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U.S. Intervention**

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The United States all but abandoned its foreign-exchange-market intervention operations in late 1995, when they proved corrosive to the credibility of the Federal Reserve's commitment to price stability. We view this decision as the culmination of the evolution of U.S. monetary policy over the past century from a gold standard to a fiat money regime. The abandonment of intervention was necessary to secure monetary policy credibility.

Keywords: Trilemma, central-bank independence, intervention, monetary policy, swap lines, warehousing.

JEL classification: F3, N1, N2.

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## Lessons from the Evolution of U.S. Monetary and Intervention Policies

“There is no evidence, nor does anybody here [in the FOMC] believe that there is any evidence, to confirm that sterilized intervention does anything.”

Alan Greenspan, *FOMC Transcripts*, 3 October 2000, p. 14

The twentieth century witnessed a transition from a gold standard to a fiat-money-cum-floating-exchange-rate regime, as policy makers in the advanced economies came to grips with the fundamental trilemma of formulating monetary policy in an open economy: Countries cannot simultaneously stabilize their exchange rates, participate fully in financial globalization, and pursue an independently chosen inflation objective. The foreign-exchange-market interventions of the floating-exchange-rate era were the tailings of this transition—a residue of gold standard eras that initially promised to relieve the trilemma by encouraging exchange-rate stability while maintaining monetary independence, but eventually proved corrosive to the credibility of monetary policy in a fiat regime. When that became apparent, the United States abandoned its active intervention policy.

### *The Trilemma and Monetary Evolution*

At the start of the twentieth century, monetary authorities operated under the classical gold standard—a solution to the trilemma that eschewed independent monetary policies in favor of fixed exchange rates and free cross-border financial flows. Instead of targeting domestic objectives, they effectively focused monetary policy on maintaining fixed exchange rates. Countries set an official price of gold, promised to buy and sell unlimited quantities of the metal, and allowed private individuals to import or export gold freely. Official gold prices defined exchange-rate parities, and arbitrage contained exchange rates within gold export and import points. The bank notes and the national currencies that circulated were convertible into gold.

By limiting monetary authorities’ discretion, the classical gold standard anchored expectations about the long-run purchasing power of money. Still, monetary authorities could exercise some discretion within the gold points to influence market exchange rates, and whenever gold movements threatened the banking sector or the domestic economy in general, authorities as far back as Nicholas Biddle undertook gold devices, proto-foreign-exchange interventions, and monetary-policy actions to affect gold flows. Although monetary authorities exercised some discretion in the short term, preserving convertibility remained their overarching, long-term objective.

World War I ended the classical gold standard and monetary authorities’ near singular focus on maintaining fixed exchange rates. To be sure, the subsequent gold-exchange standard remained a strong commitment to fixed exchange rates, but not one for which countries would long sacrifice internal economic conditions. Additional policy objectives, however, required additional independent instruments. When necessary, countries sterilized gold flows, erected trade barriers, and intervened in the gold and foreign-exchange markets. Between 1924 and 1931, the Federal Reserve—in close cooperation with foreign central banks—was heavily involved in various types of exchange-market operations, including gold purchases and sales, the extension of foreign central-bank credits, and foreign-exchange interventions.

The Great Depression pushed many foreign countries—notably the United Kingdom in 1931—off of the gold standard and forced policy makers to focus on domestic policy goals. Trade restraints, competitive depreciations, and other beggar-thy-neighbor policies ran rampant. When it abandoned gold, the United Kingdom set up the Exchange Equalization Account, a mechanism for intervening in foreign-exchange markets. Fearing that Britain might attempt to manipulate exchange rates for its competitive advantage, the United States established its own Exchange Stabilization Fund. (The United States had also devalued the dollar, but aside for a brief hiatus between April 1933 and January 1934, remained committed to the gold standard.) The ESF was the first formal U.S. institution set up specifically for intervention, previous arrangements, such as those undertaken in WWI, were makeshift. When a dollar exchange rate moved to a gold point, as happened relative to the French franc, or moved by a substantial amount, as happened vis-à-vis the British pound, the ESF typically bought or sold gold instead of foreign exchange. The 1936, Tripartite Agreement between France, the United Kingdom, and the United States emphasized and promoted cooperation in these intervention operations. ESF remained active through 1939.

