effects were even more severe for many foreign institutions (especially European), which were highly reliant on wholesale funding markets to finance their dollar-based activities. These funding stresses, in turn, prompted a scramble for dollars in US markets.

[4] Libor-OIS spreads—a measure of the cost of short-term wholesale borrowing for banking firms—are an important metric of confidence in the banking system.

Figure 1: Three-Month Dollar LIBOR-OIS Spread

July 2007–July 2008



July 2007–February 2010

Sources: Reuters and ICE.

One concrete result of these stresses, of great concern to the Fed, was increased volatility in the fed funds market, the inter-bank lending rate that the Fed manages as its key policy tool. (See chapter on classic lender of last resort programs and chapter on monetary policy.) European institutions had difficulty borrowing dollars early in their trading day and piled into the fed funds market as it opened. This caused the funds rate to surge, only to fall sharply in the afternoon after the European trading-day ended. These intra-day dynamics created meaningful challenges for the Federal Reserve Bank of New York (FRBNY) desk as it sought to control the funds rate and maintain the FOMC's target. In addition, foreign banks' efforts to raise dollar funding were prompting them to sell mortgages and other assets, which contributed to market pressures more generally. Some of these foreign institutions had access to the Fed's discount window, but many others did not or held collateral mainly in their home jurisdictions.

In early December 2007, the FOMC considered a staff proposal to establish a swap line with the ECB, in tandem with opening the Term Auction Facility (TAF), under which the Fed auctioned fixed amounts of term discount window credit to eligible borrowers. Chairman Bernanke framed the relevant considerations:

> There is a problem with dollar funding in Europe. There is a shortage there early in the day, which often leads the funds rate to open high. It creates problems for our monetary policy implementation. It creates problems in other markets, like the foreign exchange swap market. We have believed for some time that it would be helpful if the ECB would enter a swap agreement with us to use the dollars to address some of those needs. . . [T]he ECB, which met today, came back to us and said that . . . they would be interested in a swap arrangement that would give them dollars as part of this overall effort to improve liquidity in dollar term funding markets.[5]

In response to these stresses, the FOMC on December 6, 2007, approved a $20 billion swap line with the ECB and, within days, a $4 billion line with the SNB. The size of these lines subsequently grew. By the time of Lehman's collapse on September 15, 2008, they allowed total draws of $55 billion by the ECB and $12 billion by the SNB.

The Intense Crisis-Fighting Phase

Following the collapse of Lehman, the global funding situation became significantly more severe. In response, the Fed moved in rapid-fire succession to expand the swap program:

- On September 18, the Bank of Japan (BoJ), the Bank of England (BoE), and the Bank of Canada (BoC) were added as counterparties.
- On September 24, the central banks of Australia, Sweden, Norway, and Denmark were added.

[5] "Conference Call of the Federal Open Market Committee on December 6, 2007," 13-14.

- The drawing capacity on the lines was ramped up substantially further on September 29, to allow a total of $620 billion dollars.
- Most consequentially, on October 13-14, the Fed announced that the caps on the swap lines with the ECB, BoE, SNB, and BoJ would be removed, allowing these central banks to supply as many dollars as their banks demanded.[6]
- New Zealand was added as the tenth advanced economy on October 28.

The rationale for these extraordinary moves was the cascading of financial stresses after Lehman's failure. At an FOMC conference call on September 29, Bill Dudley (then the head of the NY Fed's markets desk) described many of these strains. He noted further substantial upward pressures on dollar LIBOR-OIS spreads (including the 3-month spreads shown in the lower panel of Figure 1) and a generalized withdrawal of institutions from term lending. In addition, severe financial pressures at US and foreign institutions were increasingly evident. He then observed:

> Obviously, things are breaking, even with all the tools that we've rolled out. So I think that just suggests that more force needs to be applied. Clearly, confidence in the markets is extraordinarily poor and fragile, and that's another reason that an escalation in the [swap lines] is important—to reassure people that the central banks are prepared to be there, if necessary.[7]

Following the decision to greatly expand the program, drawings under the swap lines grew dramatically (Figure 2). Amounts outstanding increased from $62 billion in mid-September 2008 to $500 billion by the end of October. The borrowing under the lines peaked in mid-December at more than $580 billion. Of these drawings, the ECB accounted for more than $310 billion, the BoJ for more than $125 billion, the BoE for $50 billion, and the SNB for $16 billion.

