

# KOREA'S POSTCRISIS EXCHANGE RATE POLICY

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## Introduction

There are few areas about which there is a greater range of opinions among international monetary experts than the issue of exchange rate regimes. Eminent economists can be found who support almost any position. However, this range masks the substantial amount of agreement among a broad majority of serious students of international monetary economics. Even though economists might not agree on the exact content of optimal policy strategies, they often agree substantially about the wrong policies and the dimensions of the ballpark for appropriate policies.

Disputes have been considerable about what Korea's postcrisis exchange rate policy should be and what it has been. In an earlier version of this paper<sup>1</sup> we argued that a serious application of the theory of optimum currency areas suggests that the broad outlines of Korea's current exchange rate policy are quite appropriate and that, although Korea should be very interested in regional (and global) monetary coopera-

tion, this interest should not take the form of either unilateral or joint fixing or pegging of the *won* exchange rate. In this version of our work, we focus on what policy has been.

Although characterization of Korea's exchange rate policy might seem quite easy, this is not the case. Korean officials often refer to current policy as a freely floating exchange rate. This characterization meets the definitions that have been offered by some classifiers of exchange rate regimes.<sup>2</sup> Levy-Yeyati and Sturzenegger classify Korea as fixed regime,<sup>3</sup> and McKinnon and Schnabl describe Korea and other Asian countries as having returned to a dollar standard.<sup>4</sup> Others conclude that Korea's policy is described by neither extreme, but rather is an intermediate regime based on managed floating.<sup>5</sup> After reviewing various classification schemes and criteria, we conclude that the best characterization of Korea's policy is a managed floating rate and suggest that at issue are not just academic questions of nomenclature but also substantive issues of exchange rate management.

1. Thomas D. Willett, with the assistance of Yongbok Kim, "Assessing Korea's Post Crisis Managed Float," working paper no. 209 (Seoul: Bank of Korea, Institute for Monetary and Economic Research, 2004), [http://210.104.132.11/contents\\_admin/info\\_admin/main/home/bokdb/publication/occasion/occasion01/info/IMER209.pdf](http://210.104.132.11/contents_admin/info_admin/main/home/bokdb/publication/occasion/occasion01/info/IMER209.pdf).

2. Carmen M. Reinhart and Kenneth S. Rogoff, "The Modern History of Exchange Rate Arrangements: A Reinterpretation," *Quarterly Journal of Economics* 119, no. 1 (2004): 1–48; and Kim Soyoung, Sunghyun H. Kim, and Yunjong Wang, "Fear of Floating in East Asia" (paper prepared for Claremont-KIEP conference on Monetary and Exchange Rate Arrangements in East Asia, 2004).

3. Eduardo Levy-Yeyati and Federico Sturzenegger, "Classifying Exchange Rate Regimes: Deed vs. Words," *European Economic Review* 49, no. 6 (2005): 1603–35.

4. Ronald McKinnon and Gunther Schnabl, "The East Asian Dollar Standard, Fear of Floating, and Original Sin," *Review of Development Economics* 8, no. 3 (2004): 331–60.

5. Michael Dooley, Rudi Dornbusch, and Yung Chul Park, "A Framework for Exchange Rate Policy in Korea," in *Korean Crisis and Recovery*, ed. David T. Coe and Se-Jik Kim (Washington, D.C.: International Monetary Fund; Seoul: Korea Institute for International Economic Policy, 2002); Leonardo Hernández and Peter J. Montiel, "Post-Crisis Exchange Rate Policy in Five Asian Countries: Filling in the 'Hollow Middle'?" *Journal of the Japanese and International Economics* 17, no. 3 (2003): 336–69; Park Yung-chul and Charles Wyploz, "Exchange Rate Arrangements in East Asia: Do They Matter?" (paper prepared for Claremont-KIEP conference on Monetary and Exchange Rate Arrangements in East Asia, 2004); Eiji Ogawa and Doo Yong Yang, "Exchange Rate Arrangement in East Asia" (paper prepared for Claremont-KIEP conference on Monetary and Exchange Rate Arrangements in East Asia, 2004); and Tony Cavoli and Ramkishan S. Rajan, "Have Exchange Rate Regimes in Asia Become More Flexible Post Crisis? Re-visiting the Evidence," working paper no. 519 (Singapore: National University of Singapore, 2005).

