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# Exchange Rate Policy Strategies and Foreign Exchange Interventions in the Group of Three Economies

MARCEL FRATZSCHER

The literature on the pattern and effectiveness of official interventions in foreign exchange markets has continued to grow significantly in recent years. Much of the literature has focused on the Group of Three (G-3) economies, for which data on actual foreign exchange intervention have become available recently (for comprehensive surveys, see Sarno and Taylor 2001, Edison 1993). The growth in this literature is nevertheless somewhat puzzling because US and euro area authorities, including their predecessors, basically abandoned actual interventions in foreign exchange markets almost a decade ago. Between 1990 and 1995, the United States and Germany bought or sold foreign exchange on 83 days and 82 days, respectively. Since mid-1995, however, the US Federal Reserve has intervened only twice—both times in coordination with other countries' central banks—and the European Central Bank has also acted merely twice in foreign exchange markets. Only Japan continues to conduct regular foreign exchange interventions, which increased both in frequency and in magnitude in 2003.

A key point that has not received much attention in the literature so far is that monetary authorities have not one but *two* policy instruments to directly influence exchange rates: actual interventions as well as oral interventions—that is, public statements about the desired level or direction of

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the exchange rate. In this chapter, I argue that G-3 exchange rate policies underwent a fundamental regime change in the 1990s as oral interventions essentially replaced actual interventions as the primary policy tool for affecting exchange rates in both the United States and the euro area.

The objective of this chapter is to identify and characterize the *strategies* and *pattern* of exchange rate policy among the G-3 policymakers during the past 15 years. The chapter is a companion paper to an article I wrote (Fratzscher 2004) focusing solely on the *effectiveness* of actual and oral intervention policies. The analyses of the two papers are based on the same data set of oral interventions (derived from reports from news wire services) and of actual interventions (as provided by G-3 central banks).

The chapter analyzes the questions of what induces policymakers in the G-3 economies to intervene and conduct actual interventions, and whether one can identify a motivation and pattern behind oral intervention policies. The literature for actual interventions has argued that such interventions are systematically related to (1) monetary policy conditions, (2) past and/or future monetary policy changes, (3) the past exchange rate trend and the deviation from sustainable exchange rate, (4) the degree of market uncertainty, and (5) the extent to which actual interventions are coordinated.

The particular questions this chapter therefore asks are: Do G-3 actual interventions indeed follow a pattern related to these factors? And do oral interventions show a similar pattern? The chapter uses a binomial logit model to answer these questions for G-3 actual and oral interventions since 1990. The chapter has two key findings. First, both actual interventions and oral interventions indeed follow a well-defined pattern. Second, an important result is that the two types of interventions are quite distinct in that, overall, actual interventions seem to follow a more well-defined pattern than oral interventions.

Moreover, actual and oral interventions tend to (1) follow a “leaning against the wind” pattern against the exchange rate trend; (2) be more frequent when exchange rate deviations and volatility are high; (3) be mostly consistent with and supportive of monetary policy changes, both before and after these changes occur; and (4) be coordinated domestically and internationally. There are also some distinct differences in exchange rate policy strategies across the G-3 countries.

The remainder of the chapter is organized as follows. The second section outlines the data on actual and oral interventions and presents several stylized facts of the exchange rate strategies since the 1990s. The third section sheds light on the question of what may explain the regime change in G-3 foreign exchange policies over the past decade, and it compares the evidence on the effectiveness found in the literature about actual interventions relative to oral interventions. The fourth section outlines the empirical methodology and results for identifying the pattern of actual and oral intervention policies, based on a binomial logit model and the derived odds ratio. The fifth section offers conclusions.

