

# On the Rotation of the Earth, Drunken Sailors, and Exchange Rate Policy

by Owen F. Humpage

Once was the time when learned people thought that the sun revolved around the earth. Indeed, the casual empiricism of the day supported the notion. The sun rose each morning in the east and set each night in the west. But, as we all now know, the perception belies the reality.

Now is the time, with the dollar's value sliding sharply against the euro and yen, that a growing number of observers—including many economists and policymakers—believe that official intervention offers a useful tool for managing the dollar's descent. This perception stems from myriad recent studies showing that official purchases and sales of foreign currencies have sometimes affected exchange rate movements over the short term. Much of the evidence reflects the experience of the Japanese Ministry of Finance since 1991. But do these empirical facts fit the conclusion many seem to draw—that such interventions allow countries to avoid or substantially modify trends in the movements of their exchange rates?

To be sure, foreign exchange interventions can sometimes produce temporary changes in exchange rates as the market learns about and adjusts to evolving fundamentals, but because foreign exchange intervention does not change those fundamentals, it ultimately cannot prevent or materially alter the adjustment process. The value of intervention, therefore, is very limited.

## ■ Intervention and Monetary Policy

Intervention refers to official purchases or sales of foreign exchange that are designed to influence countries' exchange rates. Except for the instrument involved, the mechanics of the transaction match those of an open market operation, and like any open market operation, foreign exchange transactions have the potential to drain or add bank reserves. When, for example, a central bank buys foreign exchange, it pays in domestic currency basically by crediting exchange dealers' commercial bank accounts. The process injects reserves into the banking system just as if the central bank had bought government securities on the open market. Similarly, when a central bank sells foreign exchange to dealers, it contracts commercial bank reserves.

Central banks, however, typically offset (or sterilize) the impact of foreign exchange intervention on bank reserves. Any central bank that conducts its monetary policy by targeting an overnight, reserve market interest rate—as nearly all large-country central banks do—or an aggregate amount of reserves—as the Bank of Japan does—will automatically offset all transactions that threaten its operating target.

They do this to prevent intervention from interfering with their domestic inflation objectives. Conflict between an exchange rate and an inflation objective is not a certainty; it depends on why the exchange rate is moving in the first place. If, for example, a nation's currency is depreciating because its monetary policy has

**A growing number of observers seem to believe that official foreign exchange intervention offers a useful tool for managing the dollar's descent. In particular situations, official transactions can sometimes produce temporary changes in exchange rates, but intervention does not permit countries to avoid or substantially modify trends in the movements of their exchange rates. At best, intervention is of very limited value.**

become too expansionary and inflation is rising, then selling foreign exchange and draining bank reserves is consistent both with resisting a depreciation and preventing inflation. If, on the other hand, monetary policy is achieving its inflation objective, but the domestic currency is depreciating because residents elect to import more goods, then selling foreign exchange and draining bank reserves resists depreciation only at the expense of generating deflation. As a general rule, only when the underlying exchange rate disturbance stems from domestic monetary policies will intervention remain compatible with a central bank's inflation objective. Under any other type of disturbance, an inevitable conflict between policy goals ensues.

Sterilization is also particularly important in the United States because the U.S. Treasury holds primary responsibility for intervention. In the absence of sterilization, the Treasury's foreign exchange operations could affect bank

reserves, interfere with monetary policy, and thereby circumscribe the Federal Reserve's independence and policy credibility.

As noted, intervention and monetary policy are sometimes compatible, and central banks sometimes do formulate their monetary policies with an exchange rate objective in mind. One might expect that adding or draining domestic bank reserves through intervention might be better suited to achieving an exchange rate objective than standard open market operations in domestic government securities. Unfortunately, available evidence for the United States suggests that when intervention and federal funds target rate changes occur in concert, the former adds nothing to any exchange rate outcome. Foreign exchange transactions seem wholly redundant to normal open market operations.

### ■ Intervention and Exchange Rates

When central banks neutralize the effects of intervention on bank reserves, they prevent intervention from ultimately affecting money growth and, in doing so, close a recognized channel through which intervention could affect exchange rates. Some economists contend, however, that a second mechanism could link intervention with exchange rate fundamentals. When a central bank buys foreign currency, it injects reserves into the banking system. If this reserve provision is incompatible with its operating target, the central bank will sell government securities to the market. While this set of transactions leaves bank reserves unchanged, it increases the amount of publicly held government securities. If international investors are reluctant to add these securities to their portfolios, their hesitancy may produce a depreciation and possibly a rise in domestic interest rates even without a change in bank reserves. This theoretically plausible channel, which could afford monetary authorities a direct influence over an exchange rate fundamental—the currency composition of outstanding assets—unfortunately lacks convincing empirical support.

Although sterilized intervention does not directly affect market fundamentals, most economists believe that it can influence the market's perception and expectations of those fundamentals. Because information is costly, various

market participants do not continuously possess the same information about exchange rates. Survey evidence, for example, indicates that large foreign exchange dealers have better information than their smaller counterparts and other market participants because of their broader customer base and market network. Because of these asymmetries, new information takes some time—albeit some very short time—to be disseminated through the market, and exchange rates will not continuously reflect all available information. In such markets, nonfundamental forces like bandwagon effects, overreaction to news, technical trading, and excessive volatility may underlie short-term exchange rate dynamics. Any trader—including monetary authorities—who the market suspects of having superior information could affect prices, if market participants observed his or her trades.