Between 1934 and the outbreak of World War II, the United States still viewed its exchange-market operations as augmenting the gold-exchange standard. The interventions over this period may have promoted short-term exchange-rate stability, but they did not address fundamental misalignments among currencies. They did not solve the trilemma. World War II with its exchange controls and disruptions ended the problems that the Great Depression posed for exchange markets.

The unwillingness to constrain U.S. monetary policy to the rigors of fixed exchange rates proceeded throughout the Bretton Woods era. Under the Bretton Woods agreement, the United States pegged the dollar to gold, and other countries pegged their currencies to the dollar. Countries could, however, adjust exchange rates to fundamental disequilibria. The Federal Reserve System focused monetary policy almost exclusively on domestic economic objectives, and left other countries, which cared equally about their own domestic conditions, with the burden of defending their currencies. The Federal Reserve and the U.S. Treasury took steps to protect the U.S. gold stock and to help other countries defend their parities, but these actions did not address fundamental problems. In the early 1970s, countries began allowing their currencies to float against the dollar. Floating exchange rates solved the trilemma problem in favor of free cross-border financial flows and monetary-policy independence. Still, countries attempted to manipulate exchange rates through intervention. They feared that informational inefficiencies made foreign exchange rates excessively volatile and prone to substantial deviations from fundamental values. It took U.S. policymakers another twenty years to appreciate that intervention did not provide a way around the trilemma—a way to systematically affect exchange rates without interfering with domestic policy objectives.

### ***Sterilized Intervention and Monetary Policy Credibility***

The institutional arrangements and operating mechanisms adopted under the Bretton Woods system—along with attitudes about the inherent instability of the foreign-exchange markets—carried forward into the floating exchange-rate era. Initially economic theory suggested that sterilized intervention offered a mechanism through which to affect exchange rates independent of the domestic goals for monetary policy. It offered a solution to the trilemma. As time went by, however, clear evidence of sterilized intervention's effectiveness seemed scarce. Instead, sterilized intervention increasingly seemed a hindrance to monetary

policy. Because the Federal Reserve System lacked a clear legislative mandate for price stability, its credibility with respect to that goal was fragile. Intervention and the associated institutional arrangements for intervention in the United States seemed to threaten that credibility. The problem was three-fold: First, in the United States, the Federal Reserve was subservient to the U.S. Treasury with respect to exchange-market operations. Second, to have anything other than a fleeting effect on exchange rates, an appropriate change in monetary policy needed to accompany a sterilized intervention. Could then the Treasury by directing intervention operations influence—or even appear to influence—monetary policy? Third, the institutional arrangements for intervention often involve the System in operations that appeared to contravene the Congressional appropriations process. Might a jealous Congress retaliate and circumscribe the System’s independence? These concerns, which germinated in 1961, came to full fruition thirty years later.

*~ Independent Within, Not Of, Government*

By early 1961, U.S. dollar liabilities to the rest of the world exceeded the U.S. gold stock, implying that the United States could not fulfill its pledge to freely exchange dollars for gold at the existing official price. This deficiency encouraged foreign central banks to convert unwanted dollar reserves into gold and raised uncertainty about the Bretton Woods parity structure. To dampen growing speculation in gold and foreign-exchange markets, the Exchange Stabilization Fund began intervening for the first time since 1939. By and large, the ESF undertook forward sales of key European currencies, hoping to lower the forward premia at which they traded against the dollar. These first few operations seemed an unmitigated—and profitable—success, but they were only an opening salvo. The fundamental flaws in the Bretton Woods system were becoming increasingly apparent.

The ESF lacked the foreign-exchange reserves necessary to mount a protracted dollar defense and turned to the Federal Reserve System, whose participation could greatly increase the funding for such operations. To Chairman William McChesney Martin participation was imperative. Martin hoped to reassert the FOMC’s dormant influence in this area, and he may have even wanted to bring the entire function into the Federal Reserve’s domain. Martin understood that the Treasury was primarily responsible for foreign-exchange operations in the United States and that the System must coordinate all such actions with the Treasury, but Martin did not think that the relationship threatened the System’s independence. He viewed the Federal Reserve as independence within—not of—government. Martin’s distinction implied that the System must cooperate with the Treasury as far as possible, particularly in governmental actions that did not directly interfere with monetary-policy decisions. At the time, intervention seemed like just such an action since the System could sterilize any unwanted effects on the monetary base.

