

WORKING PAPER SERIES

The Practice of Central Bank Intervention: Looking Under the Hood

Christopher J. Neely

Working Paper 2000-028A
http://research.stlouisfed.org/wp/2000/2000-028.pdf

October 2000

PUBLISHED: Central Banking November 2000. Reprinted Federal Reserve Bank of St. Louis Review, 83(3), May/June 2001, pp. 1-10

FEDERAL RESERVE BANK OF ST. LOUIS
Research Division
411 Locust Street
St. Louis, MO 63102

The views expressed are those of the individual authors and do not necessarily reflect official positions of the Federal Reserve Bank of St. Louis, the Federal Reserve System, or the Board of Governors.

Federal Reserve Bank of St. Louis Working Papers are preliminary materials circulated to stimulate discussion and critical comment. References in publications to Federal Reserve Bank of St. Louis Working Papers (other than an acknowledgment that the writer has had access to unpublished material) should be cleared with the author or authors.

Photo courtesy of The Gateway Arch, St. Louis, MO. www.gatewayarch.com

The practice of central bank intervention: Looking under the hood

Christopher J. Neely*

October 11, 2000

Abstract: This article first reviews methods of foreign exchange intervention and then presents evidence—focusing on survey results—on the mechanics of such intervention. Types of intervention, instruments, timing, amounts, motivation, secrecy and perceptions of efficacy are discussed.

* Senior Economist, Research Department
411 Locust St.
Federal Reserve Bank of St. Louis
St. Louis, MO 63102
(314) 444-8568 (o), (314) 444-8731 (f), neely@stls.frb.org

Keywords: foreign exchange, intervention, exchange rates, monetary authority, central bank

---

The author thanks the monetary authorities of Belgium, Brazil, Canada, Chile, the Czech Republic, Denmark, France, Germany, Hong Kong, Indonesia, Ireland, Italy, Japan, Mexico, New Zealand, Poland, South Korea, Spain, Sweden, Switzerland, Taiwan and the United States for their cooperation with this study. The author thanks Michael Melvin and Paul Weller for discussions about the survey and Hali Edison, Trish Pollard and Lucio Sarno for helpful comments. The views expressed are those of the author and do not necessarily reflect official positions of the Federal Reserve Bank of St. Louis, or the Federal Reserve System.

1. Introduction

There has been a long and voluminous literature about *official intervention* in foreign exchange markets. Official intervention is generally defined as those foreign exchange transactions of monetary authorities designed to influence exchange rates, but can more broadly refer to other policies for that purpose. Many papers have explored the determinants and efficacy of intervention (Edison, 1993; Sarno and Taylor 2000) but very little attention has been paid to the more pedestrian subject of the mechanics of foreign exchange intervention like choice of markets, types of counterparties, timing of intervention during the day, purpose of secrecy, etc.. This article focuses on the latter topics by reviewing the motivation for, methods and mechanics of intervention. Although there has apparently been a decline in the frequency of intervention by the major central banks, reports of a coordinated G-7 intervention to support the euro on September 22, 2000 remind us that intervention remains an active policy instrument in some circumstances.

The next section of the article reviews foreign exchange intervention and describes several methods by which it can be conducted. The third section presents evidence from 22 responses to a survey on intervention practices sent to monetary authorities.

2. Types of Intervention

Intervention and the Monetary Base

Studies of foreign exchange intervention generally distinguish between intervention that does or does not change the monetary base. The former type is called *unsterilized* intervention

while the latter is referred to as *sterilized* intervention. When a monetary authority buys (sells) foreign exchange, its own monetary base increases (decreases) by the amount of the purchase (sale). By itself, this type of transaction would influence exchange rates in the same way as domestic open market purchases (sales) of domestic securities; however, many central banks routinely sterilize foreign exchange operations; that is, they reverse the effect of the foreign exchange operation on the domestic monetary base by buying and selling domestic bonds (Edison, 1993). The crucial distinction between sterilized and unsterilized intervention is that the former constitutes a potentially useful independent policy tool while the latter is simply another way of conducting monetary policy.