**Table 11.1 Group of Three actual foreign exchange (FX) interventions, 1990–2003**

Period	US Federal Reserve			Bundesbank / ECB			Bank of Japan		
	All	Buy FX	Sell FX	All	Buy FX	Sell FX	All	Buy FX	Sell FX
<b>Number of intervention days</b>									
1990–2003	84	27	57	87	43	44	278	251	27
1990–94	74	25	49	79	39	40	131	104	27
1995–98	9	1	8	4	4	0	59	59	0
1999–2003	1	1	0	4	0	4	88	88	0
<b>Magnitude of interventions</b> (average, millions of dollars)									
1990–2003	284	202	323	1,591	2,589	617	1,554	1,697	223
1990–94	203	125	242	1,709	2,811	634	385	427	223
1995–98	821	833	819	419	419	—	1,706	1,706	—
1999–2003	1,500	1,500	—	n.a.	—	n.a.	3,192	3,192	—

— = no actual interventions of this type took place in the subperiod.

n.a. = not available

ECB = European Central Bank

Sources: US Federal Reserve, Bundesbank, European Central Bank, Bank of Japan.

## The Regime Shift in Exchange Rate Policy

Publicly available data on actual interventions show that the authorities in the United States and in the euro area intervened frequently before 1995 but have basically abandoned such interventions, intervening only during two episodes since 1995 (table 11.1). By contrast, Japanese authorities have increased their actual interventions in recent years, both in frequency and in magnitude. For the United States and the euro area, it is therefore somewhat puzzling why there is still a large and continuously growing literature on the effects and effectiveness of actual foreign exchange interventions, when in fact such interventions have all but stopped in these economies.

Looking at the behavior of monetary authorities shows that increased communication on exchange rates, or what I call oral interventions, have replaced actual intervention policies in the United States and in the euro area. To measure oral interventions, I employ the methodology used in Fratzscher (2004) to extract all statements about exchange rates by the relevant policymakers in the G-3 economies since 1990 from a commonly used wire service, Reuters News. These statements are then transformed into an indicator function,  $IO_t$ , with  $IO_t = 1$  if the statement supports a stronger domestic currency,  $IO_t = -1$  if it promotes a weaker currency, and  $IO_t = 0$  if there is no statement on any given day during the sample period 1990–2003.

The search criteria are based on (1) the name or title of the relevant policymaker and (2) the word “exchange rate” or the name of the domestic currency. Exchange rate policy in the United States and Japan lies in the realm

of the finance ministries, so that the statements extracted are therefore those of the secretary and his deputy in each country. By contrast, exchange rate policy is the domain of the central banks in the euro area, and the policymakers whose statements are extracted are the members of the Bundesbank Zentralbankrat before 1999 and the European Central Bank's Governing Council after 1999.<sup>1</sup> A more detailed analysis and explanation of the database is available in Fratzscher (2004).

Table 11.2 shows that there has been a clear shift toward a "strong-dollar policy" in the United States with the beginning of Bill Clinton's administration in 1993, which has continued also in recent years despite a rather strong US dollar exchange rate. Policymakers in the euro area have similarly pursued a "strong-euro policy," although they were less adamant about this policy in some periods, including the first months after the introduction of the euro in 1999. By contrast, Japan altered its communication policy about the yen several times in the 1990s and 2000s, promoting a strong yen in the early 1990s and briefly in 1998, while otherwise arguing for a weaker yen during the past 14 years.

## **Explaining the Regime Change: The Effectiveness of Interventions**

Why have the United States and the euro area effectively stopped conducting actual interventions in foreign exchange markets, and why have they used primarily oral interventions instead? The answer to this question does not seem to lie in the behavior of exchange rates, for the major world currencies have experienced significant changes and misalignments in recent years. Even the sharp drop of the dollar-euro exchange rate to close to 0.82 in late 2000 and in mid-2001 triggered only two episodes of interventions between September and November 2000. Moreover, a significant change in the monetary policy strategy in the two economies has also not taken place. In fact, the rise in openness of both during the past two decades has made them more rather than less exposed to exchange rate developments.

