

**Is Foreign Exchange Intervention Effective? :
The Japanese experiences in the 1990s**

Takatoshi Ito

Figures and Tables

(Revised, version 14 February 2002)

	Japan	USA	Euro	UK
Decision	Ministry of Finance	Treasury (lead) and FRB	ECB in consultation with EcoFin Concil	H.M. Treasury and BOE (as monetary policy)
Agent	BOJ	New York FED	ECB	BOE
Disclosure	April 1991-present. (1-3 month delay). Day, Amount, Currency	All since 1973? (1-3 month delay) Amount, Day, Time, Currency	Not disclosed	Year 2000 to present. Day, Amount.

Case 1	DAY t-1			DAY t		
	Tokyo 9 - 17:00	London 9 - 17:00	New York 9 - 17:00	Tokyo 9 - 17:00	London 9 - 17:00	New York 9 - 17:00
Japan				Intervention		
US						Intervention
Case 2	DAY t-1			DAY t		
	Tokyo 9 - 17:00	London 9 - 17:00	New York 9 - 17:00	Tokyo 9 - 17:00	London 9 - 17:00	New York 9 - 17:00
Japan						Intervention (by NYFed)
US						Intervention
Case 3	DAY t-1			DAY t		
	Tokyo 9 - 17:00	London 9 - 17:00	New York 9 - 17:00	Tokyo 9 - 17:00	London 9 - 17:00	New York 9 - 17:00
Japan				Intervention		
US				Intervention (by BOJ)		

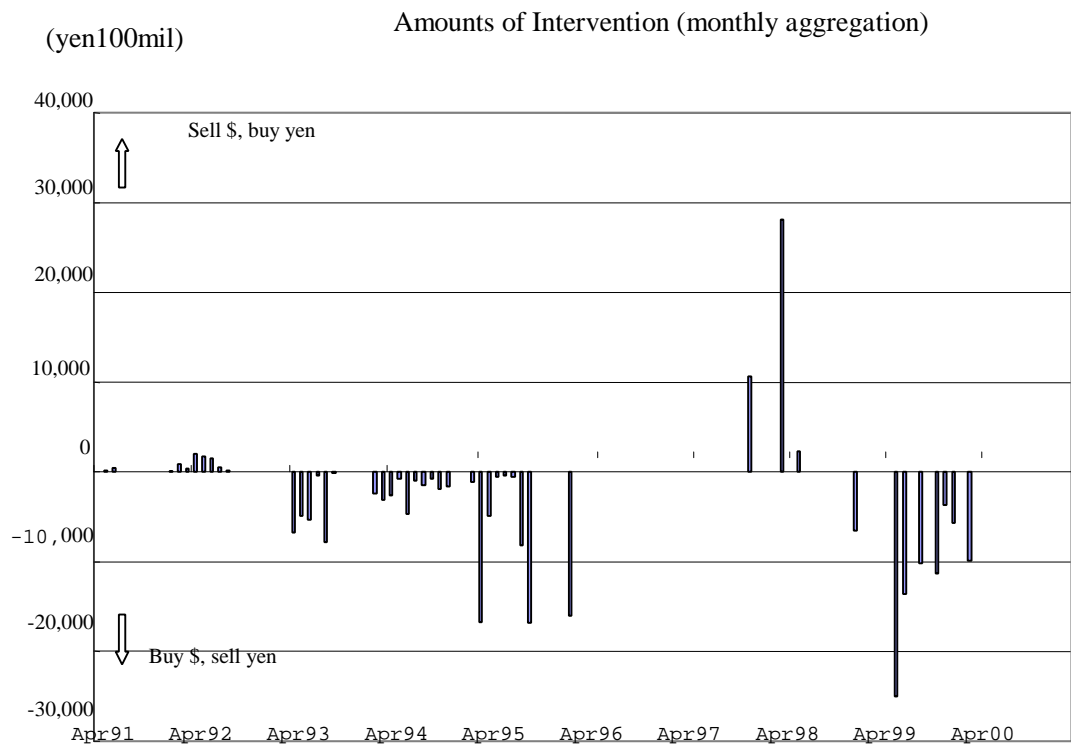
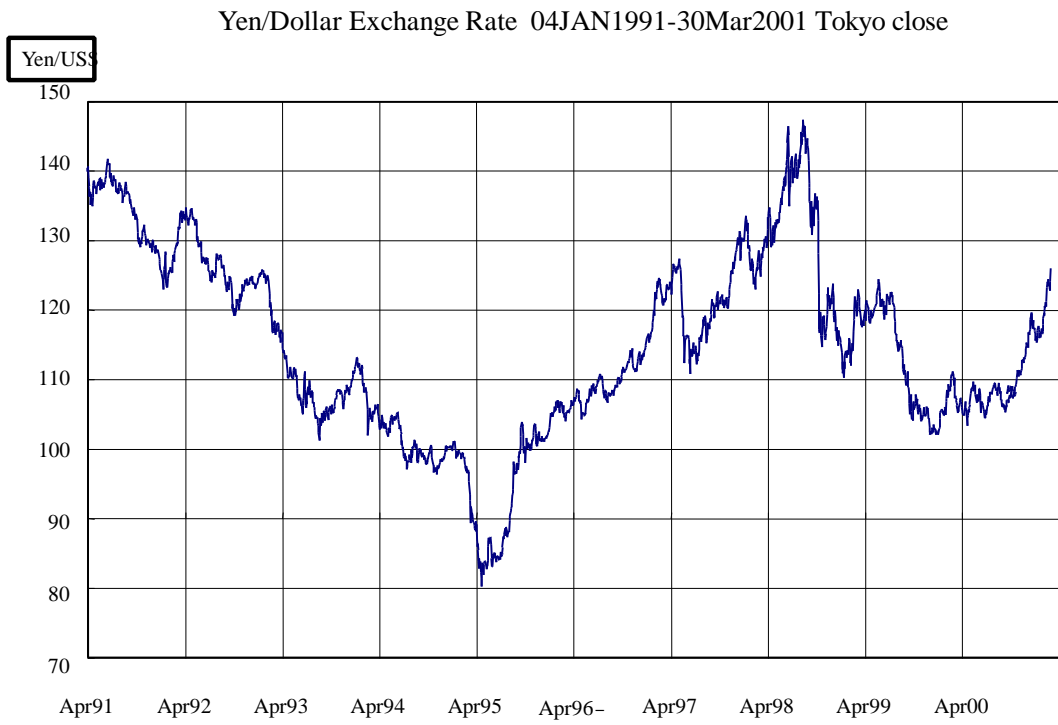