For example, on June 17, 1998 the Federal Reserve Bank of New York bought $833 million worth of yen (JPY) at the direction of the U.S. Treasury and the Federal Open Market Committee. In the absence of offsetting transactions, this transaction would have increased the U.S. monetary base by $833 million, which would tend to temporarily lower interest rates and ultimately raise U.S. prices, depressing the value of the dollar.[1] As is customary with U.S. intervention, however, the Federal Reserve Bank of New York also sold an appropriate amount of U.S. Treasury securities to absorb the liquidity and maintain desired conditions in the interbank loan market. Similarly, to prevent any change in Japanese money market conditions, the Bank of Japan would also conduct appropriate transactions to offset the rise in demand for Japanese securities caused by the $833 million Federal Reserve purchase. The net effect of these transactions would be to increase the relative supply of U.S. government securities versus Japanese securities held by the public but to leave the U.S. and Japanese money supplies unchanged.

[1] Empirically, it has been very difficult to establish the reaction of exchange rates to changes in economic fundamentals.

Fully sterilized intervention doesn't directly affect prices or interest rates and so does not influence the exchange rate through these variables like ordinary monetary policy. Rather, sterilized intervention might affect the foreign exchange market through two routes: the portfolio balance channel and the signaling channel. The portfolio balance channel theory holds that sterilized purchases of yen raise the dollar price of yen because investors must be compensated with a higher expected return to hold the relatively more numerous U.S. bonds. To produce a higher expected return, the yen price of the U.S. bonds must fall immediately. That is, the dollar price of yen must rise. In contrast, the signaling channel assumes that official intervention communicates information about future monetary policy or the long-run equilibrium value of the exchange rate.

Spot and Forward Markets for Intervention

The previous example implicitly assumed that the Federal Reserve Bank of New York conducted its purchase of yen in the *spot* market—the market for delivery in two days or less. Intervention need not be carried out in the spot market, however, it also may be carried out in the *forward* market.[2] Forward markets are those in which currencies are sold for delivery in more than two days. Because the forward price is linked to the spot price through *covered interest parity*, intervention in the forward market can influence the spot exchange rate.

To understand covered interest parity, consider the options open to an American bank that has capital to be invested for one year. The bank could lend that money at the interest rate on U.S. dollar assets, earning the gross return of $\left(1+i_t^{USD}\right)$ on each dollar. Or, it could convert its funds to a foreign currency (e.g., the euro), lend that sum in the overnight euro money market at

the euro interest rate, and then convert the proceeds back to dollars at the end of the year. If, at the beginning of the contract, the bank contracts to convert the euro proceeds back to dollars, it will receive $1/F_{t,t+365}$ dollars for each euro, where $F_{t,t+365}$ is the euros per dollar forward exchange rate. The gross return to each dollar through this second strategy is $\frac{S_t}{F_{t,t+365}}\left(1+i_t^{euro}\right)$, where S_t is euros per dollar spot exchange rate on day t. If the return to one strategy is higher than the other, market participants will invest in that strategy, driving its return down and the other return up until the strategies have approximately equal return. Covered interest parity (CIP) is the condition that the strategies have equal return:

$$\left(1+i_t^{USD}\right)=\frac{S_t}{F_{t,t+365}}\left(1+i_t^{euro}\right) \tag{1}$$

As equation (1) must approximately hold all the time, intervention that changes the forward exchange rate must also change the spot exchange rate.[3] For example, a forward purchase of euros that raises $F_{t,t+365}$ must also raise S_t.

Forward market interventions—the purchase or sale of foreign exchange for delivery at a future date—have the advantage that they do not require immediate cash outlay. If a central bank expects that the need for intervention will be short-lived and will be reversed, then a forward market intervention may be conducted discreetly—with no effect on foreign exchange reserves data. For example, published reports indicate that the Bank of Thailand used forward market purchases to shore up the baht in the Spring of 1997 (Moreno (1997)).[4]

---

[2] Exchange rate markets and practices are described in detail in the Bank for International Settlements *Central Bank Survey of Foreign Exchange and Derivatives Market Activity* (1999).

[3] Of course, (1) could continue to hold with a change in i_t^{USD} or i_t^{euro} instead of $F_{t,t+365}$, but the interest rates are held fixed by conditions in the U.S. and euro money markets, respectively.

[4] Not all spot or forward market transactions are intervention, of course. For example, to limit the costs of capital controls that made it hard to hedge foreign exchange exposure, the Reserve Bank of South Africa (RBSA) used to provide forward cover for firms with foreign currency exposure. That is, it would buy dollars forward from foreign

Both the spot and forward markets may be used simultaneously. A transaction in which a currency is bought in the spot market and simultaneously sold in the forward market is known as a *currency swap*. While a swap itself will have little effect on the exchange rate, they can be used as part of an intervention. The Reserve Bank of Australia (RBA) used the swaps market to sterilize spot interventions. In these transactions, the spot leg of the swap is conducted in the opposite direction to the spot market intervention, leaving the sequence equivalent to a forward market intervention. The RBA uses the spot/swap combination rather than an outright forward because the former permits more flexible implementation of the intervention.