Two findings that emerge from the literature on foreign exchange interventions go a long way toward explaining the observed regime shift in instruments from actual to oral interventions: the uncertain effectiveness and the time-consistency problem of actual interventions. Concerning uncertain effectiveness, the seminal work by Kathryn Dominguez and Jeffrey Frankel (1993) finds evidence that some intervention episodes in the 1980s may indeed have been partly successful. However, the recent literature

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1. There were relatively fewer additional statements on exchange rates by central bank officials in the United States and Japan, and by finance ministry officials in the euro area. Adding such statements, however, does not significantly alter the empirical results presented below.

**Table 11.2 Group of three oral foreign exchange interventions, 1990–2003**

Period	United States		Euro area		Japan	
	Strengthen	Weaken	Strengthen	Weaken	Strengthen	Weaken
<b>Number of intervention days</b>						
1990–2003	125	30	77	37	66	71
1990–1994	18	15	13	4	34	16
1995–1998	31	5	3	15	16	4
1999–2003	76	10	61	18	16	51

Sources: Reuters News, author's categorization.

using data for interventions in the 1980s and 1990s reveals much less compelling evidence that actual interventions have had a significant effect on the level of exchange rates and also shows that actual market interventions by central banks are frequently counterproductive in that they merely raise market uncertainty and volatility (e.g., Baillie and Osterberg 1997; Beine, Bénassy-Quéré, and Lecourt 2002).

Concerning the time-consistency problem, a key finding in the literature is that actual interventions tend to be more successful if they are publicly announced and if they are coordinated. However, the time-consistency problem states that publicly announced interventions may trigger speculative behavior by investors, which in turn may make the actual intervention costly and possibly counterproductive (Flood and Marion 2000). This time-consistency problem may partly explain why most actual interventions are in fact conducted in secret (Sarno and Taylor 2001).

In more recent work, researchers (e.g., Ito 2002) find that actual foreign exchange interventions may indeed be effective in the G-3 economies, but that the *magnitude* of the interventions needs to be relatively large to have a significant effect on the level of the exchange rate. For instance, Ito's (2002) results indicate that a \$17 billion purchase in exchange for yen of the Bank of Japan is needed to depreciate the yen by 1 percent against the dollar.

Fratzscher (2004) compares the effectiveness of actual interventions with that of oral intervention policies by the G-3. The paper analyzes the impact of actual and oral interventions by the G-3 economies in the period 1990–2003. Using daily intervention data, the empirical findings of the paper show that both types of intervention have a significant effect on exchange rates on intervention days. An oral intervention by monetary authorities in the United States, Japan, and the euro area is shown to move exchange rates in the desired direction by, on average, about 0.20 percent on the intervention day. The results for the effectiveness of actual interventions differs across the G-3 economies. For the United States and Germany, which intervened almost exclusively before 1996, the effect of a given intervention amount on exchange rates is significantly larger than that for Japan, which has intervened heavily, in particular since 2002. This finding suggests

that in an environment of more closely integrated global financial markets and rapidly rising trade volumes, an ever larger intervention amount is required to move the exchange rate by the desired magnitude.

Another key result of Fratzscher (2004) is that there are strong asymmetries in the effects of oral and actual interventions. A particularly striking result is that an oral intervention that goes *against* the prevalent policy mantra—that is, a statement by US and euro area policymakers that attempts to weaken the dollar or the euro—is substantially more effective in influencing exchange rates than are statements that confirm the existing policy mantra. For instance, statements by US officials to weaken the dollar have tended to depreciate the dollar by as much as 1 percent, on average, on the day of the statement, whereas statements to strengthen the dollar had a much smaller influence. There are similar results for the euro area and Japan, and also for the effectiveness of actual interventions.

However, there are several key differences between oral and actual interventions. Most important, actual interventions tend to be effective only under very specific market conditions. For instance, actual interventions tend to be effective only when they move in the same direction as the previous exchange rate trend (again, leaning-with-the-wind interventions), if they are consistent with the monetary policy trend and monetary policy decisions, and frequently only if they are coordinated internationally.