## Classifying Korea's Postcrisis Exchange Rate Regime

There is no question that Korea's postcrisis exchange rate regime is based on a flexible or floating exchange rate. Within this broad category exist many varieties of regimes, however; and where in this range Korean policy should be placed has been the subject of some controversy. Recent research on exchange rate regimes has taught us that official classifications can often be misleading. China argues, for example, that it has a managed float although its currency has remained pegged to the dollar within a narrow range since the mid-1990s. Calvo and Reinhart<sup>6</sup> have labeled such heavy management of officially flexible rates as "fear of floating," and they argue convincingly that the shifts in recent years in official classifications of floating rates have greatly overstated the true increase in flexibility. Indeed, some experts, such as Ron McKinnon,<sup>7</sup> have argued that in Asia there has been little real increase in flexibility since the crisis and that most of Asia is best described as still being on a de facto dollar standard. We argue below that this contention is overstated.

Korea officially maintains that it is practicing a "free float" but notes that official intervention is sometimes used. This terminology is not consistent with the standard textbook definition of freely floating. Jeffrey Frankel, in his recent classification of exchange rate regimes, stated, "With a free float, the central bank does not intervene in the foreign-exchange market."<sup>8</sup> Ito and Park refer to this "nonexistence of official intervention" as the "fundamentalist" definition of free floating.<sup>9</sup>

Seldom is such a pure free float followed in practice. As Reinhart and Rogoff argue, "In reality, 'pure' floating exchange rates are an artifact of economics textbooks. Even in countries where the exchange rate is not an explicit target of policy, there are typically occasional (relatively rare) instances where there is unilateral or coordinated intervention in the foreign exchange market."<sup>10</sup> The United States, Canada, and, in recent periods, Mexico would be examples of only occasional foreign exchange market intervention. For years New Zealand has been an exception and has practiced a completely free float although the central bank reserves the right to intervene if foreign exchange markets should become disorderly.

The Reinhart and Rogoff study makes valuable contributions to the literature on the classifications and analysis of exchange rate regimes, but its treatment of free-floating rates is open to the serious criticism that it is based solely on the behavior of exchange rates. Analytically, however, the degree of flexibility of an exchange rate regime should depend on the degree of exchange market pressure that it takes in the form of changes in reserves versus changes in exchange rates. In a pure float, all change comes in the exchange rate; and in a pure fix, all of it is taken as a change in reserves. (Other policies such as monetary policy and controls can also be varied to deal with exchange market pressure, and, as will be discussed below, this needs to be taken into account in the full description of a country's monetary policy-cum-exchange rate regime.) Where exchange market pressure is strong, there can be both a lot of exchange rate movement and a lot of intervention. Failure to take this into account led Reinhart and Rogoff to erroneously classify Japan as a free-floating regime

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6. Guillermo A. Calvo and Carmen M. Reinhart, "Fear of Floating," *Quarterly Journal of Economics* 117, no. 2 (2002): 379–408.

7. McKinnon and Schnabl, "The East Asian Dollar Standard, Fear of Floating, and Original Sin."

8. Jeffrey Frankel, "Experience of and Lessons from Exchange Rate Regimes in Emerging Economies," in *Monetary and Financial Integration in East Asia: The Way Ahead*, vol. 2 (Manila: Asian Development Bank; Basingstoke: Palgrave Macmillan, 2003), 5.

9. Takatoshi Ito and Yung Chul Park, "Exchange Rate Regimes in East Asia," in *Monetary and Financial Integration in East Asia: The Way Ahead*, vol. 1 (Manila: Asian Development Bank; Basingstoke: Palgrave Macmillan, 2003).

10. Carmen M. Reinhart and Kenneth S. Rogoff, "The Modern History of Exchange Rate Arrangements: A Reinterpretation," working paper no. 8963 (Cambridge, Mass.: National Bureau of Economic Research, 2002), 43.

despite the record amount of intervention that was undertaken.

Reinhart and Rogoff similarly classify Korea's postcrisis regime as free floating. However, the huge increase in Korea's international reserves indicates that it, like Japan, while clearly following a floating as opposed to a pegged-rate regime, is practicing substantially heavier management of its exchange rate than countries such as Canada, Mexico, New Zealand, and the United States. Of course, changes in reserves are far from a perfect proxy for official intervention, but with reserve accumulations so large, this seems like a safe conclusion.

Somewhat surprisingly, the new behavioral International Monetary Fund (IMF) classifications of exchange rate regimes based on the judgments of IMF staff place Korea in its most flexible category, which they label "independent" floating. Such independent floating is described as follows: "The exchange rate is market determined; any foreign exchange intervention aims at moderating the rate of change and preventing undue fluctuations that are not justified by the fundamentals, rather than establishing a level for the exchange rate."<sup>11</sup> This they contrast with "tightly or other managed floating" in which "the authorities influence exchange rate movements through interventions to counter the long-term trend of the exchange rate, without specifying a predetermined exchange rate path, or without having a specific exchange rate target ('dirty floating')."<sup>12</sup> Their distinction between "tightly" and "other managed floating" is not entirely clear, but for the latter "the exchange rate is influenced in a more ad hoc manner." Even the distinction between independent and managed floating does not seem clear, however, because both "moderating the rate of change" and "countering the long-term trend" can be forms of "leaning against the wind" intervention. In other words, under the IMF's categories of

managed floating and independent floating, there could be heavy or light exchange rate management. This distinction (albeit subject to a fuzzy dividing line) is more relevant for policy analysis.