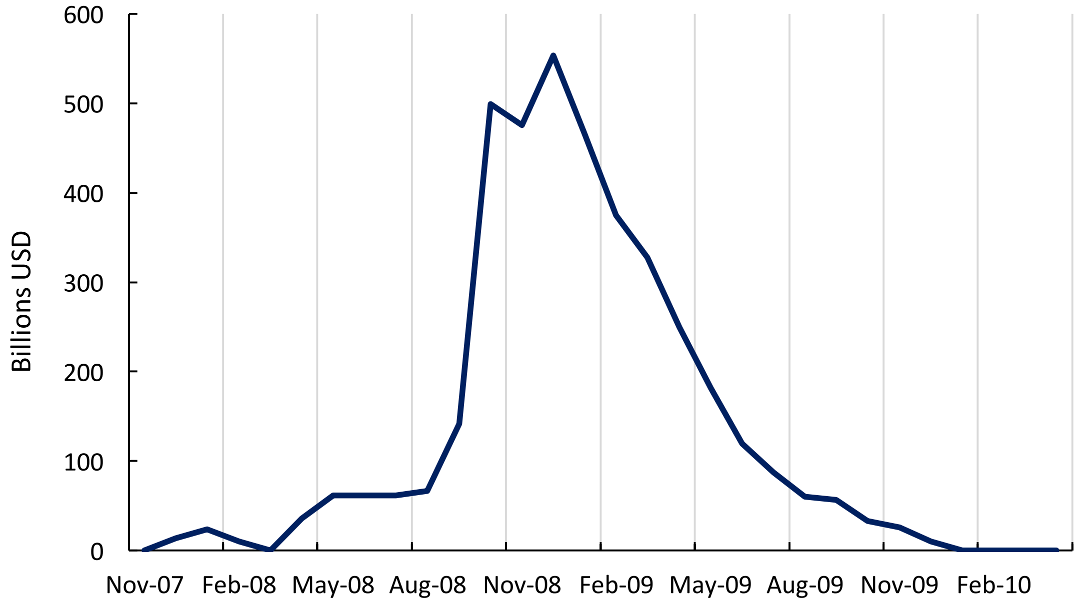
Thereafter, the drawings under the lines fell off almost as sharply during the first half of 2009 as they had risen in the previous months, reflecting the initial stages of healing in global financial conditions. These lines were subsequently closed on February 1, 2010.[8]

[6] In early October 2008, Congress gave the Federal Reserve authority to pay interest on excess reserves. This gave the Fed increased scope to expand its balance sheet while still maintaining a target for the federal funds rate.

[7] "Conference Call of the Federal Open Market Committee on September 29, 2008," 7.

[8] The program was soon reinstated, however, in response to the intensifying European crisis. In May 2010, the Fed announced liquidity swap lines with the ECB, BoE, SNB, BoJ, and Bank of Canada. These swap lines were made permanent in 2013.

Figure 2: Federal Reserve Swaps Outstanding, End of Month



Source: Board of Governors of the Federal Reserve System.

Emerging-Market Swap Lines

As the financial crisis proliferated, powerful contagion effects swept many emerging-market economies, including some major countries that had track records of disciplined economic management. This was a key motivation for establishment of the swap lines with Mexico, Brazil, Korea, and Singapore approved by the FOMC in late-October 2008, each for $30 billion. In introducing this proposal to the FOMC, Nathan Sheets—then director of the Board's division of International Finance—noted:

> [T]hese economies have generally pursued prudent policies in recent years, resulting in low inflation and roughly balanced current account and fiscal positions or, in the case of Singapore, sizable surpluses. Accordingly, the stresses that these countries are feeling seem largely to reflect financial contagion effects from the advanced economies. . .[9]

Thus, the core rationale for these lines was two-fold. The first was the general seizing up of financial conditions that motivated the swaps with the advanced countries. Second, while for many of the advanced economies, the crisis in large measure reflected failures in their own efforts to adequately manage and supervise risk, these emerging-market countries were innocent bystanders to a much greater extent.

[9] "Meeting of the Federal Open Market Committee on October 28-29, 2008," 10.

Another consideration that motivated the Fed's efforts was crisply articulated by Timothy Geithner, then the president of the NYFRB, during the Committee's deliberation on the emerging-market swap line proposal:

> The privilege of being the reserve currency of the world comes with some burdens. Not that we have an obligation in this sense, but we have an interest in helping these guys mitigate the problems that they face. . . We have the same basic interest that led us to be responsive to the European need in some cases.[10]

This observation was a core rationale for the overall swap line program. The financial crisis entailed an unprecedented seizing up of global dollar-funding markets. Responding to these disruptions fell almost unavoidably to the Fed, as the issuer of the world's leading reserve currency. Only the Fed could issue dollars in sufficient quantity to defuse the intensifying funding stresses.