The Options Market and Intervention

The options market has also been used by central banks for intervention. A *European-style call (put) option* confers the right, but not the obligation to purchase (sell) a given quantity of the underlying asset on a given date. Usually, the option contract specifies the prices for which the asset may be bought or sold, called the *strike* or *exercise price*.

Monetary authorities seeking to prevent depreciation or devaluation of their currency may sell put options on the domestic currency or call options on the foreign currency.[5] While the price of options has no direct effect on spot exchange rates, speculators often purchase put options instead of shorting a weak currency. The writers (sellers) of these put options attempt to hedge their position by taking a long position in the weak currency, adding to the downward pressure on its price. By writing put options on the weak currency—adding liquidity to the options market—the central bank provides dealers with a synthetic hedge; dealers need not go into the spot market to take short positions in the weak currency. This arrangement creates the

---

firms with dollar accounts receivable and sell dollars to foreign firms with dollar accounts payable in the future. As capital controls have been reduced, the RBSA has reduced its net open position in the forward market.

same type of financial risk for the central bank—if the currency is devalued—as would the direct purchase of the weak currency in spot or forward markets. Like forward market intervention, it does not, however, require the monetary authority to immediately expend foreign exchange reserves. In fact, the strategy generates revenues upon the sales of the options. The Bank of Spain reportedly used this strategy of selling put options on the peseta to fight devaluation pressures during 1993 (*The Economist*, 1993), though the institution denied it emphatically (*The Financial Times*, 1993).

In another intervention strategy using options, the Banco de Mexico has employed sales of put options on the U.S. dollar to accumulate foreign exchange reserves since August 1, 1996 (Galan Medina, Duclaud Gonzalez de Castillo, Garcia Tames, 1997). The put options give the bearer the right to sell dollars to the Banco de Mexico at a strike price determined by the previous day's exchange rate, called the *fix exchange rate*. The option may only be exercised if the peso has appreciated over the last month, if the fix peso price of dollars is no higher than a twenty day moving average of previous strike prices. This restriction is designed to prevent the Banco de Mexico from having to buy dollars (sell pesos) during a period of peso depreciation.

The sales of these put options may be considered foreign exchange intervention because they are designed to prevent the necessity of intervention to purchase dollar reserves that might affect the exchange rate in undesirable ways. Because the mechanism is totally passive—the public decides when to exercise the options—the use of these options effectively lessens the signaling impact of Banco de Mexico purchases of foreign exchange reserves.

[5] Blejer and Schumacher (2000) discuss the implications of the use of derivatives for central banks' balance sheets.

Indirect Intervention

Recall that while official intervention is generally defined as foreign exchange transactions of monetary authorities designed to influence exchange rates, it can also refer to other (indirect) policies for that purpose. In addition to direct transactions in various instruments, Taylor (1982a, 1982b) recounts a number of methods by which countries intervene indirectly in foreign exchange markets. For example, he reports that in the 1970s governments manipulated the currency portfolio of nationalized industries in France, Italy, Spain and the United Kingdom to influence exchange rates. This practice was allegedly used to "disguise" intervention, as was the French and Italian practice of transacting through undisclosed foreign exchange accounts held at commercial banks.

There are innumerable methods of indirectly influencing the exchange that do not fit in the narrow definition of intervention as foreign exchange *transactions* of monetary authorities designed to influence exchange rates. These methods involve *capital controls*—taxes or restrictions on international transactions in assets like stocks or bonds—or *exchange controls*—the restriction of trade in currencies (Dooley, Mathieson and Rojas-Suarez (1993), Neely (1999)), rather than transactions. Sometimes such methods are substituted for more direct foreign exchange intervention, especially by the monetary authorities of countries without a long history of free capital movements. For example, Spain, Ireland and Portugal introduced capital controls—including mandatory deposits against the holding of foreign currencies—in the ERM crises of 1992-93, in response to speculation against their currencies.