While most FOMC participants accepted the Chairman’s direction on this matter, some were decidedly unenthusiastic. Their primary concern was Congress, whose opinion about Federal Reserve intervention in foreign-exchange markets had never been unequivocal. In 1933, Senator Glass, whom many regarded as the father of the Federal Reserve Act, admonished the Federal Reserve Bank of New York for foreign-exchange transactions that it had undertaken in the late 1920s. Glass suggested—and the Board of Governors agreed—that such “stabilization operations” were inconsistent with the Federal Reserve Act. The next year, Congress with strong direction from the Roosevelt administration, passed the Gold Reserve Act, which established the Exchange Stabilization Fund and appropriated resources to the new agency specifically for the

purpose of intervening in the foreign-exchange market. Now, some FOMC participants wondered if this Congressional action precluded the System from such operations.

In 1961, however, the Board of Governor's general council, Howard Hackley, offered a new legal interpretation of the Federal Reserve Act that supported intervention. Hackley argued that various sections of the Act, when considered together, did indeed authorize the Federal Reserve to hold foreign exchange, to intervene in both the spot and forward markets, to engage in swap transactions with foreign central banks, and to warehouse foreign currencies for the U.S. Treasury.

Hackley's interpretation won the day. To be sure, a clear majority of FOMC participants have always favored the System's foreign-exchange operations, but two concerns surfaced immediately and would reappear over the years in various guises. First, some FOMC participants worried that the System's involvement would raise Congressional ire. Congress had explicitly established and funded the Exchange Stabilization Fund for the purpose of intervention, and the agency also engaged in foreign lending. Congress might view the System's participation as a circumvention of their rightful appropriations process. Second, some FOMC participants feared that the arrangements could threaten System independence. In 1961, their concerns focused on pressures to intervene, but over the next twenty years this concern would eventually morph into a fear of losing monetary-policy credibility.

The Federal Reserve subsequently undertook direct interventions in both the spot and foreign exchange markets often in concert with the Treasury. In keeping with the key U.S. objective of protecting the U.S. gold stock, however, the System generally focused on two types of swap operations instead of direct foreign-exchange interventions. The System often drew on its swap lines to provide central banks in surplus countries with cover for temporary, unwanted dollar balances. Absent this cover, these central banks would quickly exchange these dollars for U.S. gold. In addition, the System often used swap drawings to provide central banks in deficit countries with temporary dollar liquidity when they faced reversible shortages of foreign-exchange reserves. Ideally these operations raised the costs of speculation against specific currencies and neutralized potential contagion effects.

Temporary was the operative term for all System operations. Because of its clearer legal authority for intervention, the Treasury undertook operations of a longer-term nature. These included backstopping the System when market conditions prevented the System from promptly reversing a swap drawing. The arrangement, however, would give the Treasury an unwanted voice in how the System reversed those swaps after Bretton Woods collapsed.

The swap transactions and sterilized interventions of the Bretton Woods era confronted two critical and interrelated problems: First, governments had difficulty distinguishing between temporary, reversible disturbances, against which these policies worked admirably well, and more fundamental adjustment problems, against which these policies offered no remedy. In the latter cases, these policies seemed only to delay necessary adjustments and to worsen the situation. Second, they were—along with myriad other arrangements of the period—a tactic to buy time. They did not provide governments a way around the fundamental trilemma—a way to pursue domestic policies under fixed exchange rates with free cross-border financial flows. Consequently, in August 1971, the United States closed its gold window, and in March 1973, generalized floating commenced.

*~ Does Sterilized Intervention Do Anything?*

The heightened speculation, large international imbalances, and excessive worldwide liquidity of early 1970s made fixed exchange rates unworkable. Few, however, believed that an international monetary system based on floating exchange rates was sustainable. Many feared that the uncertainties inherent to floating rates would discourage international trade and investment, and would provoke the same disruptive policies—protectionism and competitive depreciations—that characterized the 1930s. (Nixon, after all, imposed import surcharges when he closed the gold window.) Some even contemplated a complete breakdown of international monetary cooperation and financial order.

Although monetary authorities soon grew comfortable with floating exchange rates, they continued to view the market as inherently prone to bouts of disorder. Information imperfections could cause exchange rates to deviate from their fundamental values, create excessive volatility, and foster destabilizing speculation. Under such conditions, an official presence—particularly on the part of the United States—could help direct exchange rates along a path consistent with fundamentals and could do so with lower volatility than would otherwise be the case.