In the event, the emerging-market lines left a comparatively small imprint on the Fed's balance sheet. Only the line with Korea was actively used, with Korea's drawings peaking at just over $16 billion during the first quarter of 2009. Mexico made one precautionary drawing on its line, of $3.2 billion, in April 2009. Brazil and Singapore did not tap their lines.

II. How Were the Swap Lines Structured?

Swaps lines have a long history in central banking. They were used in previous generations to fund intervention in foreign-exchange markets or to provide bridge financing to countries during times of stress.[11] The Fed's use of swap lines during the crisis pushed that into new territory by using them to relieve dollar-funding stresses in the global financial system.[12]

The structure of the swap lines is as follows: The Federal Reserve and the foreign central bank exchange dollars for foreign currency at the prevailing market exchange rate. The two parties contractually agree to reverse the transaction at some point in the future, varying from 1-day to 90-days, at the same exchange rate.

The foreign central bank, in turn, lends this dollar liquidity through a variety of mechanisms and against many different types of collateral (including both dollar-denominated and foreign-currency denominated instruments). Given differences across

[10] "Meeting of the Federal Open Market Committee on October 28-29, 2008," 21.

[11] See, for example Owen Humpage and Michael Shenk, "Swap Lines," October 8, 2008, Federal Reserve Bank of Cleveland.

[12] An early precedent for this was the use of swap lines in the aftermath of the terrorist attacks on September 11, 2001. In that episode, the Fed established swap lines to backstop the functioning of financial markets. These lines were used only by the ECB, however, and were closed after one month. (See Fleming and Klagge, "The Federal Reserve's Foreign Exchange Swap Lines," *Current Issues*, April 2010.)

economies, the Fed typically deferred to foreign central banks as to how the dollars would be most effectively supplied within their jurisdictions. Indeed, the fact that the delivery mechanisms could differ somewhat from economy to economy, and over time, gave the structure flexibility and resilience. The Fed, however, broadly expected that the liquidity would be allocated in a transparent way through a market-based mechanism.[13] To this end, the Fed retained meaningful control of the swap lines. For example, even after the caps on some of the swap lines were abolished, the Fed retained the right to approve use of the lines on a drawing-by-drawing basis.

This structure had numerous advantages for the Fed. First, the lines entailed essentially zero risk to the Fed's balance sheet. The Fed was transacting at short tenure with foreign central banks, the safest possible counterparties. There was no foreign exchange risk because the exchange rate for unwinding the swap was predetermined. And the transaction was effectively collateralized by the foreign currency that the Fed received in exchange for the dollars.[14] Second, as noted, the Fed's counterparty in the transaction was the foreign central bank, not the institutions that ultimately received the dollars. This structure served to minimize the Fed's exposure to credit risk, but more importantly, it acknowledged the jurisdiction-specific expertise of the foreign central banks. At an ECB conference in November 2008, Chairman Bernanke noted:

> Under swap agreements, the responsibility for allocating foreign-currency liquidity within a jurisdiction lies with the domestic central bank. This arrangement makes use of the fact that the domestic central bank is best positioned to understand the mechanics and special features of its own country's financial and payments systems and, because of its existing relationships with domestic financial institutions, can best assess the strength of each institution and its needs for foreign-currency liquidity. The domestic central bank is also typically best informed about the quality of the collateral offered by potential borrowers.[15]

Another notable feature of the swap lines was that the foreign central bank paid interest to the Fed, typically at 100 basis points over the OIS rate, on the dollars that it received. From the time of the initial establishment of the swap lines in December 2007, the precedent was for the foreign central bank to pass back to the Fed all its earnings from dollar auctions. This reflected the ECB's preference early in the crisis to be merely a pass-through agent in helping the Fed extinguish dollar-funding stresses. The ECB initially sought to strike a posture that it was merely supporting the Fed's efforts to counter US-centric and dollar-centric stresses, rather than embracing its role as the

[13] As a notable exception to this general rule, the Federal Reserve allowed the Swiss National bank to draw on its swap line in size to purchase commercial bank assets. (See, for example, "Monetary Policy Alternatives (Bluebook)," Federal Reserve, October 23, 2008.)

[14] Steven Kamin, "The European Economic and Financial Situation," Testimony before the Subcommittee on Domestic Monetary Policy and Technology, Committee on Financial Services, US House of Representatives, March 27, 2012.

[15] "Policy Coordination among Central Banks," November 14, 2008.