3. Survey Results

To investigate the practice of foreign exchange intervention, questionnaires on the topic were sent to the 43 institutions that participated in the Bank for International Settlements (BIS) (1999) survey of foreign exchange practices, and the European Central Bank. Of those 44 authorities, 22 responded to some or all of the questions asked. Table 1 shows the list of surveyed authorities, as well as whether each responded. A cover letter explained that the survey covered practices over 1990-2000, so that authorities that no longer intervene—or even no longer have independent currencies—could report on past practices. The Reserve Bank of New Zealand was the only authority to report that it had not intervened in the last 10 years.[6] To respect the confidentiality of the respondents, the responses of specific institutions will not be identified unless the information is clearly in the public domain. Table 2 shows statistics summarizing the distribution of the responses to survey questions on the mechanics of, motivation for, and the efficacy of intervention.

The Mechanics of Intervention

Question 1 inquires about the frequency of intervention. Of the 14 authorities that responded to the question, the percentage of business days on which they report intervening—using either sterilized or unsterilized transactions—ranged from 0.5 percent to 40 percent, with 4.5 percent being the median. While there might be some selection bias in that authorities that intervene are more likely to respond to the survey, it does appear that official intervention is

[6] The Reserve Bank of New Zealand's response on this point is a matter of public record. See Deputy Governor Sherwin's May 9, 2000 speech to the World Bank Treasury at http://www.rbnz.govt.nz/speeches/0092115.html. This link was current as of October 20, 2000. The appendix to this article provides links to descriptions of foreign exchange markets and/or intervention policies in the web pages of a number of monetary authorities.

reasonably common in foreign exchange markets.

In responding to question 2, 30 percent of authorities report that all their foreign exchange transactions change the monetary base, 30 percent that such dealings sometimes change the base and 40 percent that they never change the base. For some issues, such as motivation or time horizon of effectiveness, this conflation of responses about sterilized and unsterilized intervention is potentially unfortunate.

When monetary authorities do intervene, they seem to have some preference for dealing with major domestic banks but will also transact with major foreign banks (question 3). This should not come as a complete surprise as banks tend to specialize in trading their own national currencies (Melvin, 1997). Approximately half of authorities will sometimes conduct business with other entities, such as other central banks (23.5 percent) or investment banks (25 percent). 6.3 percent will always transact with investment banks.

Intervention transactions over the last decade have almost always been conducted at least partially in spot markets according to the answers to question 4. 95.2 percent of authorities report that their official intervention activities always include spot market transactions and another 4.8 percent sometimes include spot transactions. 52.9 percent of authorities report sometimes using the forward market, perhaps in conjunction with the spot market to create a swap transaction. No authority reports always using the forward market. Finally, one authority reports having used a futures market to conduct intervention.

There is no clear pattern as to the method of dealing with counterparties (question 5). Direct dealing over telephone is most popular, being used sometimes or always by 100 percent of authorities. Direct dealing over an electronic network is used by 43.8 percent of authorities sometimes or always. Live foreign exchange brokers are used sometimes or always by 63.2

percent of the respondents. Finally, electronic brokers such as EBS are used by 12.5 percent of the authorities. There was some evidence that responding institutions are moving increasingly toward electronic methods, along with other market participants.

There has been very little research on factors that determine the magnitude of intervention—though reaction function research touches on this issue—but the responses to question 6 indicate that the size of interventions frequently depends on market reaction to initial trades. 95 percent of monetary authorities report that market reaction sometimes or always affects the size of total trades. Because the size of the intervention is endogenous to market reaction, determining the interaction of intervention and exchange rate changes at high frequencies might require careful evaluation.[7]

Most intervention takes place during the business day but almost half the banks report that they sometimes intervene prior to business hours and more than half intervene after business hours.[8] For example, the Reserve Bank of Australia publicly states that it is willing to intervene outside of normal business hours (Rankin (1998)). Some after-hours intervention might be in support of other authorities. About a quarter of central banks report that they always intervene in the business morning (14.3 percent) or business afternoon (10 percent), however.

In answering question 8, 23.8 percent of authorities report sometimes intervening with indirect methods. The authorities cite changing banking regulations on foreign exchange exposure and moral suasion as methods of indirect intervention. Not surprisingly, indirect methods seem to be used predominantly by central banks without a long history of free capital movements or a convertible currency.

[7] The author thanks Lucio Sarno for pointing this out.
[8] Fischer and Zurlinden (1999) examine the affect of intervention using high frequency data and the time of data.