Figure 1

Table 3: Intervention by exchange rate brackets				
Rate(central rate)				100 million yen
At or above	Less than	Direction	Number of days	Sum of Amounts
140	145	Sell US\$	3	2,736
135	140	Sell US\$	1	139
130	135	Sell US\$	8	30,581
125	130	Sell US\$	20	15,338
120	125	Buy US\$	2	17,109
115	120	Buy US\$	4	21,568
110	115	Buy US\$	17	13,815
105	110	Buy US\$	28	38,310
100	105	Buy US\$	50	63,977
95	100	Buy US\$	35	27,257
90	95	Buy US\$	9	5,406
85	90	Buy US\$	16	20,718
80	85	Buy US\$	7	3,680
		Subtotal, Sell US\$	32	48,794
		Subtotal, Buy US\$	168	211,860
		Total	200	260,654
Notes: In addition to these Yen/\$ intervention, 1 Sell\$/BuyDM, 1 BuyDM/Sell yen, 5 Sell \$/Buy Rupiah, 5 Buy Euro/Sell Yen interventions.				
Lowest point (Central rate, Tokyo)of Sell US\$			126.50	
Highest point (Central rate, Tokyo) of Buy US\$			122.65	

Table 4 Calculation of Realized and Unrealized gains

	Intervention in billion yen (A)	Intervention in US\$ billion (B)	Average exchange rate (yen/\$) (C)	Realized gains (in billion yen) of buying \$ 37.42371 at 104.17 and selling \$ at 130.38	Unrealized gains (in billion yen) of selling (203.4- 37.4) billion dollars evaluating at 126.25 yen against inventory cost of 104.17
Subtotal, Sell US\$	4879.4	37.42371	130.38	981.14	3665.25
Subtotal, Buy US\$	21186.0	203.38800	104.17		
Calculation	See Table 3	Note (1)	(A)/(B)	=37.42371* (130.38-104.17)	=(21186- 4879.4)*(126.25- 104.17)
<p>Notes: (1) For each intervention day, the exchange rate of Tokyo market (central rate) is applied to calculate the US\$ equivalent. Then all intervention days, separately for sell US\$ and for buy US\$, are aggregated.</p> <p>(2) In calculating unrealized gains, the NY close on March 30, 2001 is used. The yen/dollar rate was 126.25 yen/dollar.</p>					

Table 5: Were interventions successful, given Interventions are conducted; April 1991-March 2001;						
Direction	BEFORE s(t-1)-s(t-2)	Number of interventions	AFTER s(t)-s(t-1)	Benchmark (If no intervention)	Number of success	Rate of success
Buy yen	Yen Depreciation (lean-against)	19	Appreciation? (Reversal)	Random Walk	10	52.6%
			Slower? (Smoothing)		17	89.5%
Buy yen	Yen Appreciation (lean-in)	13	Accelerating? (Push the trend)		8	61.5%
			Not depreciation (Appreciation)	Random Walk	8	61.5%
Sell yen	Yen Appreciation (lean-against)	119	Depreciation? (Reversal)	Random Walk	54	45.4%
			Slower? (Smoothing)		83	69.7%
Sell yen	Yen Depreciation (lean-in)	49	Accelerating? (Push the trend)		11	22.4%
			Not appreciation (Depreciation)	Random Walk	19	38.8%