The most blatant forms of beggar-thy-neighbor policies involve government-induced devaluations when a country is running a balance of payments surplus. The development of international monetary cooperation in the post-World War II period has virtually eliminated such blatant practices that were implemented by some countries, including the United States, during the 1930s. Today manipulation is usually more passive and typically acts merely to reduce or halt appreciations, not actively force major depreciations. Such policies can still generate substantial disequilibrium, however, and thus may have an important influence on the international distribution of adjustment pressures. With the substantial increase in exchange rate flexibility since the 1970s, such issues have become considerably less contentious than during the days of the Bretton Woods adjustable peg system. They are not entirely eliminated, however, and the large reserve accumulations in Asia in recent years have become the subject of a great deal of commentary.

It is certainly wrong to suggest that exchange market intervention by Asia is the major cause of the huge U.S. current account deficits,<sup>13</sup> but there is some legitimacy to European concerns that the continuation of such policies would place an excessive portion of needed future exchange market and current account adjustment on them. From this standpoint, it is not clear whether greater concern should be focused on China or Japan. Japan has allowed its currency to rise against the dollar while China has not, but Japan's reserve accumulations have been greater. While quantitatively smaller, Korea's accumulation of reserves has been far from negligible as well.

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11. Andrea Bubula and Inci Ötker-Robe, "The Evolution of Exchange Rate Regimes Since 1990: Evidence from De Facto Policies," working paper no. 02/155 (Washington, D.C.: International Monetary Fund, 2002), 15.

12. Ibid.

13. For evidence on this point, see Warwick J. McKibbin, Jong Hwa Lee, and Yung Chul Park, "The Transpacific Imbalance: An East Asian Perspective" (paper presented at the Western Economic Association International session on Global Imbalances and East Asia's Exchange Rate Policy, 2004).

In the case of both China and Korea, a substantial increase in reserves in the postcrisis period was extremely sensible from both national and international points of view. Recent crises have highlighted the strong contributions of inadequate reserve holdings to increased risk of crisis. However, Korea's reserve accumulations now appear to substantially exceed prudent needs.<sup>14</sup>

Note that, where surrender requirements for foreign currency proceeds are in place, reserves can be accumulated by the central bank without taking any active measures in the foreign exchange market. From an analytical point of view, however, the benchmark of no substantive intervention would require the government or central bank to place the surrendered foreign exchange in the market rather than use it to accumulate reserves. The accumulated reserves would place the same depressing influence on the value of the currency whether the reserves were acquired actively through direct intervention or passively through surrender requirements.

Other channels of indirect official influence on the exchange rate are also possible. For example, Dooley, Dornbusch, and Park suggest that "the Korean authorities, it appears, have not resorted to the use of reserves to moderate the movements of the nominal exchange rate. Instead, they have relied on a few state-owned banks to intervene in the market, using their own holdings of foreign exchange, which are not counted as part of the central bank foreign reserves."<sup>15</sup>

It should be made clear that, in discussing government intervention, we have been following the standard convention of assuming sterilized intervention or its equivalent. There is of course considerable debate about how effective such intervention can be in influencing the exchange rate. Where capital mobility is perfect, such intervention could work only through signaling effects. There is substantial capital mobility for countries such as Korea, but it is far from perfect; and it is usually argued that the foreign exchange market for the *won* is relatively thin.<sup>16</sup> Thus, it seems likely that sterilized intervention can be effective, although the extent of this should be the subject of study.

Where intervention is unsterilized, it in effect implies monetary policy actions, and there is no question that this can have powerful effects on exchange rates (although there is a debate about the possible existence of a Laffer curve with respect to the effects of interest rate increases). The question of how much weight should be given to exchange rate movements in setting national monetary policy is largely separate from issues of strategies for unsterilized intervention. There are some types of shocks for which sterilized intervention would be the optimal response.<sup>17</sup> The danger is that sterilized intervention can also be used for other purposes such as postponing needed adjustments; if this becomes prolonged, it can create the preconditions for currency crisis.

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14. See Kim Jung Sik, Jie Li, Ramkishan S. Rajan, Ozan Sula, and Thomas D. Willett, "Reserve Management Policy in East Asia" (paper prepared for Claremont-KIEP conference on Monetary and Exchange Rate Arrangements in East Asia, 2004).

