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THE ACCURACY OF REPORTS OF
FOREIGN EXCHANGE INTERVENTION

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ABSTRACT

Daily foreign exchange operations by the Federal Reserve are not revealed to the public contemporaneously or, up until recently, even years after the fact. With the recent release of daily intervention data it is now possible to gauge the accuracy of the market's perceptions of the Fed's foreign exchange intervention. In this paper we look at both qualitative and quantitative evidence on the accuracy of press reports of foreign exchange intervention by the Federal Reserve between the beginning of January 1985 and the end of December 1989. The evidence shows that the likelihood of intervention being reported given that it actually occurred was 72 percent and that the likelihood of intervention actually occurring given that it was reported was 88 percent. Interventions which were reported by the newspaper were larger on average than those which were not reported and this difference is statistically significant. Multinomial logit analysis also demonstrates that the likelihood of intervention being reported increased with the size of the intervention.

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Introduction

As with many of its operations, details on foreign exchange intervention by the Federal Reserve are kept secret. Intervention can move currency values and thus announcements of intervention would represent valuable news to the foreign exchange market. The only contemporaneous accounts of intervention activity, however, are unofficial reports in the public press. Until recently, the confidentiality of the Federal Reserve's actions have made it impossible to gauge the accuracy of these reports of intervention or to consider possible differences between intervention which was reported and intervention which went unnoticed by the press. We now have the opportunity to compare reported with actual intervention with the recent release by the Federal Reserve of daily intervention data for the second half of the 1980s.

In this paper we look at both qualitative and quantitative evidence on the accuracy of press reports of foreign exchange intervention by the Federal Reserve between the beginning of January 1985 and the end of December 1989. Exchange rate policy figured prominently in the news during this period. The September 1985 Plaza meeting marked a watershed in international policy coordination with its commitment by the governments of the five largest industrial economies to engineer a depreciation of the dollar. This coordination continued with the Louvre meeting in February 1987 at which time the policy goal switched to currency stabilization. The coordinated exchange-rate policy of the Louvre period fell victim to the October 1987 worldwide stock market crash when concern with a potential recession shifted policy focus away from currency management. Nevertheless, the Federal Reserve did continue its attempts to manage currency values over the next two years. Noteworthy during this time were an effort to halt the dollar's slide at the end of 1987 with well-publicized intervention in the first week of 1988 (the

so-called *bear trap*) and dollar sales to temper the dollar's appreciation in mid-1988 and again in mid-1989.

The apparent success of exchange-rate policy during the latter half of the 1980s has rekindled interest in the efficacy of foreign exchange intervention. The results in this paper complement recent research on exchange-rate policy. In the absence of actual intervention data, press reports of intervention have been used by researchers to assess the efficacy of foreign exchange intervention.¹ The evidence presented in this paper shows that the probability of intervention being reported given that it actually occurred was 72 percent and that the probability of intervention actually occurring given that it was reported was 88 percent. These results suggest that newspaper reports were largely accurate representations of actual intervention.²

A second set of results in this paper contributes to our understanding of the foreign exchange market's perceptions of central bank activity. The emphasis in recent research on the informational role of intervention underscores the importance of these perceptions.³ Results presented in this paper demonstrate that interventions which were reported by the press were larger on average than those which were not reported and this difference is statistically significant. Multinomial logit analysis also demonstrates that the likelihood of intervention being reported increased with the size of the intervention.

¹See, for example, Klein and Lewis (1991) and Klein and Rosengren (1991).

²Dominguez and Frankel (1992) also consider the relationship between actual and reported intervention as part of their wide-ranging study of intervention policy.

³For example, see Obstfeld (1990), Dominguez and Frankel (1990), and Klein and Rosengren (1991). For a survey of recent literature see Humpage (1991). Edison (1991) provides an annotated bibliography.

1. Actual and Reported Intervention

The dramatic movements of the dollar in the mid-1980s and the policies enacted in order to affect its value drew public attention to exchange rates and exchange-rate management. Between 1980 and 1985 the dollar appreciated 82 percent against the Deutschmark and 24 percent against the yen. During this time the United States current account moved from surplus to an annual deficit in excess of one-hundred billion dollars. These events prompted a reversal of the laissez-faire approach to currency management that characterized United States policy during the first half of the 1980s.