So queries about the efficacy of intervention typically boil down to a single question: Do monetary authorities routinely possess better information about market fundamentals than private traders? To be sure, monetary authorities sometimes have an information advantage over the private sector, especially about impending monetary policy changes, but as a general proposition, the claim is shaky. If the assertion that monetary authorities routinely have better information and can reveal it through their trades is true, then we should observe a clear, persistent correlation between intervention and exchange rate movements.

Empirical studies frequently find a connection between foreign exchange intervention and day-to-day exchange rate movements. Studies using even finer data discover that exchange rates tend to respond within minutes of an official operation. Large interventions, especially those undertaken with two or more central banks transacting in concert, are more likely to affect exchange rates in the desired direction than small, unilateral operations. Nevertheless, the empirical results are not robust across currencies, time periods, or empirical techniques, indicating that intervention's effects are not a sure thing.

An analysis of U.S. foreign exchange operations between 1985 and 1997, for example, clearly illustrates the hit-or-miss nature of intervention. Following the Plaza Accord in September 1985, when large nations agreed to concerted

intervention aimed at fostering a dollar depreciation, and again after the stock market decline in October 1987, official U.S. transactions in Japanese yen and German marks tended to moderate—but not offset—day-to-day fluctuations in the dollar against these currencies. Even then, however, success was not a sure thing; fewer than one-half of the interventions seemed successful. After January 1989, the overall effectiveness of U.S. operations waned, and U.S. policymakers sharply curtailed their operations. Since 1995, the United States has only intervened twice. Nevertheless, even in the post-1989 period, one can point to individual interventions that created the desired movement in exchange rates.

Economist Alain Chaboud and I undertook a similar analysis of Japanese intervention between 1991 and 2002, with comparable results. We found that Japanese purchases of dollars often affected the yen-dollar rate in a manner consistent with the Ministry of Finance's overall objectives. However, a success was not a certainty. Of the 182 dollar purchases, we counted 119, or 65 percent, as successful. Before 1995, for example, we observed that the rate of the dollar's depreciation on the day of an intervention was often smaller than on the previous day. In addition, we found that the larger, less frequent Japanese interventions after 1995 were often associated with outright dollar appreciations.

Others have reached similar conclusions about U.S. and Japanese intervention and about the exchange rate operations of other monetary authorities. Sterilized interventions—those operations that may affect expectations, but do not affect fundamentals—can sometimes produce changes in day-to-day exchange rate movements that are consistent with the objectives of monetary authorities. But can we conclude from this evidence that sterilized intervention provides a useful technique for guiding exchange rates along a near-term path?

### ■ Drunken Sailors and Exchange Rate Movements

We know virtually nothing about the duration of intervention effects, but if intervention reveals new information, its impact is likely to be permanent. Unfortunately, sending the exchange rate off permanently along a different path does not necessarily change its

FIGURE 1 JAPANESE EXCHANGE RATE



SOURCE: Board of Governors of the Federal Reserve System, Release H.10, "Foreign Exchange Rates," <[www.federalreserve.gov/release/h10/hist/dat00\\_ja.txt](http://www.federalreserve.gov/release/h10/hist/dat00_ja.txt)>.

ultimate destination. The walk of a drunken sailor—a favorite analogy of financial economists—helps to illustrate the point.

Imagine a hopelessly drunken sailor standing atop a steep hill. He heads out, staggering back and forth, making his way down the hill. The fundamental involved here is gravity, and at the end of his sojourn, the sailor will end up sprawled out on the sidewalk at the bottom of the hill. But our sailor can take any one of an infinite number of paths down the hill to his inevitable destination. If you come by and nudge the sailor on his way down, you will send him off on a different path. You may send him more quickly to his fate or you may even send him up the hill for a while. Eventually, however, the laws of physics (and alcohol) will hold, and...thud.

Like the drunken sailor, exchange rates demonstrate a long-term response to economic forces and a curious short-term haphazardness. Macroeconomic fundamentals do a notoriously poor job of predicting exchange rate movements over short time horizons, but these

same fundamentals do seem to guide exchange rates over the long run. The currencies of countries with loose monetary policies and relatively high rates of inflation, for example, ultimately seem to depreciate, but this can take many years. In the meantime, exchange rates are continuously feeling their way along a path consistent with the evolving fundamentals. Moreover, the market is forward looking, meaning that today's quotes rely heavily upon expectations about future developments. As new information becomes available, market participants revise their expectations—a process that imparts a seemingly random, zig-zag pattern to short-term exchange rate movements (see figure 1). Reflecting this process, the probability that the dollar will appreciate or depreciate on any given day is roughly 50 percent. Trend movements in the dollar, however, take weeks, even months to reveal themselves.

If a central bank intervenes in such a market and if its actions provide the market with new information pertinent to the pricing of foreign exchange without actually changing underlying macroeconomic fundamentals, the

exchange rate will jump and begin moving along an alternative path. But the exchange rate will not escape the pull of its basic economic determinants. What benefit then was intervention's nudge? It's almost like trying to stop the sun from setting.

## ■ Recommended Reading

### Survey Articles

Richard T. Baillie, Owen F. Humpage, and William P. Osterberg. 2000. "Intervention from an Information Perspective." *Journal of International Financial Markets, Institutions, and Money* 10, pp. 3–4.

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Catherine Bonser-Neal, V. Vance Roley, and Gordon H. Sellon, Jr. 1998. "Monetary Policy Actions, Intervention, and Exchange Rates: A Reexamination of the Empirical Relationships Using Federal Funds Rate Target Data." *Journal of Business*, 71:2, pp. 147–77.

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