Fed's full partner in fighting a crisis that was centered in the United States but that had truly global dimensions.[16]

The Fed did not pay interest on the foreign currency that it received in the swap. The Fed, however, did agree to leave the foreign currency with its counterpart central bank; this sidestepped monetary control issues that might have bedeviled the foreign central bank if the Fed had withdrawn the reserves and lent them in the market.[17] This structure meant that the swap line program generated income for the Fed throughout its existence.[18]

Finally, the emerging-market swap lines incorporated additional governance mechanisms to ensure that the resources were used to fight dollar-liquidity stresses as intended and to protect the Fed's balance sheet. All drawings under the lines required the approval of the FOMC's Foreign Currency Subcommittee (which included the Chairman). Transparency requirements were more demanding than in the lines with the advanced economies, and the Fed had broad "set-off rights." This allowed the Fed, in the event of a central bank's default, to seize any of its assets held in custody by the Federal Reserve Bank of New York.[19]

III. What Other Approaches Were Considered?

At each step in the evolution of the swap line program, the FOMC and the Fed staff considered a range of possible options. These debates were particularly vigorous at two key decision points. The first, in December 2007, was focused on the advisability of initially establishing the lines. The second was in late-October 2008, when the swap lines with the four emerging-market central banks were proposed. In each case, these were existential debates about the advisability of approving a *qualitatively* new type of swap line—first with the advanced economies and then with the emerging markets.[20]

At the time of the FOMC's swap-line discussion in December 2007, the main alternative was to reject the swap lines and to ask afflicted countries to liquefy their international reserves. The view was that being able to respond in times of stress is

[16] This divergence in perspective between the Federal Reserve and the ECB manifested itself in July of 2008 when the ECB moved to hike its policy interest rate, out of concern over inflation and essentially declaring the financial crisis over.

[17] More specifically, the legal contract for the dollar-liquidity swaps *required* the Fed to hold the foreign currency at the counterpart central bank. For this reason, in April 2009, the FOMC put in place "reciprocal" liquidity swap lines with the ECB, BoE, SNB, and BoJ that would allow the Fed to provide US institutions with foreign-currency liquidity in the event of funding disruptions abroad. These lines, however, were never drawn upon.

[18] The structure of the swap lines is concisely laid out in Federal Reserve, "Frequently Asked Questions: US Dollar and Foreign Currency Liquidity Swaps," at www.federalreserve.gov/.

[19] These and related issues are discussed in detail by the FOMC in "Meeting of the Federal Open Market Committee on October 28-29, 2008," 10-44.

[20] In contrast, given the exigencies of the crisis, the expansion of the number of swap lines—i.e., the increase in advanced-economy counterparties from two to ten—and the significant easing of drawing limits elicited little debate within the FOMC. Further, the broad structure of swap-line transactions was also uncontroversial. Their structure was generally judged to provide ample protections to the Fed's balance sheet, even in late 2008 when drawings under the lines grew dramatically, while also offering enough flexibility to allow dollar-liquidity to reach pressure points in the global system.

exactly why countries hold international reserves—the insurance motive. In addition, some argued that Fed action could stoke moral hazard, inducing policy complacency at foreign central banks in the future. Another concern was that the swap lines might be interpreted by the markets as over-reacting and would thus reinforce, rather than soothe, the mounting stresses.[21]

These arguments were ultimately about the depth of the stresses that were being faced. In response to shocks of limited size, foreign central banks can legitimately be expected to utilize their own resources. But the escalation of the global financial crisis meant that the actions considered in December 2007 were at least an order of magnitude too small. The ECB's borrowing under the swap lines ultimately far outstripped its reserve holdings.[22] The other central banks could have, perhaps, provided the necessary dollar financing by liquefying their own reserves (i.e., their borrowings under the lines were less than their international reserves). But this observation raises salient questions about whether it is advisable during episodes of extreme stress to send foreign centrals banks *en masse* into the Treasury market to sell securities.[23] Might this be destabilizing to the market? Long historical experience highlights that sustained reserve depletion can undercut market confidence regarding a country's prospects and fuel adverse, non-linear feedback loops and spillovers. In addition, this would have involved no expansion in the overall availability of dollar liquidity. As a result, the tensions in dollar-funding markets and the foreign-exchange markets (both spot and swaps) would have been even more severe.

In an FOMC discussion nearly two years after the first swaps were established, Janet Yellen, then President of the San Francisco Fed, aptly summarized these issues:

> I think the distinction here is similar to the old one between inside and outside money. The reserves that [foreign economies] hold are equivalent to inside money. When they sell dollar reserves in a crisis situation to provide liquidity to their banks, it is a propagation mechanism for causing exchange rate movements and international transmission of the disturbances that they are suffering. In contrast, when we provide liquidity, we are printing money. We are adding to the stock of outside money, and we circumvent those repercussions. So, in a crisis, the dynamics aren't the same. There is a good reason to have this kind of facility.[24]

Two other drawbacks of asking countries to rely exclusively on their foreign exchange reserves are also notable. First, this would have given countries even greater motivation in the years after the crisis to amass huge war chests of reserves, which often

[21] At this time, Congressional criticism of the swap lines was muted, but such criticism intensified over time as the borrowings increased. See, for example, Chairman Bernanke's colloquy with Representative Grayson on July 21, 2009 https://www.youtube.com/watch?v=n0NYBTkE1yQ .