15. Michael Dooley, Rudi Dornbusch, and Yung Chul Park, "A Framework for Exchange Rate Policy in Korea."

16. On estimates of capital mobility for Korea, see analysis and references in Manfred Keil, Amnat Phalappleewan, Ramkishan S. Rajan, and Thomas D. Willett, "Interest Rate Interdependence in East Asia" (paper prepared for Claremont-KIEP conference on Monetary and Exchange Rate Arrangements in East Asia, 2004); and Thomas D. Willett, Manfred Keil, and Young-Seok Ahn, "Capital Mobility for Developing Countries May Not Be So High," *Journal of Development Economics* 68 (2002): 421–34.

17. See Thomas D. Willett, "International Financial Markets as Sources of Crisis or Discipline: The Too Much Too Late Hypothesis," Princeton Essays in International Economics no. 218 (Princeton, N.J.: Princeton University, Department of Economics, May 2000, [www.princeton.edu/~ies/IES\\_Essays/E218.pdf](http://www.princeton.edu/~ies/IES_Essays/E218.pdf)); and Thomas D. Willett, "Fear of Floating Needn't Imply Fixed Rates: An OCA Approach to the Operation of Stable Intermediate Currency Regimes," *Open Economies Review* 14, no. 1 (January 2003): 71–91.

We observe that at least some types of intermediate exchange rate regimes tend to be more crisis prone than the corners of highly flexible and hard fixed rates. Drawing on an analysis by Jeffrey Frankel,<sup>18</sup> we have suggested in recent work that a major cause of the tendency toward greater instability of intermediate regimes is that they offer greater incentives for, and fewer restraints against, prolonged inconsistencies between exchange rate and domestic monetary or macroeconomic policy.<sup>19</sup> Thus the risk of generalizing currency crisis also needs to be considered. It is clear that intervention to prop up a currency is more likely to end in crisis than an equal sized intervention to hold down a currency. However, as Park, Chang, and Wang warn: “If the government intentionally makes the currency cheap through foreign exchange intervention in the name of foreign reserve accumulation, this undervaluation will not be sustainable because anticipated appreciation will continuously bring about more capital inflows.”<sup>20</sup> Such speculative inflows can generate uncertainty and disrupt domestic monetary policy. This has certainly become a problem for China.

On the basis of detrended monthly data from 1999:1 through 2004:6, the coefficient of changes in intervention proxy (foreign reserves – interest earnings)<sup>21</sup> on changes in the monetary base had a positive coefficient of 0.05, but this was less than the standard error. The coefficients on M2 and M3 were both negative and also insignificant. Thus, there is little indication in the raw data of intervention policy’s seriously hampering the conduct of domestic monetary policy.

## Statistical Description of Korea’s Postcrisis Exchange Rate Policy

It has become widely recognized that in analyzing exchange rate regimes we should not look at the behavior of the exchange rate alone. The variability of an exchange rate could be low because of heavy official intervention or because there are few shocks. Thus, at a minimum, we need to look at the relationship between exchange rate changes and intervention. In the absence of publicly available information on actual intervention, the imperfect proxy of changes in reserves is often used.

Recent studies are all based directly or indirectly on the concept of exchange market pressure, and they consider how exchange market pressure is reflected in the behavior of its various components. Thus, such measures control for the size of shocks and focus on the extent to which these are allowed to fall on various policy instruments. We focus here just on the exchange rate–intervention dimension.

Several studies have implemented this approach by looking at the ratio of variances. This has two serious problems, however.<sup>22</sup> Where trends are important, simple standard deviations and variances can give misleading results. Furthermore, the concept of exchange market pressure is only well defined when intervention is used to prevent or reduce exchange rate movements. For many monthly observations, however, reserve changes are found to reinforce rather

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18. Frankel, “Experience of and Lessons from Exchange Rate Regimes in Emerging Economies.”

19. See Willett, “Fear of Floating Needn’t Imply Fixed Rates.”

20. Park Yung Chul, Chae-Shick Chung, and Yunjong Wang, “Fear of Floating: Korea’s Exchange Rate Policy after the Crisis,” *Journal of the Japanese and International Economies* 15, no. 2 (June 2001): 248.