The watershed event in this change of policy was the September 1985 Plaza Meeting when representatives of the Group of Five (G-5) countries agreed to coordinate efforts to depreciate the dollar. Between the Plaza Meeting and the beginning of 1987 the dollar depreciated almost forty percent against both the Deutschmark and the yen. This apparent policy success was followed by an attempt to stabilize currencies when, on February 22, 1987, officials from the G-5 and Canada met at the Louvre. The ten months following the Louvre meeting was a period of relative exchange rate stability. Policy coordination began to unravel in the early autumn of 1987 and, in the wake of the October 1987 worldwide stock market crash, policy concerns turned towards staving off recession rather than managing currencies. The Federal Reserve responded to the depreciation of the dollar in December 1987 with dollar purchases during the first days of 1988. The subsequent dollar appreciation in the spring and summer of 1988 led to dollar sales by the Federal Reserve. After depreciating in the autumn of 1988 the dollar again began to appreciate in early 1989, reaching a two-and-a-half year high against the yen and Deutschmark in May and June. In response, the United States intervened

with dollar sales in the summer of 1989.⁴

While vague policy goals were announced during this period day-to-day intervention activity was not made public.⁵ The policy focus on exchange rates, however, led to increased scrutiny of intervention by the media. Newspapers regularly reported the perceived activities of the Federal Reserve and other central banks. These newspaper reports represented, up until now, the best information available to researchers on daily intervention activity because of restricted access to intervention data even years after the fact.

In the summer of 1991 the Federal Reserve made available information on its daily intervention in the foreign exchange market during the period from January 1985 to December 1989. These data represent daily intervention activity against the yen and the Deutschemark, listing the actual values of dollar purchases or dollar sales each day. The data relevant for this paper include transactions undertaken in the foreign exchange market between the Federal Reserve and private currency traders.⁶ Daily press reports of intervention are drawn from *The New York Times* and *The Wall Street Journal*. We record a reported intervention if either paper reported dollar sales or dollar purchases by the Federal Reserve. Unlike the actual intervention

⁴Destler and Henning (1989) provide an interesting overview of exchange rate policy in the United States for the period discussed in this paper.

⁵The communiques issued after the Plaza and Louvre meetings, for example, stated very imprecise goals. The communique issued after the Plaza meeting stated that "... exchange rates should better reflect fundamentals than has been the case." (point 17) The G-6 communique issued after the Louvre meeting concludes with "... [the Ministers and Governors] agreed to cooperate closely to foster stability of exchange rates around current levels."

⁶Another category of transaction listed by the Federal Reserve, called "directly with the customer," represents transactions between it and other governmental or quasi-governmental agencies other than central banks of major industrial countries (e.g. the World Bank, the Asian Development Bank, or the central banks of less developed countries). There are only twenty-four cases of intervention "directly with the customer" in the time period we study.

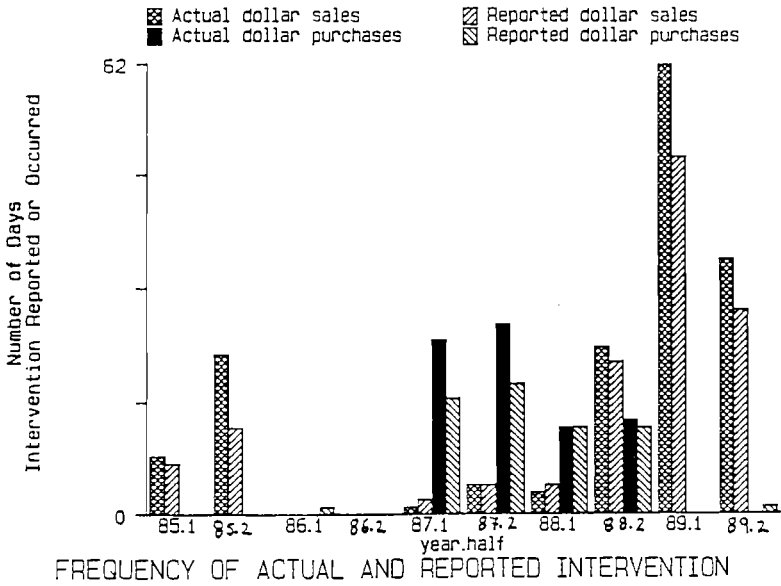
data, the reported data are qualitative. The newspapers typically reported whether the Federal Reserve intervened in the market by purchasing or selling dollars but did not report the perceived size of the intervention.⁷