By contrast, oral intervention policies tend to be quite different, in the sense that they are effective in moving the level of the exchange rate in the desired direction quite independently of market conditions and circumstances. Although oral interventions are also more effective if they are coordinated and are consistent with monetary policy decisions and the previous direction of the exchange rate, this type of intervention can be effective even if these conditions are not present.

A further key difference is that oral interventions tend to *lower* exchange rate volatility, whereas actual interventions almost always *raise* it. This is an important difference, because foreign exchange policy may often have the objective of stabilizing the movements of exchange rates and foreign exchange markets, as for instance expressed by the Group of Seven in the 1987 Louvre Accord; that is, they focus on the volatility of exchange rates rather than their levels. This distinction also underlines the fundamental difference between these two types of interventions: Oral interventions provide a public and transparent signal to the markets about policymakers' views and intentions, thereby reducing uncertainty. By contrast, actual interventions are frequently conducted in secret and therefore do not provide public information, thus raising market uncertainty and volatility. The important result of Fratzscher (2004) is not only that there are key differences between actual and oral intervention policies but also that oral interventions constitute a relatively autonomous tool for policymakers in the G-3 economies.

## Patterns and Strategies of Oral and Actual Interventions

Foreign exchange interventions by monetary authorities tend to have an objective. The focus of this chapter is therefore: What is this objective? The literature has focused on three broad characteristics of foreign exchange interventions: exchange rate developments, monetary policy, and the coordination of interventions. First, interventions have been shown to focus on achieving a particular level, reducing deviations from what authorities believe are sustainable levels or lowering volatility. In particular, actual interventions often attempt to lean against the wind, in that they try to reverse a particular trend (Edison 1993, Sarno and Taylor 2001).

Second, several studies have argued that there may be a close relation between foreign exchange interventions and monetary policy. Through the signaling channel, foreign exchange interventions may be used by authorities to signal to the markets the timing and direction of future monetary policy changes. On the contrary, there is also some evidence that central banks in the 1980s intervened *after* a monetary policy change and in the opposite direction to reverse some of the undesired exchange rate effects of monetary policy changes (Lewis 1995; Kaminsky and Lewis 1996; Bonser-Neal, Roley, and Sellon 1998).

Third, monetary authorities in the past have frequently coordinated their interventions across countries to raise the effectiveness of the signal on exchange rates (Bonser-Neal and Tanner 1996; Beine, Bénassy-Quéré, and Lecourt 2002). But coordination may occur not only across countries. Because I analyze in this chapter not only actual interventions but also particularly oral interventions, the coordination may also imply that interventions are coordinated domestically, in that several actual or oral interventions occur in a short period of time. In addition, authorities may use both actual and oral interventions together to increase their effect on the exchange rate.

I conduct a logit analysis to identify whether there is a systematic pattern of oral and actual interventions. In this analysis, the dependent variable is the intervention itself, where  $Y_t = 1$  for those days when an intervention occurred and  $Y_t = 0$  when no intervention occurred. The explanatory variables  $X_t$  are those related to exchange rate developments, monetary policy conditions, and coordination. The multivariate logit model, with the vector of independent variables  $X_j$ , is defined as

$$\Pr(Y = 1) = F(X_j\beta) = \frac{e^{X_j\beta}}{1 + e^{X_j\beta}} \quad (11.1)$$

From the logit model, I derive odds ratios for each of the independent variables that indicate whether an intervention is more likely to occur under condition  $X_1$  than under  $X_0$ :