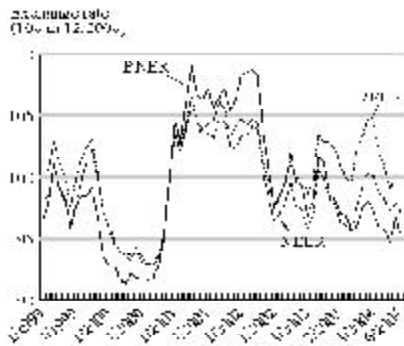
21. Several studies (for example, Calvo and Reinhart, “Fear of Floating”; and Cavoli and Rajan, “Have Exchange Rate Regimes in Asia Become More Flexible Post Crisis? Re-visiting the Evidence”) argue that interest earnings of foreign reserves are not part of intervention. Intervention proxy in our study therefore is calculated by subtracting interest earnings proxy from foreign reserves. Our formula is: Foreign reserves – U.S. Treasury bill rate × Foreign reserves in previous month

22. See Isriya Nitithanprapas and Thomas D. Willett, “Classifying Exchange Rate Regimes,” Claremont Colleges Working Papers in Economics no. 2002-22 (Claremont, Calif.: Claremont McKenna College, 2002), <http://econ.claremontmckenna.edu/papers/>; and Thomas D. Willett, Yongbok Kim, and Isriya Nitithanprapas, “Some Methodological Issues on Classifying Exchange Rate Regimes” (paper presented at the annual meeting of Western Economic Association International, 2005).

than reduce exchange rate movements. Because there are different possible interpretations of these observations with “wrong signs,” we report our results for correctly signed observations separately from those for the total observations.

Two other important issues concern the time periods and exchange rate measures to be used. For purposes such as looking at effects on growth rates over long periods of time, Reinhart and Rogoff’s method<sup>23</sup> of using five-year averages has much to commend it. For studying the details of strategy under a managed float, however, there may be frequent changes in policy. Rather than basing calculations on arbitrary time periods, we look for changes in relationships and thus identify a number of subperiods. We contrast our statistical analysis based on these subperiods with a characterization for the full sample. We begin our analysis of postcrisis behavior in 1999:01, after the *won* had substantially completed its rebound from its overdepreciation.

**Figure 1: Monthly average BNER (won-dollar), NEER, and REER, 1999–2004**



Sources: For BNER: International Financial Statistics, IMF, Washington, D.C.; for REER: data from JPMorgan; for NEER: authors’ calculations. Note: BNER, bilateral nominal exchange rate; NEER, nominal effective exchange rate; REER, real effective exchange rate.

A problem for many countries is that more than one foreign currency is important for their international trade and financial relations. This had led to many proposals for pegging to baskets of currencies and surely indicates that undermanaged exchange rate regimes focusing on just one currency can be less than optimal and, in some cases, quite dangerous. We do not address here the issues of the relative importance of different exchange rates for the *won*,<sup>24</sup> but we do analyze the behavior of nominal and real effective exchange rates for Korea (**Figure 1**). The result of our analysis does not show any significant difference across exchange rate measures in Korea.

In the framework developed earlier,<sup>25</sup> intervention indices indicate the degree to which authorities allow pressures in the currency market to move the exchange rate versus intervening to damp its movement. The following formulas summarize this idea.

Trend propensity to intervene during subperiods

$$(TPI) = \frac{|T_e|}{|T_e| + |T_r|}$$

Smoothing propensity to intervene for each month

$$(SPI_t) = \frac{|\Delta u_{it}|}{|\Delta u_{it}| + |\Delta u_{it}^*|}$$

Smoothing propensity to intervene during subperiod average ( $\overline{SPI}_t$ ).

where

$T_e$  and  $T_r$  are estimated coefficients of time trends in exchange rates and our intervention proxy (foreign reserves–interest earnings), respectively  $\Delta u_{it}$  and  $\Delta u_{it}^*$  are the percentage change rates of the exchange rates and intervention proxy, respectively.

23. Reinhart and Rogoff, “The Modern History of Exchange Rate Arrangements: A Reinterpretation.”

24. On such issues, see Oh Junggun, “Exchange Rate Disparities and Needs of Policy Cooperation in East Asia” (paper presented at WEAI conference, Vancouver, 30 June–3 July 2004); and Shin Kwanho and Yunjong Wang, “Trade Integration and Business Cycle Co-movements: The Case of Korea with Other Asian Countries,” *Japan and the World Economy* 16, no. 2 (April 2004): 213–30.

25. Nitithanprapas and Willett, “Classifying Exchange Rate Regimes”; and Willett, Kim, and Nitithanprapas, “Some Methodological Issues on Classifying Exchange Rate Regimes.”

As their names imply, they measure two types of interventions motivated by different goals. *SPI* is related with smoothing operation around the trend while *TPI* is related with managing trend. When market pressure is resolved entirely through the change of exchange rate without any intervention, the indices are 0. When market pressure is resolved only through intervention, the indices are 1. Thus, the higher the value of the intervention indices, the greater the propensity to intervene.