Yet, the FOMC never clearly explained how intervention might accomplish this task. In the 1970s, many economists—including the Board staff—believed that intervention worked through a portfolio-balance channel, which allowed central banks to affect exchange rates independent of their domestic objectives. The Foreign Exchange Desk, however, never described intervention in these terms. Instead the Desk viewed intervention as having a psychological effect on the market that came about because the intervention expressed an official concern for exchange rates. Neither of these transmission mechanisms, however, seemed to inform their early operations. The Desk, which then focused on preventing dollar depreciations, typically undertook small sales of foreign exchange executed via a commercial-bank correspondent in the brokers' market. This maintained the Desk's anonymity. The Desk, which was intervening without Treasury participation, favored this stealth approach because it feared that speculators might quickly bet against, and overwhelm, the operations. In all this anonymity, however, where was the official expression of concern? Moreover, because the System drew on swap lines to finance its sales of foreign exchange, the Desk had to quickly reverse course to repay the swap. Hence, any portfolio effect quickly disappeared.

Between 1977 and 1979, market conditions changed for the worse. Monetary policy was excessively easy, confidence in the Federal Reserve quickly evaporated, and, as it did, the dollar sharply depreciated. The United States began a more forceful dollar defense. The U.S. Treasury began to intervene in the exchange market in concert with the System and often announced specific operations. In addition, the Desk now frequently intervened directly with commercial banks, rather than through a broker. The United States, however, still relied heavily on swap drawings to finance its interventions. As an expression of displeasure with the Federal Reserve's inflationary policies, Germany threatened to attach macroeconomic conditions to further swap drawings. On 6 October 1979, the FOMC announced major monetary-policy changes designed to stop inflation and regain credibility.

Still the dollar did not begin a sustained appreciation—despite the sterilized intervention and the initial policy changes—until late 1980. By that time, the Federal Reserve had demonstrated its commitment to disinflation despite the onset of recession and growing unemployment. A tight monetary policy and, after 1981, a loose fiscal policy propelled the



dollar on a sustained appreciation through early 1985. The heavy interventions since 1977 seemed to have had little effect, except to occasionally limit the extent of the dollar depreciation.

Consequently, by late February 1981, the United State had all but stopped intervening. The Reagan administration explained that the dollar's depreciation since 1973 had primarily reflected America's relatively high rate of inflation—a fundamental that sterilized intervention did not address. If anything, sterilized intervention may have interfered with monetary policy. Since 1979, the Desk had been attempting to acquire a portfolio of foreign exchange—as protection against future conditions on swap drawings—while the FOMC was attempting to tighten policy. Such operations seemed at cross purposes. Moreover, exchange markets had evolved since 1973, and the presumption that the Desk possessed an information advantage over the market now seemed passé.

The Reagan administration's position on intervention—in conjunction with the dollar's persistent appreciation—culminated in the first multinational study of intervention. The resulting Jurgensen (1983) report was by and large ineffectual, but it did reach one conclusion that would reverberate within the FOMC and that would eventually become a focal point for arguments against interventions. The Report stated that in the face of persistent market pressures, sterilized intervention was ineffective and that “supportive” domestic monetary-policy changes were necessary. By the time of the Jurgensen report, the leading paradigm for intervention—the portfolio-balance channel—was losing ground to the signaling mechanism, whereby sterilized intervention was useful as a signal of unanticipated future changes in monetary policies. If the Jurgensen conclusion and this new transmission mechanism were true, sterilized intervention did not provide monetary authorities with a way around the trilemma.

~ *Credibility, and Independence.*

Despite the equivocal support for sterilized intervention, the United States returned to the markets in force in 1985. As the dollar appreciated, U.S. policymakers were coming under intense pressure from businesses, academic economists, and foreign officials to intervene again in the foreign-exchange market. The Federal Reserve, concerned that the prolonged dollar appreciation might bring pressure for monetary ease and thus might undermine its ongoing inflation fight, thought that sterilized intervention might buy it some cover. The interventions that began in the mid-1980s and continued through the early 1990s were often part of an international attempt at macroeconomic policy coordination, which the U.S. Treasury negotiated among its G5 counterparts. The evidence that these interventions—and not the monetary-policy changes that sometimes accompanied them—systematically affected exchange rates never was compelling.

Still, most FOMC participants seemed willing to defer to the Desk's opinion about the need and effectiveness of sterilized intervention until the operations started to interfere with monetary policy. In the late 1980s, the FOMC was tightening monetary policy, trying to stem a rise in inflation, and hoping to consolidate hard-won gains in its credibility. The Desk, under strong pressure from the U.S. Treasury, was buying huge amounts of German marks and Japanese yen and warehousing large positions for the Treasury. The perennial concerns about intervention arose anew, but now focused on monetary-policy credibility.