The Motivation for Intervention

The motivation for intervention decisions has been widely researched and often discussed. Research and official pronouncements support the idea that monetary authorities with floating exchange rates most often employ intervention to resist short-run trends in exchange rates, the leaning-against-the-wind hypothesis.[9] Another popular hypothesis is that intervention is used to correct medium-term "misalignments" of exchange rates away from "fundamental" values. Question 9 inquires about these possibilities. The responses generally support these hypotheses with 89.5 percent of monetary authorities sometimes or always intervening to resist short-run trends and 66.7 percent of the authorities seeking to return exchange rates to "fundamental values." Some countries specified "other" reasons that might be interpreted as variations on the leaning-against-the wind or misalignment hypotheses. Still other countries note macroeconomic goals such as limiting exchange rate pass-through to prices, defense of an exchange rate target or accumulating reserves as motivating intervention.

One hypothesis that has received some attention in the last few years is that profitability is a consideration in intervention. A series of papers have examined the profitability of intervention (Leahy (1995), Sweeney (1997), Saacke (1999)), the relationship between intervention profitability and technical analysis (Neely (1998, 2000)), and whether past profits influence intervention (Kim and Sheen (1999)). While the early evidence (Taylor (1982b)) indicated that central banks were losing money on their intervention, the later papers have been much more supportive of the hypothesis that central banks have at least broken even on floating rate intervention, with some evidence that they have made large profits.[10]

[9] Indeed, the published statements of several central banks specifically cite the desire to counter trends in exchange rates as motivating intervention. See Board of Governors (1994, p. 64) or Rankin (1998).

[10] Sweeney (1997, 2000) argues that risk adjustment is crucial in assessing profits or losses from official intervention.

The notion that profitability is a consideration in intervention decisions is uniformly rejected, however, by the survey respondents. Not one respondent to question 9 reports that profitability was ever a motivation for intervention. Despite this, private conversations with individuals involved in intervention decisions suggest that profitability is a useful gauge of their success as careful stewards of public resources. In addition, the Reserve Bank of Australia (RBA) argues that profitability attests that its intervention has stabilized the exchange rate (Rankin (1998)). This RBA claim relies on Friedman's (1953) claim that stabilizing speculation is equivalent to profitable speculation. If speculators consistently buy (sell) when the asset price is below (above) its equilibrium value, they will both tend to drive the asset price toward its equilibrium value and to profit from these transactions.[11] The link between profitability and stabilizing speculation is tenuous, however. Salant (1974), Mayer and Taguchi (1983), and Delong, Schleifer, Summers, and Waldman (1990) provide counterexamples.

The Role of Secrecy in Intervention

The role of secrecy in intervention is not well understood. Most monetary authorities usually chose to intervene secretly, releasing actual intervention data with a lag, if at all. Some authorities, the Swiss National Bank, for example, always publicize interventions at the time they occur. Does secret intervention maximize or minimize the impact of the transaction? If authorities intervene to convey information to markets, why do they conceal these transactions? Dominguez and Frankel (1993) recount several possibilities. When fundamentals are inconsistent with intervention, monetary authorities would prefer not to draw attention to the intervention. Or, the monetary authority might have poor credibility for sending trustworthy

[11] Friedman (1953) was referring more generally to speculation in foreign exchange and discussed government speculation (intervention) as a special case.

signals. Or, the monetary authority might wish to simply adjust the currency holdings of its portfolio. Bhattacharya and Weller (1997) provide another possible explanation for secrecy. They present a model in which small amounts of intervention reveals the authority's information to private parties, influencing exchange rates. This secrecy issue has not been satisfactorily resolved in the literature.

Consistent with the confusion in the academic literature, the results to question 10 reflect disagreement among the respondents about the purpose of secrecy. More authorities report sometimes or always intervening discreetly to maximize market impact (76.5 percent) than report sometimes or always intervening secretly to minimize market impact (57.1 percent). Such disagreement is significant. No central bank cites portfolio adjustment as a reason for secret intervention, contrary to the reasonable conjecture of Dominguez and Frankel (1993). Of course, the central banks might not consider transactions for portfolio adjustment to be intervention.

The Horizon of Intervention Effects

Perhaps the most important question in the literature on central bank intervention is whether central bank intervention is effective in influencing the exchange rate. For many years, the biggest hurdle to answering this question was the paucity of data. More recently, even as more data has become available, it is manifest that two barriers to answering the question remain. First, what would the exchange rate have been in the absence of intervention? Second, over what horizon should we measure the effectiveness of intervention and how large and long-lasting an effect can be considered a success?