Our indices are composed of trend coefficients as well as intervention indices. Because the natural logarithm of exchange rate and reserves is used to calculate intervention indices, the trend coefficients are interpreted as monthly rates of change. These are transformed into annual rates of change in the tables for ease of interpretation.

It is not possible to adequately characterize the degree of exchange rate flexibility with just one parameter. This is because we do not have any clear way of equating the relationships of trends in exchange rates with variability around trends. To help fix ideas, compare a crawling peg with a narrow band with a fixed peg with a wide band. Which is more flexible? We don't have an unambiguous theoretical rationale for reaching an answer. Furthermore, shifts are frequent in trends, or the base level of the exchange rate, or both. Thus, our approach allows for trends in exchange rates and rates of reserve change, and it also calculates the propensity to intervene around trend. We further allow for shifts in trends and levels. There is no unambiguous way to identify such shifts, and how many shifts one is willing to allow will depend at least in part on the purposes of the exercise.

This approach also gives us a crude method of attempting to distinguish between reserve buildup and

exchange rate smoothing motivations for intervention. With a clear delineation between the two objectives, the reserve accumulation objective should be revealed in the trend term and the smoothing objective in the smoothing propensity to intervene. In practice, however, these motives are often combined through patterns of asymmetric intervention via leaning against the wind more strongly during periods of appreciation than during depreciation. Dooley, Dornbusch, and Park<sup>26</sup> describe an early version of Hernández and Montiel<sup>27</sup> as finding that Korea was not using reserves for smoothing operations, but rather showed a systematic tendency to accumulate reserves over time. A country can be doing both, however; and our estimates suggest that this has been the case for Korea (*Table 1* and *Figure 2*).<sup>28</sup>

It is a significant characteristic of Korea's foreign exchange policy that there was a consistent and a very large positive trend coefficient in the intervention proxy regardless of movement in exchange rates. Our estimates for *TPI* therefore have correct signs, when exchange rates appreciated, in only two out of four subperiods. This suggests that foreign reserve accumulation was the primary objective, not managing the trend in exchange rates.

Because there has not been a strong long-term trend in the *won* since its postcrisis recovery, our estimates for *SPI* for the whole period coincide fairly closely with the averages of those calculated for the individual periods.<sup>29</sup> *SPIs* for the fourth period, which is the last and longest of the subperiods, are quite close to those for the whole period, running a little above 0.5. We find much stronger smoothing intervention in the second period (with a strong *won*), all running between 0.7 and 0.8 for the dollar; while most of the estimates for period three (a weak *won*) are considerably lower, with around 0.4 being an average esti-

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26. "A Framework for Exchange Rate Policy in Korea."

27. Hernández and Montiel, "Post-Crisis Exchange Rate Policy in Five Asian Countries: Filling in the 'Hollow Middle'?"

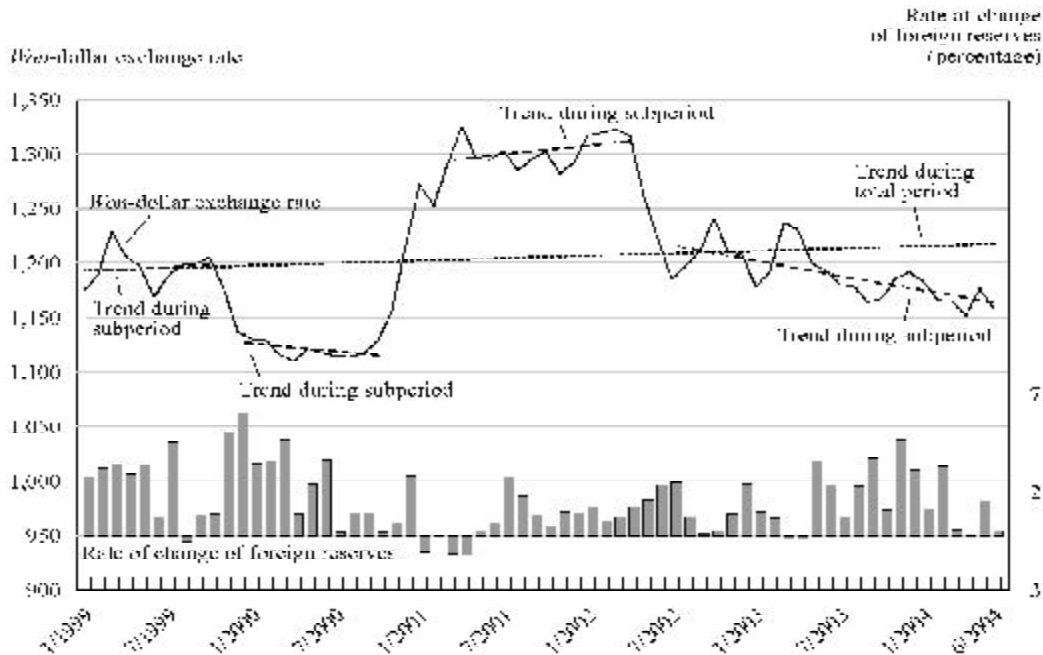
28. In the published version of their paper, Hernández and Montiel (*Ibid.*) make only the milder argument that the behavior of Korea's reserves is not consistent with smoothing operations only. Thus their analysis and ours are in qualitative agreement.