The frequency of daily intervention in each of the ten six-month periods between the beginning of 1985 and the end of 1989 is shown in Figure 1. This histogram shows both the number of days on which dollar purchases or dollar sales occurred and the number of days they were reported. The most days of reported and actual dollar sales occurred in 1989. In May and June of that year the dollar appreciated to a two-and-a-half year high despite little change in interest differentials. Frequent dollar sales (and reports of dollar sales) also occurred in the wake of the Plaza Meeting in the second half of 1985, and in the second half of 1988 when the dollar appreciated in response to an increase in the discount rate. Actual and reported dollar purchases occurred most frequently in 1987. The purchases in the first half of that year reflected attempts to prop up the dollar in the months following the Louvre while the dollar purchases in the second half of that year were in the wake of the October stock market crash. We also note from the histogram that in almost all periods there were more days on which intervention occurred than days on which intervention was reported.

The first issue we address concerning the accuracy of the reporting of intervention is

⁷For example, a typical newspaper report states "But selling of dollars by the Bank of Japan and West Germany's Bundesbank cooled off the rally yesterday, and there were unconfirmed reports that the Federal Reserve was also intervening against the dollar. The Fed discloses intervention only in quarterly reports to Congress." *New York Times*, October 8, 1985, p. D24. The March 27, 1987 *Wall Street Journal* includes the following; "Coordinated intervention by central banks of the 'Group of Six' industrial nations continued to offset downward pressure on the dollar yesterday, leaving it narrowly mixed in light trading." (p. 28).

FIGURE 1
 FREQUENCY OF ACTUAL AND REPORTED INTERVENTION



qualitative; were days on which intervention occurred accurately identified? The time period we study, from January 1, 1985 until December 31, 1989, includes 1297 observations. Table 1 reports the actual number of days in which the Federal Reserve intervened in the foreign exchange market, the number of days in which intervention was reported, and the relationship between reported and actual intervention. This table breaks down actual intervention activity by the currency against which it occurred (the yen or the Deutschemark) and whether the intervention was dollar purchases or dollar sales.

The information reported in Table 1 shows that the Federal Reserve intervened on 232 of the days in the sample. Dollar purchases occurred on more than twice as many days as dollar sales. There are more days on which dollars were sold for Deutschemarks than for yen, but there were more days on which dollars were purchased with yen than days on which dollars were purchased with Deutschemarks. There were joint dollar sales or dollar purchases of both Deutschemarks and yen on about 40 percent of those days on which the Fed intervened. Intervention was reported less frequently than it actually occurred, with about four-fifths as many reports of intervention as days of actual intervention. While there was intervention by the Federal Reserve on the majority of the days in which intervention was reported, there were also 23 days when intervention was reported but did not take place.

The data in Table 1 is summarized in the conditional probability statistics presented in Table 2. The overall conditional probability that intervention was reported given that it actually occurred is 72 percent. The probability that actual dollar sales for Deutschemarks were reported is higher than the probability that actual dollar sales for yen were reported. There is less difference in conditional probabilities of reported intervention across currencies for dollar

TABLE 1
Number of Days of Reported and Actual Intervention

	<u>Dollar Sales</u>				<u>Dollar Purchases</u>			
	<u>Total</u>	<u>DM</u>	<u>Yen</u>	<u>Both</u>	<u>Total</u>	<u>DM</u>	<u>Yen</u>	<u>Both</u>
Actual Intervention	158	130	88	60	74	37	65	28

of which:

Reported and Actual	113	99	55	41	53	27	48	22
Actual, but not Reported	45	31	33	19	21	10	17	6
Reported Intervention	127				62			

of which:

Reported and Actual	113				53			
Reported but not Actual	14				9			

TABLE 2
Conditional Probabilities of Reported and Actual Intervention

	<u>Dollar Sales</u>				<u>Dollar Purchases</u>			
	<u>Total</u>	<u>DM</u>	<u>Yen</u>	<u>Both</u>	<u>Total</u>	<u>DM</u>	<u>Yen</u>	<u>Both</u>
Prob(Reported Actual)	.72	.76	.63	.68	.72	.73	.74	.79
Prob(Actual Reported)	.89				.85			

purchases than for dollar sales. The conditional probability that intervention occurred given that it was reported is 88 percent, with a slightly higher probability for dollar sales than for dollar purchases.⁸

We next turn to quantitative comparisons between reported and unreported intervention. In Table 3 we present the ranges of Federal Reserve dollar purchases and dollar sales by currency and by whether or not the intervention was reported. The data in Table 3 demonstrates that there is considerable overlap between those interventions which are reported and those which are not reported. Despite this overlap, Table 4 demonstrates that there are large and significant differences between the average size of interventions which were reported and those which were not reported. The average size of dollar purchases by the Federal Reserve which were reported was \$210 million while the average size of interventions which were not reported was \$107 million. This difference is statistically significant at the 5 percent level. Likewise, the average intervention on those days on which dollar sales were reported by *The New York Times* or *The Wall Street Journal*, which was \$227 million, was significantly larger than the average intervention of \$133 million on those days on which the intervention was not reported. The significantly larger value of interventions which were reported as compared to those which were not reported holds across currencies and across the direction of intervention. All differences in means are statistically significant at the 5 percent level but for dollar purchases of Deutschmarks, in which case the difference is statistically significant at the 10 percent level.

These findings suggest that intervention is more likely to be reported the larger its size.

⁸The probabilities of actual intervention given reported intervention cannot be disaggregated by currencies since newspaper reports do not specify the currency purchased or sold by the Federal Reserve.

TABLE 3
Ranges of Reported and Unreported Interventions

<u>Type of Intervention</u>	<u>Reported</u>	<u>Not Reported</u>
<i>Total Intervention:</i>		
Dollar Purchases	\$10 mil. - \$ 720 mil.	\$ 3 mil. - \$438 mil.
Dollar Sales	\$ 3 mil. - \$ 1250 mil.	\$6 mil. - \$480 mil.
<i>Intervention Against Deutschemark:</i>		
Dollar Purchases	\$ 30 mil. - \$ 395 mil.	\$15 mil. - \$ 265 mil.
Dollar Sales	\$ 25 mil. - \$ 797 mil.	\$ 10 mil. - \$ 400 mil.
<i>Intervention Against Yen:</i>		
Dollar Purchases	\$10 mil. - \$720 mil.	\$ 3 mil. - \$ 319 mil.
Dollar Sales	\$ 3 mil. - \$ 555 mil.	\$ 6 mil. - \$ 380 mil.

TABLE 4
Means of Reported and Unreported Interventions

<u>Type of Intervention</u>	<u>Means</u>		t-statistic for <u>difference in means</u>
	<u>Reported</u>	<u>Not Reported</u>	
<i>Total Intervention:</i>			
Dollar Purchases	\$210 mil.	\$107 mil.	3.12
Dollar Sales	\$227 mil.	\$133 mil.	3.79
<i>Intervention Against Deutschemark:</i>			
Dollar Purchases	\$138 mil.	\$ 77 mil.	1.91
Dollar Sales	\$166 mil.	\$ 91 mil.	3.40
<i>Intervention Against Yen:</i>			
Dollar Purchases	\$154 mil.	\$ 87 mil.	2.37
Dollar Sales	\$167 mil.	\$ 96 mil.	3.22

This question is distinct from the issue addressed in Table 4 since that analysis is conditional on intervention having actually occurred and thus only includes those days when the Federal Reserve intervened. In the multinomial logit analysis presented below we investigate whether the likelihood of a report of intervention is related to the size of the actual dollar purchases or dollar sales that day. This analysis considers the full data set, including days on which there was no intervention but intervention was reported and days on which there was no intervention and none was reported, as well as days when the Federal Reserve actually intervened.