The academic literature has been ambivalent about the efficacy of official intervention in the foreign exchange market. The Jurgensen Report (Jurgensen (1983)) was pessimistic about

the effects of intervention. Dominguez and Frankel (1993)—using then-recently released intervention data—argued that intervention can work by changing expectations of future exchange rates. Edison (1993) concluded that while the evidence might be consistent with some short-run effect, there is no evidence for a lasting effect from intervention. Sarno and Taylor (2000), in contrast, conclude that the recent consensus of the profession is that intervention is effective through both the signaling and portfolio balance channel.

Despite skepticism on the part of academics, central banks continue to intervene—though perhaps less frequently than in the past— implying that policymakers do think that intervention can be an effective tool. Question 11 asks the monetary authorities on whether intervention has an effect on exchange rates and, if so, over what horizon one might see the full effect. All of the respondents indicate that they think intervention has some effect on exchange rates.[12] Most of the respondents believe in a relatively rapid response, over a few minutes (38.9 percent) or a few hours (22.2 percent). Still, a substantial minority think that intervention's full effect is seen over a few days (27.8 percent) or more (11.1 percent). The dispersion in the survey is substantial, indicating almost as much discord among central bankers as among academics.

4. Discussion and Conclusion

This article has examined the mechanics of intervention—instruments, counterparties, timing, amounts—as well as related issues like secrecy, motivation and the perceived efficacy of such transactions. A survey of monetary authorities' intervention practices reveals that a number of monetary authorities do intervene with some frequency in foreign exchange (mostly spot) markets. The desire to check short-run trends or correct longer-term misalignments often

motivates intervention while the size of intervention often depends on market reaction to initial trades. Although intervention typically takes place during business hours, most monetary authorities will also intervene outside of these hours, if necessary. And while there is unanimous agreement that intervention does influence exchange rates, there is much disagreement about the horizon over which the full effect of this influence is felt, with estimates ranging from a few minutes to more than a few days.

The topic of the practice of official intervention is very broad. To simplify this study, issues like coordinated versus unilateral intervention, choice of intervention currency and distinguishing between intervention in fixed and flexible exchange rate regimes have been left for further study. Other issues that merit further consideration are motivations for secrecy and the metric for judging the success of intervention.

[12] Of course, having an effect on exchange rates at some horizon might not imply that intervention is successful.

Appendix: Monetary Authority Web Pages Describing Intervention or Foreign Exchange Markets

Monetary Authority	Uniform Resource Locator on Intervention or Foreign Exchange	Notes on the pages
Reserve Bank of Australia	http://www.rba.gov.au/publ/pu_teach_98_2.html	Excellent descriptive page on markets and intervention.
Central Bank of Brazil	http://www.bcb.gov.br/ingles/himf1900.shtm#destino6	Foreign exchange policy.
Bank of Canada	http://www.bankofcanada.ca/en/backgrounders/bg-e2.htm	Concise description of intervention policy.
Bank of England	http://www.bankofengland.co.uk/factfxmkt.pdf	Description of foreign exchange markets.
European Central Bank	http://www.ecb.int/	No work directly describing intervention policy but speeches and working papers may relate.
German Bundesbank	http://www.bundesbank.de/en/presse/pressenotizen/pdf/mp100197.pdf	1997 description of the ECB's responsibility in foreign exchange intervention.
Hong Kong Monetary Authority	http://www.info.gov.hk/hkma/eng/speeches/speechs/joseph/speech_030398b.htm	Speech by the CEO describing exchange rate policy.
Bank of Japan	http://www.boj.or.jp/en/faq/faqkainy.htm	Outline of the Bank of Japan's Foreign Exchange Intervention Operations
Banco de Mexico	http://www.banxico.org.mx/siteBanxicoINGLES/bPoliticaMonetaria/FSpoliticaMonetaria.html	Description of monetary and exchange rate policies.
National Bank of Poland	http://www.nbp.pl/en/publikacje/index.html	Some descriptions of intervention in annual reports.
Monetary Authority of Singapore	http://www.mas.gov.sg/resource/index.html	See the pamphlet, *Economics Explorer #1*.
Reserve Bank of South Africa	http://www.resbank.co.za/ibd/fwdcover.html	Describes South Africa's use of forward cover in somewhat technical terms.
Swiss National Bank	http://www.snb.ch/e/publikationen/publi.html	Some intervention descriptions in annual reports.
Bank of Thailand	http://www.bot.or.th/BOTHomepage/BankAtWork/Monetary&FXPolicies/EXPolicy/8-23-2000-Eng-i/exchange_e.htm	Very brief description of current exchange rate policy.
Federal Reserve of the United States	http://www.federalreserve.gov/pf/pdf/frspurp.pdf	See page 64 for a very brief description of intervention policy.