29. There are four main subperiods and three transition periods: subperiod 1 is 1999:1–1999:10, transition period 1 is 1999:11; subperiod 2 is 1999:12–2000:10, transition period 2 is 2000:11–2001:2, subperiod 3 is 2001:3–2002:4, transition period 3 is 2002:5–2002:6; and subperiod 4 is 2002:7–2004:6.

mate. This period also showed much greater dispersion across the various estimates.<sup>30</sup> With the exception of period two, the estimates of the intervention coefficients run well below those for the precrisis 1990s. **Table 2** and the work of Nitithanprapas and Willett<sup>31</sup> support the findings of a number of studies<sup>32</sup> against the conclusions of McKinnon and Schnabl.<sup>33</sup> The *won* has indeed been more flexible since the crisis than it was before. Korea does display evidence of fear of completely free floating, but such fear appears to be much less strong than would be implied by a return to a de facto dollar standard.

It is interesting that most of the movements in the *won* occurred during brief periods of substantial appreciation or depreciation, with the trend rates of change within periods being rather small. Our results suggest a tendency toward asymmetrical intervention. In period three (see Table 1), when the *won* was weak, both the estimated trend rate of reserve growth and the estimated coefficient of intervention around trend are substantially lower than in all other periods. This qualitative conclusion is robust with respect to all three measures of the exchange rate and all four methods of calculating the intervention coefficient.<sup>34</sup>

**Figure 2: Won-Dollar Nominal Exchange Rate and Trends and the Rate of Change of Foreign Reserves in Korea, 1999–2004**



Source: Authors' calculations.

30. It shows that consideration of sign and trend is important.

31. Nitithanprapas and Willett, "Classifying Exchange Rate Regimes."

32. Hernández and Montiel, "Post-Crisis Exchange Rate Policy in Five Asian Countries: Filling in the 'Hollow Middle'?"; Park and Wyploz, "Exchange Rate Arrangements in East Asia: Do They Matter?"; Ogawa and Yang, "Exchange Rate Arrangement in East Asia."

33. Ronald McKinnon and Gunther Schnabl, "The East Asian Dollar Standard, Fear of Floating, and Original Sin."

34. A month-by-month investigation of separate coefficients for intervention during periods of appreciation and depreciation is now under way.



**Table 1: Trend Coefficients and Intervention Indices for Bilateral Nominal Exchange Rate of Korean Won against the U.S. Dollar, 1999–2004**

Period	Trend coefficient <sup>a</sup>		Type of data <sup>b,c</sup>	Propensity to intervene	
	Exchange rate	Reserve		TPI	SPI
<b>Whole period</b>					
1999:1–2004:6	0.37	19.93	A (39/65)	WS	0.53
			B (39/65)		0.54
			C		0.51
			D		0.55
<b>Subperiods</b>					
<b>One</b>					
1999:1–1999:10	0.72	32.78	A (5/9)	WS	0.67
(Transition:5.7%) <sup>d</sup>			B (4/9)		0.49
			C		0.60
			D		0.62
<b>Two</b>					
1999:12–2000:10	–1.28	30.82	A (6/10)	96.01	0.78
(Transition:14.4%) <sup>d</sup>			B (7/10)		0.80
			C		0.75
			D		0.72
<b>Three</b>					
2001:3–2002:4	1.25	14.91	A (9/13)	WS	0.38
(Transition:–10.1%) <sup>d</sup>			B (6/13)		0.50
			C		0.40
			D		0.57
<b>Four</b>					
2002:7–2004:6	–2.28	24.61	A (13/29)	91.52	0.53
			B (14/29)		0.53
			C		0.55
			D		0.51

Source: Authors' calculations.

a. The trend coefficients are annual rates of change. A positive number for exchange rate means depreciation, and a positive number for reserve denotes increasing reserve.

b. The numerator in parenthesis in this column is the number of observations of leaning against the wind; the denominator is the total number of observations.

c. A: detrended and right signs, B: nondetrended and right signs, C: detrended and all signs, D: nondetrended and all signs.

d. Number for transition is the percent change in the exchange rate during the transition periods.