The Federal Reserve Bank of Richmond (1994, 1995) articulated the fear: Sterilized intervention and the institutions associated with intervention damaged the Federal Reserve's credibility, because Congress had never statutorily mandated price stability as the Fed's sole—or

even chief—policy goal. The System’s credibility with respect to price stability was purely reputation based. Such credibility is hard to acquire and is inherently fragile. Central bank independence—keeping the System free of political influence—is the *sine qua non* of reputation-based credibility.

The FOMC’s objections to intervention became three-fold: First, although legally independent, the Federal Reserve had little choice but to participate with the U.S. Treasury in major foreign-exchange operations. If it did not contribute, Congress or the administration might accuse the System of undermining a legitimate government operation. Second, FOMC participants—echoing the Jurgensen Report—feared that if markets interpreted sterilized intervention as a signal of future monetary-policy changes, the operations would create uncertainty about the System’s commitment to price stability. This concern was particularly critical given the Treasury’s authority over intervention in the United States and given that the dollar often appreciated when the System tightened monetary policy. Third, the operations to offset dollar appreciations and the warehousing of Treasury funds left the System holding foreign currency assets on its books. Foreign-exchange losses could lead Congress to accuse the System of mismanagement or, in the case of warehousing, of interfering with the appropriations process. Such criticisms could lead to policies that might impinge on the System’s independence.

By 1995, these arguments and a growing uncertainty about sterilized intervention’s worth had convinced U.S. monetary authorities to revert to a minimalist approach. Since August 1995, the United States has intervened on only three occasions. Some FOMC participants now took aim at the institutional arrangements for intervention—swap lines and the warehousing facility. The Mexican financial crisis in 1995 aided their efforts.

When the Mexican crisis hit, Congress refused a Clinton administration request for Mexican loan guarantees. Instead, the U.S. Treasury embarked on an existing contingency plan that presumed heavy Federal Reserve involvement. The System would increase its existing swap lines with Mexico and would augment them with additional temporary swap lines to that country. To help fund any bailout, the Treasury asked the System to warehouse up to \$20 billion in German marks and Japanese yen—a huge amount that could take a decade to unwind. The FOMC authorized the increase, but to many FOMC participants, such involvement seemed a clear circumvention of Congress’s appropriation process. In the end, the Treasury never warehoused foreign currencies with the System, and Mexico quickly repaid its swap drawing to the System. Largely in response to this incident, the FOMC eliminated the then existing swap lines, lowered the limit of warehousing, and has since never warehoused funds for the U.S. Treasury.

### ***Lessons***

This history has described the evolution of foreign-exchange operations in the United States primarily from the perspective of the Federal Reserve System. We have explained how solutions to the fundamental trilemma of international finance changed during the twentieth century and how policy makers in the large developed economies came to favor monetary policy independence, financial globalization, and floating exchange rates. We have described exchange-market policies—from gold devices to sterilized interventions—as attempts to avoid the trilemma at least in the short run. Finally, we explained how the United States ended its

active intervention policy largely because it threatened the Federal Reserve's credibility with respect to achieving price stability.

While many other key central banks followed suite, exchange-rate policy—specifically foreign-exchange-market intervention—remains a viable option for monetary authorities worldwide. In the current gloomy economic environment, with threats of “currency wars” being tossed around, the U.S. experience with intervention suggests a few general conclusions, which may now have wider relevance:

Sterilized foreign-exchange-market intervention does not affect fundamental determinants of exchange rates and, therefore, does not afford monetary authorities a means of *systematically* affecting exchange rates independent of their domestic monetary-policy objectives. Moreover, the *persistent* use of sterilized intervention may interfere with the conduct of good monetary policy if it creates uncertainty about the willingness and ability of a central bank to meet its domestic policy objectives, specifically price stability. Intervention may create uncertainty especially when it attempts to ameliorate exchange-rate movements that are themselves a response to monetary-policy initiatives, as happened in the United States during the early 1980s and often between 1987 and 1995. Such intervention may inappropriately suggest that policy will soon change, which must destroy credibility about domestic-policy objectives.