Table 6: Effectiveness of intervention

$$s_t - s_{t-1} = \mathbf{b}_0 + \mathbf{b}_1(s_{t-1} - s_{t-2}) + \mathbf{b}_2(s_{t-1} - s_{t-1}^T) + \mathbf{b}_3 \text{Int}_t + \mathbf{b}_4 \text{Int}_t^F + \mathbf{b}_5 \text{Initial_Int}_t + \mathbf{e}_t$$

where $\mathbf{e}_t = v_t \sqrt{h_t}$ with $v_t \sim N(0,1)$? $h_t = \mathbf{a}_0 + \mathbf{a}_1 \mathbf{e}_{t-1}^2 + \mathbf{a}_2 h_{t-1}$

s_t : spot rate (NY close) of day t.

s_t^T : long-run equilibrium exchange rate, 125 yen.

Int: Japanese intervention amount

IntF : FED intervention amount

IntI : Initial intervention (=Int, if no intervention in 5 preceding business days; =0, otherwise)

	FULL sample: 01Apr91-30Mar01	First half: 01Apr91- 20Jun95	Second Half 21Jun95- 30Mar01
β_0	0.0001 (0.0002)	-0.0004 (0.0002) [†]	0.0003 (0.0003)
β_1	-0.015 (0.02)	-0.038 (0.036)	-0.023 (0.031)
β_2	-0.001 (0.001)	-0.0019 (0.0016)	-0.00065 (0.002)
β_3	-0.0000006 (0.0000002)**	0.0000037 (0.000001)**	-0.0000009 (0.0000002)**
β_4	-0.0000138 (0.000003)**	-0.000011 (0.000004)**	-0.000051 (0.000008)**
β_5	-0.0000017 (0.0000004)**	0.000001 (0.000003)	-0.0000012 (0.0000004)**
a0	0.000003 (0.0000008)**	0.000006 (0.000003)**	0.000005 (0.000002)**
a1	0.10 (0.01)**	0.10 (0.02)**	0.12 (0.03)**
a2	0.84 (0.03)**	0.75 (0.07)**	0.78 (0.05)**
R2 Bar	0.035	0.020	0.08
OBS	2565	1098	1467

Note: Standard errors are given in parentheses.

[†]Statistically significant at the 10-percent level.

*Statistically significant at the 5-percent level.

**Statistically significant at the 1-percent level.

Q(10) tests suggest no serial correlation.

Table 7. Reaction Function

$$Int_t = \mathbf{b}_0 + \mathbf{b}_1(s_{t-1} - s_{t-2}) + \mathbf{b}_2(s_{t-1} - s_{t-21}) + \mathbf{b}_3(s_{t-1} - s_{t-1}^T) + \mathbf{b}_4 Int_{t-1} + \mathbf{b}_5 Int_{t-1}^F \\ + \mathbf{b}_6 ds_{t-1} D(Int_t \neq 0)_{t-1} + \mathbf{b}_7 ds_{t-1} D(Int_t^F \neq 0)_{t-1} + \mathbf{e}_t$$

	Full sample	1 Apr 91 - 20 Jun 95	21 Jun 95 – 30 Mar 01
β_0	3.75 (25.21)	3.09 (5.13)	19.59 (50.26)
β_1	10422.91 (4637.75)*	1053.77 (727.84)	13885.73 (6281.99)*
β_2	1369.70 (514.63)**	1462.71 (387.74)**	1271.11 (709.80)†
β_3	632.66 (153.94)**	217.66 (51.41)**	1044.12 (366.13)**
β_4	0.08 (0.03)**	0.45 (0.08)**	0.11 (0.05)*
β_5	0.19 (0.25)	-0.16 (0.30)	0.20 (0.60)
β_6	8973.19 (10590.21)	1656.74 (7306.41)	41722.91 (35801.49)
β_7	-11721.77 (10516.36)	-1701.77 (9818.02)	-40294.78 (33200.06)
R2 Bar	0.026	0.345	0.025
OBS	2565	1098	1467

Note: Standard errors are given in parentheses. Q(10) Test is rejected. Estimated by GMM.

† Statistically significant at the 10-percent level.

* Statistically significant at the 5-percent level.

** Statistically significant at the 1-percent level.

$\beta_1 > 0, \beta_2 > 0$: Lean against the wind.

$\beta_3 > 0$, further the rate is away from 125 yen, more likely to have a larger intervention.

$\beta_4 > 0$, there is a tendency to have subsequent interventions.