The results do not provide strong evidence of a reserve target being met at some point with the tendency to accumulate reserves falling after. While both

the trend and intervention coefficients in period four are lower than in period two, they are substantially higher than in period three.<sup>35</sup>

35. Note that the standard method of calculation of reserve changes in percentages will automatically yield lower estimates of the trend rate of accumulation over time in the face of a constant rate of increase in absolute values. Because reserve levels tend to vary much more than scaling factors such as gross domestic product and the monetary base and monetary aggregates, a constant ratio of reserves to any of these variables would also likely generate a decreasing percentage rate of reserve accumulation. Thus, our failure to find a decreasing trend suggests that during our sample period reserves had not yet reached the satiation level.

The press has begun to report that the Bank of Korea has started to worry that reserves have reached excessive (or certainly satisfactory) levels, but a behavioral change in this direction does not show up in our sample period, which runs through the middle of 2004.

Our standard public choice or bureaucratic theories of exchange rate policy suggest that typical governments are often interested in keeping exchange rates undervalued in order to promote short-run growth and employment; central bank officials tend to have a longer time horizon and give more weight to avoiding inflation and future crisis. Again, press reports suggest that such differences in view may have developed in Korea, and the Ministry of Finance and Economy is reported to have lost around \$1.8 billion when it used commercial banks to intervene in the derivative market of its own accord.

### Concluding Remarks

Korea's postcrisis exchange rate regime has been neither a free float nor a reversion to the heavy degree of management of the precrisis periods. It has been a managed float characterized by both considerable exchange rate flexibility and considerable management. This broad strategy of a managed float combined with an inflation target—what Morris Goldstein has labeled

“managed floating plus”—has served Korea well. Of course, actual developments have not been ideal. They seldom are.

Exporters would clearly prefer for market forces to have put less upward pressure on the *won*. But the continuation of these pressures indicates that they were not just the result of short-run destabilizing speculations, and efforts to maintain a fixed level of the *won* would have resulted in enormous inflationary pressure. Substantial intervention to moderate the appreciation of the *won* was quite justified. Much of the initial appreciation was appropriate to correct for overdepreciation in the midst of the crisis. Furthermore, the domestic economy was weak. Dooley, Dornbusch, and Park suggest that “had the authorities abstained from market intervention, the nominal exchange rate might have appreciated much more than otherwise, possibly choking off the recovery from the crisis.”<sup>36</sup> There was also a need for Korea to rebuild its levels of international reserves, which were seriously depleted during the crisis. Indeed given Korea's substantial involvement with international capital flows, a much higher level of reserves was a sound national investment in future crisis prevention.

There can be too much of good thing, however. There is no one exact scientific way to judge reserve ad-

**Table 2: Trend Coefficients and Intervention Indices, May 1996–Oct. 1997**

Trend coefficient <sup>a</sup>		Type of data <sup>b,c</sup>	Propensity to intervene	
Exchange rate	Reserve		TPI	SPI
11.53	-9.28	A (10/17)	44.59	0.74
		B (13/17)		0.81
		C		0.75
		D		0.72

Source: Authors' calculations.

a. The trend coefficients are annual rates of change. A positive number for exchange rate means depreciation, and a positive number for reserve denotes increasing reserve.

b. The numerator in parenthesis in this column is the number of observations of leaning against the wind; the denominator is the total number of observations.

c. A: detrended and right signs, B: nondetrended and right signs, C: detrended and all signs, D: nondetrended and all signs.

36. “A Framework for Exchange Rate Policy in Korea,” 508.

equacy in today's world of substantial capital mobility, but a review of a number of benchmarks suggests that these accumulations have substantially exceeded prudent levels<sup>37</sup> and raises concerns that continuing increases are motivated more by mercantilistic concerns or short-run stabilization policy objectives (or both) than by prudent reserve rebuilding and short-run smoothing intervention.

The substantial appreciation of the *won* in 2005 and early 2006 has further highlighted the potential conflict in objectives. While some official statements have indicated a belief that this recent appreciation has been caused primarily by destabilizing speculation, many commentators have suggested that it largely reflects market fundamentals.

In summary, we believe that the adoption of a managed float has served Korea well and that no fundamental changes in Korea's exchange rate regime are called for. There remain, however, a number of important issues from both Korean and global perspectives concerning the best strategies for managing the *won*'s float. Although we conclude that the evidence is overwhelming that the most appropriate classification for Korea's postcrisis exchange rate regime is as a managed float, how best to manage this float under an ever-changing array of circumstances is not an easy task.

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37. Kim, Li, Rajan, Sula, and Willett, "Reserve Management Policy in East Asia."