This concern about effects of intervention on central-bank credibility is especially relevant to independent central banks whose fiscal authorities have primary control over foreign-exchange intervention. The U.S. experience shows that even central banks with well established histories of independence find it extremely difficult to avoid participating in such operations. The public often identifies central banks with intervention, even those conducted by fiscal authorities, because central banks, acting as their government's fiscal agent, execute the transactions and manage the countries' reserve positions. More importantly, when a central bank refuses to intervene in concert with its country's fiscal authority, it opens itself to criticism that its refusal sabotaged a legitimate government operation, should that operation fail. This may encourage officials to curtail the central bank's independence. To alleviate this problem, countries might place responsibility for foreign-exchange intervention solely within their central banks.

These concerns about the systematic use of foreign-exchange intervention do not mean that such operations are entirely ineffective or inappropriate, but their ability to affect exchange rates seems more of a hit-or-miss proposition than a sure bet. Among foreign-exchange-market participants information is costly and asymmetrically distributed. In such a market, any trader with superior information can conceivably affect price, if the market can observe his or her trades. Central banks may be just such traders. They have large staffs that gather and analyze data, and they maintain ongoing information relationships with major trading banks. By our estimates, however, roughly 60% of all U.S. intervention between 1973 and 1997 were successful—a number that is not different than random. This overall count masked two distinctive outcomes. First, U.S. sales or purchases of foreign exchange did not have value as a forecast that the dollar would shortly appreciate or depreciate.<sup>1</sup> Second, U.S. interventions did have value as a prediction that near-term exchange-rate movements would moderate, but less than one in four operations were successful on this score. These numbers suggest that U.S. policy makers do not *routinely* have an informational advantage over private market participants. Still, policy makers may occasionally confront periods of extreme market disorder where their actions prove successful. These should be rare events.

Moreover, a central bank might undertake such occasional interventions without damaging its credibility. As the history of the gold standard suggests, a credible central bank can occasionally deviate from its primary objective without damaging its reputation, when market participants understand that it will soon revert to its original goal. Similarly, a central bank with a sound reputation for price stability might intervene sometimes. To best protect its credibility, such a central bank should not attempt to offset exchange-rate movements that result from, or are at least consistent with, its own monetary policies. A central bank that is tightening monetary policy in pursuit of price stability, for example, should not simultaneously undertake a sterilized intervention to dampen the appreciation of its currency. Moreover, as previously suggested, such a central bank should avoid responding at the direction of a fiscal authority.

The United States, to the best of our knowledge, has not employed nonsterilized intervention during the Bretton Woods period or since the inception of generalized floating.<sup>2</sup> When engaging in nonsterilized intervention, a central bank executes open-market operations via foreign exchange. The transactions affect bank reserves and the monetary base. Nonsterilized intervention is tantamount to introducing an exchange-rate target into a central bank's reaction function, and has the potential of introducing conflict between policy goals. If, for example, the underlying shock to the exchange market is domestic in origin and monetary in nature, no conflict exists, but nonsterilized intervention is wholly redundant to normal open-market operations. If, however, the shock to the exchange rate is foreign in origin or nonmonetary in nature, nonsterilized intervention will interfere with the domestic objectives of policy. This conflict and the United States primary focus on domestic policy objectives may explain its reluctance to undertake nonsterilized intervention.

In the current economic crisis, with the policy options of many central banks constrained by short-term interest rates at or near the zero bound, the purchase of foreign exchange may provide a means of undertaking quantitative easing. Even though the effects on exchange rates of nonsterilized intervention should be similar to the effects of operations through other asset types, nonsterilized intervention may evoke complaints of beggar-thy-neighbor actions. Consequently, central banks might only use this mechanism if long-term government securities are close substitutes for short-term government securities or, along with other eligible assets, in short supply.<sup>3</sup>

We have based these conclusions on an analysis of U.S. exchange market policies during the twentieth century and, as noted, primarily from the perspective of the Federal Reserve System. While we offer them as lessons on intervention in general, we understand that the U.S. experience may be unique in some underdetermined manner. In that regard, we believe that historical studies of other countries' experiences with foreign-exchange intervention to be a profitable venue for further research.

## ENDNOTES

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<sup>1</sup> If a central bank routinely had better information about pricing than the market, then its trades should serve as a forecast of subsequent exchange-rate movements. See our empirical appendix.

<sup>2</sup> That said, the Federal Reserve has occasionally considered balance of payments or exchange rate objectives in its monetary policy decisions.

<sup>3</sup> See: B. T. McCallum. 2003. "Japanese Monetary Policy, 1991-2001," Federal Reserve Bank of Richmond *Economic Quarterly* 89(1): 1-31.