References

Bank for International Settlements. “Central Bank Survey of Foreign Exchange and Derivatives Market Activity,” May 1999.

Bhattacharya, U. and Weller, P.A. "The Advantage to Hiding One’s Hand: Speculation and Central Bank Intervention in the Foreign Exchange Market,” *Journal of Monetary Economics*, 39, 1997, 251-77.

Blejer, M I. and Schumacher L. “Central Banks Use of Derivatives and Other Contingent Liabilities: Analytical Issues and Policy Implications,” IMF Working Paper 00-66, March 2000.

Board of Governors of the Federal Reserve System. “The Federal Reserve System: Purposes and Functions,” Washington DC, Eighth edition, 1994.

DeLong, J.B., Shleifer, A., Summers, L.H., and Waldmann, R.J. "Noise Trader Risk in Financial Markets,” *Journal of Political Economy*, August 1990, 703-38.

Dominguez, K.M. and Frankel, J.A. “Does Foreign Exchange Intervention Work? Institute for International Economics,” Washington DC, 1993.

Dooley, M.P., Mathieson, D.J., and Rojas-Suarez, L. “Capital Mobility and Exchange Market Intervention in Developing Countries,” NBER Working Paper 6247, 1993.

Economist. “Spanish peseta; adios,” May 1, 1993, 84.

Edison, H.J. “The Effectiveness of Central-Bank Intervention: A Survey of the Literature After 1982,” Special Papers in International Economics No. 18, Department of Economics, Princeton University, 1993.

Financial Times. “Peseta devalued by 8% in ERM: Lisbon realigns escudo as Madrid plans 1½ point rate cut,” May 14, 1993, 1.

Fischer, A.M. and Zurlinden, M. "Exchange Rate Effects of Central Bank Interventions: An Analysis of Transaction Prices," *Economic Journal*, 109(458), October 1999, 662-76.

Friedman, M. "The Case for Flexible Exchange Rates," *Essays in Positive Economics*, University of Chicago Press, 1953, 157-203.

Galan Medina, M., Duclaud Gonzalez de Castillo, J., and Garcia Tames, A. "A Strategy for Accumulating Reserves through Options to Sell Dollars," unpublished manuscript, 1997. Available through the website of the Banco De Mexico, <http://www.banxico.org.mx/siteBanxicoINGLES/bPoliticaMonetaria/FSpoliticaMonetaria.html>

Jurgensen, P. "Report of the Working Group on Exchange Market Intervention," Washington, Treasury Department, March 1983.

Kim, S-J. and Sheen, J. "The Determinants of Foreign Exchange Intervention by Central Banks: Evidence from Australia," unpublished manuscript, The University of New South Wales, December 1999.

Leahy, M.P. "The Profitability of US Intervention in the Foreign Exchange Markets," *Journal of International Money and Finance*, December 1995, 823-44.

Mayer, H. and Taguchi, H. "Official Intervention in the Exchange Markets: Stabilising or Destabilising?" Bank for International Settlements Economic Paper 6, March 1983.

Melvin, M. (1997) *International Money and Finance*, Fifth Edition, Reading, MA: Addison Wesley Publishing.

Moreno, R. "Lessons from Thailand," *Federal Reserve Bank of San Francisco Economic Letter*, Number 97-33, November 7, 1997.

Neely, C.J. “Technical Analysis and the Profitability of U.S. Foreign Exchange Intervention,” Federal Reserve Bank of St. Louis *Review*, July/August 1998, 3-17.

Neely, C.J. “An Introduction to Capital Controls,” Federal Reserve Bank of St. Louis *Review*, November/December 1999, 13-30.

Neely, C.J. "The Temporal Pattern of Trading Rule Returns and Central Bank Intervention: Intervention Does Not Generate Trading Rule Profits,” Federal Reserve Bank of St. Louis Working Paper 2000-18B, August 2000.

Rankin, B. “The Exchange Rate and the Reserve Bank's Role in the Foreign Exchange Market,” <http://www.rba.gov.au/publ/pu_teach_98_2.html>, 1998.

Saacke, P. “Technical Analysis and the Effectiveness of Central Bank Intervention,” unpublished manuscript, University of Hamburg, 1999.