We hypothesize that the probability of a report of intervention on a particular day depends upon the actual intervention activity undertaken that day, with larger interventions more likely to be reported. We consider the possibility of three distinct outcomes; a report of a sale of dollars by the Federal Reserve on day t , S_t , a report of a purchase of dollars by the Federal Reserve, P_t , or no newspaper reports of intervention, N_t . The independent variable in our analysis is the actual intervention on day t , which we define as I_t .⁹ We characterize the relationship between the report of an intervention and the actual size of the intervention that day using the multinomial logistic distribution as follows;¹⁰

$$Prob(S_t | I_t) = \frac{\exp(\beta_0 + \beta_1 I_t)}{1 + \exp(\beta_0 + \beta_1 I_t) + \exp(\gamma_0 + \gamma_1 I_t)}$$

⁹The intervention variable I_t is actually a vector that represents dollar sales and dollar purchases separately, and may also include separate elements representing dollar sales or dollar purchases by the currency against which intervention occurred.

¹⁰See Maddala (1983) for a discussion of multinomial logit estimation.

$$Prob(P_t | I_t) = \frac{\exp(\gamma_0 + \gamma_1 I_t)}{1 + \exp(\beta_0 + \beta_1 I_t) + \exp(\gamma_0 + \gamma_1 I_t)}$$

$$Prob(N_t | I_t) = \frac{1}{1 + \exp(\beta_0 + \beta_1 I_t) + \exp(\gamma_0 + \gamma_1 I_t)}$$

where β_1 and γ_1 are positive. We can rewrite these equations in terms of the logarithms of the odds ratios as follows;

$$\log\left(\frac{Prob(S_t)}{Prob(N_t)} \mid I_t\right) = \beta_0 + \beta_1 I_t$$

$$\log\left(\frac{Prob(P_t)}{Prob(N_t)} \mid I_t\right) = \gamma_0 + \gamma_1 I_t$$

These odds ratios demonstrate that the larger the actual intervention undertaken the more likely that this intervention is reported. Thus, the larger the dollar sales on a particular day, the more likely that there is a newspaper report of dollar sales that day (i.e. β_1 is positive) and the larger the actual purchase of dollars on a particular day the more likely that there is a report of dollar purchases on that day (i.e. γ_1 is positive).

Table 5 reports the results of estimating two versions of this multinomial logit model. The first regression does not distinguish intervention by the currency against which the Federal Reserve intervened. The coefficients in this regression are of the expected sign and are highly

TABLE 4
Multinomial Logit Analysis of Likelihood of Reports of Interventions

Regression	Dollar Sales		Dollar Purchases	
	β_0	β_1	γ_0	γ_1
L. No distinction by currency of intervention	3.32 (0.16)	0.026 (0.002)	-3.91 (0.21)	0.032 (0.003)

Percent Correctly Predicted: 92 %

Regression	Dollar Sales			Dollar Purchases		
	β_0	β_1^{DM}	$\beta_1^{\$}$	γ_0	γ_1^{DM}	$\gamma_1^{\$}$
II. Distinguish by currency of intervention	-3.44 (.17)	0.039 (.004)	0.019 (.003)	-3.91 (0.22)	0.031 (.008)	0.032 (.004)

Percent Correctly Predicted: 93 %

significant. The second regression disaggregates intervention by the currency against which the Federal Reserve intervened (noted by the superscripts DM or ¥ on the coefficients). Again, the coefficients are of the expected sign and highly significant. Both regressions correctly predict over 90 percent of the data points. These results provide evidence that the likelihood of a report of intervention increases with the size of the actual intervention on that day.

3. Conclusion

The role of currency transactions by central banks in providing information to the foreign-exchange market is a central focus of recent theoretical and empirical investigation of the efficacy of intervention. This paper provides an empirical study of the accuracy of the market's perception of the activities of the Federal Reserve between 1985 and 1989. This period was one in which exchange rate management was an important focus of policy debate. The evidence provided in this paper demonstrates that the conditional probability of intervention occurring given that it was reported was about 88 percent and that the conditional probability of intervention being reported given that it occurred was about 72 percent. Interventions which were reported were significantly larger than those which were not reported. Also, the likelihood of an intervention being reported increased with the size of the intervention. These results contribute to our understanding of the workings of the foreign exchange market along the important dimension of the manner in which the market perceives the actions of the Federal Reserve.

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