[22] The foreign-currency reserve holdings of the Euro-system (i.e., the ECB plus the national central banks) totaled roughly $200 billion. The ECB's borrowings under the swap lines, as noted above, peaked at more than $310 billion.

[23] Notably, beyond those economies with unlimited lines, some central banks also mobilized their reserves by lending them to domestic institutions in need of dollars.

[24] "Meeting of the Federal Open Market Committee on November 3-4, 2009," 51.

involves repressing domestic demand to run sustained current account surpluses. Second, this approach would have foregone an important opportunity for central banks to cooperate. As noted above, a clear lesson from the crisis is that this cooperation—beyond just the dollar-funding that was provided by the swap lines—had a powerful effect in calming market stresses.

Another alternative to the swap lines that was debated in the early stages of the crisis was for the Fed to lend against cross-border collateral, which would be held in custody and certified by foreign central banks. Some of this collateral would have been denominated in dollars, but much of it would have been in foreign currencies.

This framework, however, would have been much more challenging for the Fed to administer. First, the Fed would need to determine the creditworthiness of foreign commercial banks, likely including many institutions with which it otherwise had little interaction.[25] Second, even with foreign central bank certification, the Fed would still be lending against collateral about which it was deeply unfamiliar, as well as managing the possible foreign-exchange exposure of the collateral. Third, lending to these private institutions would have gone directly onto the Fed's balance sheet, which is a much riskier proposition than exposures to foreign central banks.

A second consequential decision point for the swap lines program was the late-October 2008 debate about the advisability of swap lines with emerging-market central banks. This aspect of the program remains the most controversial and, in certain respects, the most ambitious of all the Fed's international programs. In the FOMC's discussions, a strong view was that with or without the swap lines, these countries should continue to rely heavily on their own international reserves to negotiate the crisis, with the lines serving mainly as a backstop. The FOMC's discussion focused on whether the swap lines could usefully augment their reserves and, more important, whether agreement on swap lines would send a supportive message regarding the economic and financial sustainability of not only the specific countries receiving the swap lines but also emerging-market economies more generally.

The two principal alternatives that were considered were, first, to advise these countries to go to the IMF and, second, to establish a special repurchase facility, which would allow them to smoothly liquefy their US Treasury holdings as necessary.[26]

On the first option, the IMF had long been the world's crisis-fighting institution, with a focus on programs to support the economic and financial stability of its emerging-market-economy members. In proposing the program, Fed staff argued that "meeting the

[25] The Federal Reserve did lend to many foreign institutions from its discount window and other facilities (see English and Mosser chapter on classic LoLR programs and Logan, Nason and Parkinson chapter on "novel" LoLR programs), but these were institutions that were operating in the United States, which allowed the Fed some insights into their operations. In addition, these institutions posted dollar collateral that was familiar to the Federal Reserve.

[26] During the financial crisis, some observers, such as Truman, suggested that the Federal Reserve create a swap line with the IMF; the Fund, in turn, would lend the dollar liquidity to emerging markets. However, this structure would have required explicit authorization from Congress. See Edwin Truman, "On What Terms is the IMF Worth Funding?" Peterson Institute for International Economics Working Paper, 08-11.

potential liquidity needs of these large countries would strain the available resources of the Fund." Thus, by "taking off the IMF's hands some of the largest potential liquidity needs . . . [this allows the IMF] to focus on a whole range of additional countries."[27] The Fed's efforts were thus seen as "broadly complementary" to those of the IMF.[28] The staff further argued that "given the strength of their policies, [these countries] no longer view themselves as clients of the Fund and would prefer to go it alone rather than seek IMF support."

A related point was that when the negotiations on the emerging-market lines first commenced, the IMF did not have a fast-disbursing liquidity instrument that would be appropriate for top-tier emerging-market economies. After the IMF was apprised that Fed lines for a group of emerging market economies would be forthcoming, it moved at exceptionally rapid speed to create such a facility.