**Table 11.3 Pattern of odds ratio related to exchange rate developments**

		(1) Past exchange rate trend <sup>a</sup>		(2) Deviation from PPP <sup>b</sup>		(3) Exchange rate volatility <sup>c</sup>	
		$X_1$ : Depreciation		$X_1$ : Large deviation		$X_1$ : High	
		$X_0$ : Appreciation		$X_0$ : Small deviation		$X_0$ : Low	
		Odds ratio	SE	Odds ratio	SE	Odds ratio	SE
<b>Oral interventions</b>							
United States, $IO^{US}$	All	1.406**	0.234	0.862	0.143	1.205	0.210
	Strengthen	1.481**	0.275	0.800	0.148	0.995	0.198
	Weaken	1.115	0.410	1.171	0.429	2.386**	0.876
Germany/euro area, $IO^{GEEA}$	All	0.975	0.185	2.001***	0.392	1.174	0.237
	Strengthen	0.901	0.208	2.989***	0.761	1.008	0.254
	Weaken	1.144	0.374	0.946	0.310	1.551	0.518
Japan, $IO^{JA}$	All	0.654**	0.116	1.035	0.180	1.680***	0.301
	Strengthen	1.355	0.342	0.463***	0.125	2.578***	0.642
	Weaken	0.310***	0.085	2.146***	0.543	1.063	0.279
<b>Actual interventions</b>							
United States, $IA^{US}$	All	1.616**	0.391	1.051	0.247	2.162***	0.510
	Strengthen	4.832***	1.882	1.588	0.472	1.768*	0.526
	Weaken	0.884	0.149	0.490*	0.207	2.987***	1.162
Germany/euro area, $IA^{GEEA}$	All	0.930	0.296	1.590	0.511	9.728***	3.862
	Strengthen	2.328**	0.992	0.857	0.341	10.120***	5.049
	Weaken	0.079**	0.082	7.060**	5.397	8.759***	5.714
Japan, $IA^{JA}$	All	0.256***	0.038	5.322***	0.846	1.509***	0.197
	Strengthen	1.155	0.379	0.091***	0.055	1.169	0.410
	Weaken	0.187***	0.032	17.024***	4.446	1.558***	0.217

SE = standard error; in italics

\*\*\*, \*\*, and \* indicate significance at 99, 95, and 90% respectively.

PPP = purchasing power parity

a. "Depreciation" and "appreciation" mean that oral interventions ( $IO$ ) or actual interventions ( $IA$ ) occur when exchange rate has been depreciating or appreciating over past two weeks.

b. "Large deviation" means that  $IO$  or  $IA$  occur when level of exchange rate deviates more than its period median from the PPP exchange rate; "small deviation" implies the opposite.

c. "High" means that  $IO$  or  $IA$  occur in periods when exchange rate volatility is high, i.e., above its median value, in the past two weeks, and "low" when the intervention happens during periods of low volatility.

$$\frac{\Pr(Y = 1|X_1)}{\Pr(Y = 1|X_0)} = e^{(X_1 - X_0)\beta} \quad (11.2)$$

If this odds ratio is larger than 1, then an intervention is more likely to occur when conditions  $X_1$  are present compared with  $X_0$ . When the odds ratio is smaller than 1, then this is accordingly less likely. In the case of a dummy variable, such that  $X_1: X = 1$  and  $X_0: X = 0$ , the odds ratio simplifies to  $e^\beta$ .

Tables 11.3, 11.4, and 11.5 show the odds ratios  $e^\beta$  for the various hypotheses related to exchange rates, monetary policy, and coordination that have been discussed above. Note that the null hypothesis for each of