Salant, S.W. “Profitable Speculation, Price Stability, and Welfare,” International Finance Discussion Paper 54, Board of Governors of the Federal Reserve System, November 1974.

Sarno, L. and Taylor, M.P. “Official Intervention in the Foreign Exchange Market,” unpublished manuscript, University College, Oxford, 2000.

Sweeney, R.J. “Do Central Banks Lose on Foreign-Exchange Intervention? A Review Article,” *Journal of Banking and Finance*, December 1997, 1667-84.

Sweeney, R.J. “Does the Fed Beat the Foreign Exchange Market?” *Journal of Banking and Finance*, 24, 2000, 665-94.

Taylor, D. “The Mismanaged Float: Official Intervention by the Industrialized Countries,” in *The International Monetary System: Choices for the Future*, Michael B. Connolly, ed., Praeger Publishers, 1982a, 49-84.

Taylor, D. “Official Intervention in the Foreign Exchange Market, or, Bet Against the Central Bank,” *Journal of Political Economy*, April 1982b, 356-68.

Table 1: Responding Monetary Authorities

Country/Authority
Belgium
Brazil
Canada
Chile
Czech Republic
Denmark
France
Germany
Hong Kong
Indonesia
Ireland
Italy
Japan
Mexico
New Zealand
Poland
South Korea
Spain
Sweden
Switzerland
Taiwan
United States

Notes: The table identifies the 22 monetary authorities that responded to the survey.

Table 2: Summary of Intervention Survey Responses

		# responses	minimum	median	maximum
1. In the last decade, on approximately what percentage of business days has your monetary authority conducted intervention?		14	0.5	4.5	40.0
			never	sometimes	always
2. Foreign exchange intervention changes the domestic monetary base.		20	40.0	30.0	30.0
3. Intervention transactions are conducted with the following counterparties:	major domestic banks	21	0.0	28.6	71.4
	major foreign banks	18	16.7	72.2	11.1
	other central banks	17	76.5	23.5	0.0
	Investment banks	16	68.8	25.0	6.3
4. Intervention transactions are conducted in the following markets:	spot	21	0.0	4.8	95.2
	forward	17	47.1	52.9	0.0
	future	16	93.8	6.3	0.0
	other (please specify in margin)	15	93.3	6.7	0.0
5. Intervention transactions are conducted by:	direct dealing with counterparties via telephone	20	0.0	30.0	70.0
	direct dealing with counterparties via electronic communication	16	56.3	31.3	12.5
	live FX brokers	19	36.8	52.6	10.5
	electronic brokers (e.g., EBS, Reuters 2002)	16	87.5	0.0	12.5
6. The following strategies determine the amount of intervention.	a prespecified amount is traded	17	17.6	70.6	11.8
	intervention size depends on market reaction to initial trades	20	5.0	55.0	40.0
7. Intervention is conducted at the following times of day:	prior to normal business hours	16	56.3	43.8	0.0
	morning of the business day	21	0.0	85.7	14.3
	afternoon of the business day	20	0.0	90.0	10.0
	after normal business hours	17	35.3	64.7	0.0
8. Is intervention sometimes conducted through indirect methods, such as changing the regulations regarding foreign exchange exposure of banks?		21	76.2	23.8	0.0
9. The following are factors in intervention decisions:	to resist short-term trends in exchange rates	19	10.5	42.1	47.4
	to correct long-run misalignments of exchange rates from fundamental values	18	33.3	44.4	22.2
	to profit from speculative trades	17	100.0	0.0	0.0
	other	16	62.5	25.0	12.5
10. Intervention transactions are conducted secretly for the following reasons:	to maximize market impact	17	23.5	35.3	41.2
	to minimize market impact	14	42.9	57.1	0.0
	for portfolio adjustment	11	100.0	0.0	0.0
	other	12	75.0	16.7	8.3
11. In your opinion, how long does it take to observe the full effect of intervention on exchange rates?	a few minutes	18	38.9		
	a few hours	18	22.2		
	one day	18	0.0		
	a few days	18	27.8		
	more than a few days	18	11.1		
	intervention has no effect on exchange rates	18	0.0		

Notes: Question 1 shows the minimum, median and maximum responses (from 0 to 100) on the percentage of days intervention was conducted in the last decade. Questions labeled 2-10 show the percentage of responses of "Never," "Sometimes," and "Always" to those questions. Question 11 shows the percentage of responses indicating that the full effects of intervention were felt at each horizon.