During the FOMC discussion of the emerging-market lines, Chairman Bernanke commented on the new IMF facility:

> There has been some discussion back and forth about the relationship between [Federal Reserve emerging-market swap lines] . . . and the IMF facility. I had a conversation this morning with Dominique Strauss-Kahn, the head of the IMF, and we agreed that the two facilities are complementary—that ours would provide important additional resources to the total availability of liquid resources for these countries.[29]

Historical counterfactuals are speculative at best, but a case can be made that if the Fed had not been poised to announce its swap lines, the IMF would have continued to lag in its deliberations on a liquidity facility. That said, a related argument was that the Fed might have found a way to formally incorporate the IMF into the structure of the lines. For example, the swap lines could have required that the countries be subject to heightened IMF surveillance during the period when the lines were outstanding or be required to seek an IMF program if they could not repay on time. The counter-argument was that this was unnecessary as a practical matter given the countries' strong economic policies, the fact that the lines were designed to be used as a backstop during episodes of acute stress, and the short tenure of the drawings. If the quality of policies began to slip, the Fed could quickly reduce the pace of its lending by denying additional access to the line, given that each drawing had to be approved.

Moreover, a powerful feature of these swap lines was that they were in most respects comparable in their structure to the lines that had been approved for the central banks of

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[27] As discussed in the other international chapter, the G-20 Heads of State agreed in the spring of 2009 to substantially increase the resources available to the IMF. But at the time, the Federal Reserve's commitment of potentially $120 billion in short-term liquidity assistance to these four countries freed up the IMF's balance sheet to make loans to a broader set of members. At the outbreak of the crisis, the IMF had only $250 billion in usable resources to lend.

[28] See "Meeting of the Federal Open Market Committee on October 28-29, 2008," 10, 11, and 37.

[29] "Meeting of the Federal Open Market Committee on October 28-29, 2008," 16. The Fed's press release announcing the emerging-market swap lines welcomed the IMF's new facility. However, in the end, the facility attracted no borrowers; its policy conditions, though light, and the perceived stigma of borrowing from the IMF deterred potential users.

the advanced countries. This was intended as a confidence-inducing signal of the rising importance and maturity of these countries in the global economy. As a corollary, there was a further expectation that by bolstering confidence in these four economies, this would create positive synergies and spillovers for the emerging-market economies more generally. Involving the IMF would have blunted the symmetry of the lines and their attractiveness to these central banks.

A second option that was considered during this debate was the creation of a repo facility that emerging-market economies could use to liquefy their holdings of US Treasuries. This would have entailed incrementally less risk to the Fed's balance sheet, since the counterpart collateral would have been US Treasuries. But there were also drawbacks to this approach: it would have offered a less potent backstop than the swap lines and would have lacked the psychological advantage for emerging market countries of echoing the advanced economies' swap line program.

The "boundary problem" was a closely related issue that the FOMC wrestled with. Specifically, which countries should be granted swap lines? Wherever a line for inclusion is drawn, there is some other country that is close to meeting the indicated standard. With this in mind, the staff advanced several criteria for recommending the four countries. First, each had significant economic and financial mass. Singapore was a global financial center, and the other three had GDPs of around $1 trillion. Second, these countries had pursued disciplined economic policies in recent years and were being adversely affected by global contagion. Third, there was good reason to believe that the swap lines would be helpful in defusing the pressures and risks that these countries faced.

As part of its deliberations in formulating these lines, the Fed consulted the US Treasury and the State Department. Bernanke reported to the FOMC on these conversations:

> I spoke to Secretaries Paulson and Rice about this. There was an interesting confluence of agreement that, if you are going to do this, these are the right four countries and we probably shouldn't do more, both from an economic perspective and a diplomatic perspective in the sense that these are the countries that among the emerging markets are the most important from a financial and economic point of view.[30]

While the FOMC found these arguments generally persuasive (the vote on the emerging-market lines was unanimous), Donald Kohn, the vice-chairman of the Federal Reserve Board at the time, later recalled that this program put the FOMC in the "uncomfortable" position of being an "arbiter of the soundness of other countries' policies, the liquidity requirements of their banks, and their systemic importance." He further noted that the FOMC always stays abreast of global developments but that this program "raised the required knowledge and judgment to a very much higher and more detailed level."[31] For this reason, the FOMC made clear in its deliberations that the bar

[30] "Meeting of the Federal Open Market Committee on October 28-29, 2008," 16.
[31] Donald Kohn, "The Fed's Role in the International Crisis," Brookings, September 18, 2014.

for additional emerging-market swap lines was high. In the event, the program was never expanded, notwithstanding inquiries from other potential central-bank partners.[32]

IV. Were the Swap Lines Effective?

The general assessment of observers—including domestic and foreign policymakers, analysts, and academics—is that the swap lines were effective. This conclusion rests on several observations:

- As highlighted in Figure 2, borrowing under the swap lines ran up sharply during the height of the crisis, satisfying the exploding demand for dollar funding in a smooth and orderly way. The counterfactual of how the system would have adjusted without the swap lines is grim at best to contemplate.
- Outstanding drawings under the swap lines fell off during the first half of 2009 almost as sharply as they had risen the previous fall. This pattern suggests that the swap lines successfully functioned as a classical lender-of-last-resort backstop. The liquidity was attractive during a time of stress, but it quickly became unattractive—and the drawings were unwound—once the system began to heal. In particular, the pricing of the available liquidity—typically 100 basis points over OIS—seems to have been sufficient to contain any risk of moral hazard.[33,34]
- Borrowing under the swap lines was unwound and interest paid to the Fed according to contractual terms. The combination of financial protections built into the lines and the Fed's caution in choosing central bank counterparties successfully protected its resources.

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[32] For example, on October 28-29, the FOMC discussed an approach by Iceland that had been turned down and other potential applicants mentioned were Chile, India and South Africa. The names of other countries that had approached the Federal Reserve were redacted from the FOMC transcript. See "Meeting of the Federal Open Market Committee on October 28-29, 2008," 33, 17 and 29, and 30 and 32, respectively. Eswar Prasad reports that Chile, Indonesia, Peru, and the Dominican Republic sought swap lines unsuccessfully. See "Dollar Trap," 200-209.

[33] The swap lines were typically priced at higher rates than the Federal Reserve's domestic lending through its discount window. At the height of the crisis, the narrative that foreign institutions were paying more on their swap line borrowings was politically appealing. But this pricing structure also created some challenges in 2009 as the financial system began to heal. The difference in pricing incentivized some foreign institutions to quickly unwind their swap line borrowings with their home central banks, while they continued to rely on discount loans from the Fed's window. This observation underscores the importance of coordinating pricing across facilities and adjusting it as necessary; see English and Mosser chapter.

[34] In November 2011, at the height of the European debt crisis, the Fed and the ECB agreed to reduce the pricing of the swap lines to 50 basis points over OIS. In those later circumstances, the view was that the previous pricing, 100 basis points over OIS, was too stringent and was creating stigma and constraining borrowing that would be beneficial for the overall stability of the system. This experience highlights that appropriate pricing may vary from episode to episode, depending on the severity of the shock and the strength of the banking system. (See ECB, "Experience with Foreign Currency Liquidity-Providing Central Bank Swap, *Monthly Bulletin*, August 2014, 78-79.)

- The swap lines provided the central banks with a platform for coordinated action and underscored their determination to work together. Over and above the liquidity provided by the lines, this coordination sent a soothing message to the markets. This appears to be particularly true for the emerging-market counterparties, principally Korea, for which the swap lines were pivotal in restoring confidence.
- In real time, central bankers judged that the swap lines provided a constructive backstop for dollar funding markets. This is seen in the significant demand for these arrangements during the crisis and their rapid reinstatement in response to the intensifying European crisis in 2010.

The thrust of these observations is consistent with the findings of academic studies. In an extensive empirical analysis, Allen and Moessner (2010) concluded that "the swap lines provided by the Federal Reserve were very effective in relieving US dollar liquidity stresses and stresses in the foreign exchange markets, so that the Fed's objectives were substantially met." Even so, their detailed econometric work identifies evidence of a "substantial narrowing" in money-market premiums only after the "establishment of unlimited swap lines on 13 October 2008."[35] This finding suggests that the early stages of the program were not at sufficient scale to address the intensifying dollar-funding stresses. Baba and Packer (2009) find results broadly echoing those of Allen and Moessner.[36] Similarly, Goldberg, Kennedy, and Miu (2010) observe that the existing academic work on this topic is generally "supportive of a role played by the dollar swap facilities on affecting financial variables."[37]

Empirical work assessing the effectiveness of the swap lines with the emerging-market economies is more limited. One challenge is that only Korea drew meaningfully on its line, so for the other three countries the measurable impact is largely limited to an announcement effect. Aizenman and Pasricha (2009) study exactly this issue. They find that CDS spreads of the four countries that "received the swap arrangements fell when these arrangements were announced." They also find, however, that the CDS spreads of other emerging markets fell during that period as well, albeit by less, and that emerging market CDS spreads "had already started declining before the swap arrangements were announced." One interpretation of these results is that the swap lines did not significantly help the four recipients relative to other emerging-market economies. But another interpretation is that the announcement of the swap lines provided a generalized boost to confidence across the entirety of the emerging-market complex.[38]

As for Korea's experience drawing on swap line resources, the evidence is clearer. Aizenman, Jinjarek, and Park (2011) observe:

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[35] William Allen and Richhild Moessner, "Central Bank Cooperation and International Liquidity in the Financial Crisis of 2008-9," BIS Working Papers, No. 310, May 2010.
[36] Naohiko Baba and Frank Packer, "From Turmoil to Crisis: Dislocations in the FX Swap Market Before and After the Failure of Lehman Brothers," BIS Working Papers, No. 285, July 2009.
[37] Linda Goldberg, Craig Kennedy, and Jason Miu, "Central Bank Dollar Swap Lines and Overseas Dollar Funding Costs," NBER Working Paper Series, No. 15763, February 2010.
[38] Joshua Aizenman and Gurnain Pasricha, "Selective Swap Arrangements and the Global Financial Crisis: Analysis and Interpretation," NBER Working Paper, No. 14821, March 2009.

> Korea regained a measure of financial market stability only after the BoK entered into a $30 billion swap agreement with the US Fed. . . . A simplified overall picture of the Korean experience is as follows: a country with an ample pool of reserves tries to defend its currency with massive but ineffective FX market intervention, and is ultimately rescued by swap agreements.[39]

In related work, Baba and Shim (2011) find that the Bank of Korea's (BoK's) US dollar loans funded by drawings on its Fed swap line successfully reduced tensions in the foreign exchange swap market, while loans funded from its own reserves did not. Baba and Shim further hypothesize that that this disparity reflected that "auctions funded by the Fed swap line effectively added to Korea's foreign reserves." In contrast, liquidity provided from official reserves correspondingly reduced the BoK's capacity to cover short-term foreign-currency debt if the situation deteriorated further.[40]

V. Conclusions and Lessons for the Future

The initial phases of the swap line program were no doubt helpful and constructive. But *only after the program was implemented in size did it have its most powerful effects*. In judging its effectiveness, one must bear in mind several practical constraints that the Fed faced at the time.

- First, the Fed and other central banks had very limited experience with swaps lines in the context of dollar-funding shortages. Both the Fed and its counterparties were learning and gaining experience with this tool in real time.
- Second, it's difficult to know ahead of time exactly how large a crisis-fighting program should be. That said, *during a financial crisis, the safest course and, ultimately, the most efficient course is often one that promptly brings overwhelming financial force into play*. For the swap lines, this meant moving to uncap the lines with major central banks. Rather than just seeking to meet estimated dollar funding needs, the central banks made clear that they would work together to supply whatever demand for dollar liquidity existed.
- Third, the Fed initially faced binding balance sheet constraints that limited its ability to enlarge the swap lines. Congress' approval of interest on excess reserves enhanced the Fed's flexibility to aggressively address the mounting dollar-funding stresses while also maintaining its target for the federal funds rate. This highlights that throughout the course of 2008 the Fed was amassing the tools and experience that would allow it to respond with vigor to the stresses that emerged after Lehman.

[39] Joshua Aizenman, Yothin Jinjarek, and Donghyun Park, "Evaluating Asian Swap Arrangements," Asian Development Bank Institute Working Paper Series, No. 297, July 2011.
[40] Naohiko Baba and Ilhyock Shim, "Dislocations in the Won-Dollar Swap Markets during the Crisis of 2007-09," BIS Working Papers, No. 344, April 2011.

In the end, the swaps program represented an important example of the burdens and benefits of acting as an international lender of last resort during the financial crisis. As the issuer of the world's premier reserve currency, the Fed carried some "burdens"—to use Tim Geithner's term—and it discharged its responsibilities to the global system with creativity and vigor. Of great importance, however, was that the Fed generally viewed itself as acting in the enlightened self-interest of the United States. First and foremost, the Fed was seeking to satisfy its statutory dual mandate, which is domestically focused, and to facilitate stability in US markets. When the 2008 FOMC transcripts were released to the public in early 2014, one commentator trenchantly observed:

> What [the transcripts] show is that the US policy makers are very narrowly focused on US interests, and their actions are not so much determined by any moral obligation to save the world economy, but rather a clear self-interest in preserving US economic interests.[41]

Particularly during times of stress, international economic leadership imposes demands on the Federal Reserve. But those very demands enhance the ability of the Federal Reserve to foster the economic and financial interests of the United States. This was clearly the case during the crisis. The Fed's international activities stretched the institution in some new and uncomfortable ways. The scope of the Fed's programs provided enormous support to countries abroad. But the Fed's efforts were constructed in ways that ensured they did not pose undue risks to its balance sheet or its reputation, and by helping soothe global stresses they contributed substantially to more rapid economic and financial healing in the United States as well.

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[41] Eswar Prasad, as quoted in "Fed's Aid in 2008 Crisis Stretched Worldwide," *The New York Times*, February 23, 2014.