**Table 11.4 Pattern of odds ratio related to monetary policy**

Intervention		(4) Direction of monetary policy <sup>a</sup>		(5) Change in next monetary policy meeting <sup>b</sup>		(6) Change in last monetary policy meeting <sup>c</sup>		
		<i>X</i> <sub>1</sub> : Tightening <i>X</i> <sub>0</sub> : Easing	Odds ratio	SE	<i>X</i> <sub>1</sub> : Same direction <i>X</i> <sub>0</sub> : Not same direction	Odds ratio	SE	<i>X</i> <sub>1</sub> : Same direction <i>X</i> <sub>0</sub> : Not same direction
<b>Oral interventions</b>								
United States, <i>IO</i> <sup>US</sup>	All	1.441**	0.242	1.512*	0.341	1.720**	0.380	
	Strengthen	1.885***	0.345	1.466	0.384	1.798**	0.476	
	Weaken	0.325**	0.175	1.623	0.712	1.531	0.605	
Germany/euro area, <i>IO</i> <sup>GE/EA</sup>	All	0.881	0.186	1.971**	0.550	1.910**	0.544	
	Strengthen	1.245	0.301	2.218**	0.864	2.612**	1.047	
	Weaken	0.345**	0.166	1.731	0.685	1.413	0.577	
Japan, <i>IO</i> <sup>JA</sup>	All	0.941	0.270	0.629	0.325	0.411	0.243	
	Strengthen	2.278***	0.697	17.279***	15.809	0.877	0.912	
	Weaken	0.589	0.388	0.160*	0.162	0.326	0.235	
<b>Actual interventions</b>								
United States, <i>IA</i> <sup>US</sup>	All	0.405***	0.129	0.412**	0.174	1.189	0.412	
	Strengthen	0.571	0.204	1.188	0.768	1.784	1.130	
	Weaken	0.169**	0.124	0.221**	0.135	1.002	0.419	
Germany/euro area, <i>IA</i> <sup>GE/EA</sup>	All	4.380***	1.944	0.977	0.443	0.813	0.398	
	Strengthen	5.554***	2.116	0.199	0.203	0.572	0.352	
	Weaken	3.073**	1.663	4.425**	2.805	2.203	1.910	
Japan, <i>IA</i> <sup>JA</sup>	All	0.284***	0.089	1.371***	0.303	0.528**	0.166	
	Strengthen	0.708	0.428	1.889***	0.303	0.505**	0.158	
	Weaken	0.128***	0.046	0.956	0.772	0.535**	0.169	

SE = standard error; in italics

\*\*\*, \*\*, and \* indicate significance at 99, 95, and 90% respectively.

- “Tightening” and “easing” mean that oral interventions (*IO*) or actual interventions (*IA*) occur during a period when monetary policy rates are being raised and lowered, respectively.
- “Same direction” means that *IO* or *IA* occur in the same direction of the change in the next monetary policy meeting, i.e., an intervention to strengthen the domestic currency when the central bank will raise interest rates in the next meeting or an intervention to weaken it when the central bank will lower interest rates.
- “Same direction” means that *IO* or *IA* occur in the same direction of the change in the last monetary policy meeting, i.e., an intervention to strengthen the domestic currency when the central bank has raised interest rates in the last meeting or an intervention to weaken it when the central bank has lowered interest rates.

the tests is  $e^\beta = 1$ . It should also be noted that the model shown for the bivariate case in equations 11.1 and 11.2 above is estimated in a multivariate setting, with *X* being a vector of the dummy variables capturing the different conditioning variables relating to the exchange rate, monetary policy, and coordination, as shown in tables 11.3 through 11.5. Estimating this multivariate model thus allows controlling, as much as possible, for

**Table 11.5 Pattern of odds ratios related to coordination**

Interventions		(7) Coordination with past <i>IO/IA</i> <sup>a</sup>		(8) Coordination with domestic <i>IO/IA</i> <sup>b</sup>		(9) Coordination with foreign <i>IO/IA</i> <sup>c</sup>	
		<i>X</i> <sub>1</sub> : Coordination <i>X</i> <sub>0</sub> : No coordination		<i>X</i> <sub>1</sub> : Coordination <i>X</i> <sub>0</sub> : No coordination		<i>X</i> <sub>1</sub> : Coordination <i>X</i> <sub>0</sub> : No coordination	
		Odds ratio	<i>SE</i>	Odds ratio	<i>SE</i>	Odds ratio	<i>SE</i>
<b>Oral interventions</b>							
United States, <i>IO</i> <sup>US</sup>	All	3.033***	<i>0.502</i>	1.090	<i>0.287</i>	1.723***	<i>0.301</i>
	Strengthen	3.814***	<i>0.709</i>	0.846	<i>0.271</i>	1.850***	<i>0.354</i>
	Weaken	1.068	<i>0.427</i>	2.225*	<i>1.023</i>	1.211	<i>0.502</i>
Germany/euro area, <i>IA</i> <sup>GE/EA</sup>	All	3.559***	<i>0.679</i>	0.608	<i>0.213</i>	1.755***	<i>0.339</i>
	Strengthen	4.376***	<i>1.020</i>	0.498	<i>0.232</i>	1.519*	<i>0.362</i>
	Weaken	2.189**	<i>0.732</i>	0.852	<i>0.452</i>	2.263**	<i>0.740</i>
Japan, <i>IO</i> <sup>JA</sup>	All	2.853***	<i>0.500</i>	2.102***	<i>0.385</i>	2.061***	<i>0.363</i>
	Strengthen	3.199***	<i>0.798</i>	1.273	<i>0.362</i>	1.743**	<i>0.441</i>
	Weaken	2.448***	<i>0.590</i>	3.081***	<i>0.746</i>	2.332***	<i>0.561</i>
<b>Actual interventions</b>							
United States, <i>IA</i> <sup>US</sup>	All	12.675***	<i>3.132</i>	0.728	<i>0.203</i>	5.486***	<i>1.572</i>
	Strengthen	34.337***	<i>10.874</i>	0.939	<i>0.308</i>	1.604	<i>0.847</i>
	Weaken	1.325	<i>0.866</i>	0.425	<i>0.231</i>	16.928***	<i>6.643</i>
Germany/euro area, <i>IA</i> <sup>GE/EA</sup>	All	12.315***	<i>4.083</i>	0.992	<i>0.353</i>	8.737***	<i>2.963</i>
	Strengthen	29.678***	<i>12.172</i>	0.783	<i>0.366</i>	1.228	<i>0.897</i>
	Weaken	1.299	<i>0.953</i>	1.455	<i>0.814</i>	15.334***	<i>5.691</i>
Japan, <i>IA</i> <sup>JA</sup>	All	1.630**	<i>0.393</i>	1.500***	<i>0.195</i>	5.461***	<i>0.910</i>
	Strengthen	26.271***	<i>8.829</i>	2.388***	<i>0.780</i>	1.817	<i>0.969</i>
	Weaken	0.799	<i>0.556</i>	1.367**	<i>0.192</i>	5.967***	<i>1.028</i>

*SE* = standard error; in italics

\*\*\*, \*\*, and \* indicate significance at 99, 95, and 90% respectively.

- Coordinated intervention means that, in case of oral interventions (*IO*), *IO* is preceded by at least one other domestic *IO* in same direction in previous two weeks. In case of actual interventions (*IA*), it implies that *IA* is preceded by at least one other domestic *IA* in same direction in previous two weeks.
- Coordinated intervention means that, in case of *IO*, *IO* is preceded by at least one *IA* in same direction in previous two weeks. In case of *IA*, it implies that *IA* is preceded by at least one *IO* in same direction in previous two weeks.
- Coordinated intervention means that, in case of *IO*, *IO* is preceded by at least one *IO* in same exchange rate direction by foreign authority in previous two weeks; and analogously in case of *IA*.

omitted variables. However, this potential problem proved to be of minor importance because the different independent variables mostly exhibit a low degree of correlation.

## Past Exchange Rate Developments

With regard to exchange rates, G-3 monetary authorities seem to have been conducting leaning-against-the-wind actual interventions (model 1; see

table 11.3). The US Federal Reserve has been intervening to strengthen the dollar 4.8 times more often when the dollar was depreciating compared with when it was appreciating. By contrast, the Bank of Japan also frequently conducted leaning-against-the-wind actual interventions, but it took the opposite direction: A Bank of Japan actual intervention to weaken the yen was about five times more likely when the yen had been appreciating (with an odds ratio of 0.187 in model 1). The most systematic leaning-against-the-wind actual intervention behavior is found for Germany, where the Bundesbank has been intervening against the exchange rate trend both when the deutsche mark was depreciating and when it was appreciating.

For actual interventions, there is also evidence that all of the G-3 central banks intervened more frequently when the deviation of the domestic currency was large from its average purchasing power parity level over the sample<sup>2</sup> (model 2) and in periods of high exchange rate volatility (model 3).

An important finding is that for oral interventions, there is much less evidence that authorities have been using public statements in a systematic manner to the same extent that actual interventions have been used. Most important, there is no empirical evidence that euro area authorities' oral interventions were leaning either against the wind or with the wind. For the United States and Japan, there is some evidence for the leaning-against-the-wind hypothesis, though the strength of this behavior is substantially smaller for oral intervention policy than for actual interventions. Finally, there is also less evidence that G-3 oral interventions reacted to large currency deviations and to high market volatility to the same extent as actual interventions have done.

## Monetary Policy Trends and Changes

With regard to monetary policy, the overall finding is that both oral interventions and actual interventions have been consistent with the monetary policy cycle and changes in the G-3 economies. In most cases, interventions to strengthen the domestic currency have occurred in periods of rising interest rates, and those to weaken the currencies in times of falling interest rates (model 4; see table 11.4).

There is also evidence for the signaling hypothesis in that actual and oral interventions have tended to occur more frequently before monetary policy changes, and that these interventions were consistent with monetary policy decisions (model 5).

Finally, I do not detect evidence for the leaning-against-the-wind hypothesis of monetary policy, found in Lewis (1995) and Kaminsky and

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2. Purchasing power parity deviations are measured as deviations from the average real exchange rate against the US dollar for Japan and the Germany / euro area, and a trade-weighted real exchange rate against the yen and the euro for the United States.

Lewis (1996) for the 1980s. In other words, monetary policy changes do not lead to more frequent interventions in the opposite direction—for example, an attempt to strengthen the exchange rate after lowering interest rates, if interest rates have been changed at the last monetary policy meeting (model 6).

## Coordination of Actual and Oral Interventions

There is ample proof that interventions tend to be coordinated, both domestically and across countries. There is particularly strong evidence that oral interventions and actual interventions have been clustered in time; that is, many of them occur within a few days or weeks of other such domestic interventions (model 7; see table 11.5). Both actual and oral interventions are also frequently coordinated across the G-3 economies (model 9). Moreover, oral interventions are frequently followed within days by actual interventions, and vice versa, in Japan (model 8). By contrast, oral interventions do not seem to be much coordinated with actual interventions in the United States and in Germany / the euro area. This is likely to reflect the fact that the United States and Germany / the euro area basically stopped conducting actual foreign exchange interventions in 1995.

## Conclusions

The objective of this chapter has been to analyze the strategy that G-3 policymakers have pursued with their oral and actual interventions. Overall, both oral and actual interventions indeed follow a particular pattern related to exchange rate developments, monetary policy, and coordination. However, a key finding is that actual intervention policies seem to be systematic to a sometimes substantially larger extent than oral ones. More generally, actual and oral interventions tend to (1) follow a leaning-against-the-wind pattern against the exchange rate trend; (2) be more frequent when exchange rate deviations and volatility are high; (3) be mostly consistent with and supportive of monetary policy changes, both before and after these changes occur; and (4) be coordinated domestically and internationally. Moreover, clear differences exist in intervention policies across countries: US and German / euro area authorities have tended to intervene to strengthen their domestic currencies and react more strongly when these are weak, whereas Japan has mostly pursued the opposite strategy.

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