Assessing Korea's Post Crisis Managed Float *

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Abstract

This paper analyzes both what Korea's post crisis exchange rate policy has been and the arguments about what Korean policy should be. Methods of classifying exchange rate regimes are discussed and new statistical methodology is applied which shows that Korea has been following a managed float, not the free float of stated policy. This managed float strategy has been on the whole sensible and likely superior to a completely free float as well as to a fixed exchange rate. Contrary to some assertions Korean exchange rate policy has displayed more flexibility than before the crisis, but management has been heavy at times and has been biased toward the accumulation of reserves through fighting against appreciations more strongly than against depreciation. This bias was quite desirable in the early post crisis period as this was a need to build strong reserve position. That need has been more than accomplished however, and continued strongly biased intervention could contribute to serious global economic imbalance as well as stimulate inflationary pressure in Korea.

I. Introduction

To analyze a country's exchange rate policy we must first determine what it is.

We can then move on to asking whether it has been following an appropriately broad

type of regime. If the answer is no, then the analyst should recommend what would be

better. If the answer is yes, then the analyst can evaluate the specific strategies that have

been implemented and possibly suggest improvements. All this of course assumes that

the analyst has perfect knowledge. Neither we nor any other international monetary

expert can claim access to such knowledge, but each of us hopes that we have access to

some insights and/or information that we can usefully pass along. Often this will take as

much the form of helping to form questions as attempting to provide definitive answers.

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 that support almost any position. This range masks, however,

the substantial amount of agreement among a broad majority of serious students of

international monetary economics. While having little basis for agreeing on the exact

content of optimal policy strategies, there is often substantial agreement about the wrong

policies and the general ballpark of appropriate policies.

One of the surest signs of an open minded international monetary expert is

acceptance of the proposition that, as Jeffrey Frankel has put it, no single exchange rate

regime is optimal for all countries at all times.[1] The theory of optimum currency areas

(OCA), on which this proposition is based, has grown quite complex over the years since

it was pioneered by Bob Mundell, and there are many areas of legitimate disagreement

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[1] See Frankel (1999).

2

over specific criteria, their relative importance, and their interrelations, much less what they suggest for specific countries. Still this body of theory gives us a useful, albeit far from definitive, framework for addressing exchange rate issues.

In this paper we will argue that a serious application of OCA analysis suggests that the broad outlines of Korea's current exchange rate policy are quite appropriate and that while Korea should be very interested in regional (and global) monetary cooperation, this should not take the form of either unilateral or joint fixing or pegging of the won exchange rate. While the first of the three questions mentioned above—how we should characterize 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, and this characterization meets the definitions that have been offered by some classifiers of exchange rate regimes, such as Reinhart and Rogoff (2002). On the other hand, experts such as Dooley, Dornbusch and Park (2002) have characterized Korea, even post crisis, as having an "intermediate" exchange rate regime. After reviewing various classification schemes and criteria, we will argue 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. This analysis will touch upon issues of the debate about the two corners hypothesis and the potential instability of intermediate exchange rate regimes, issues of appropriate reserve accumulations, and strategies of inflation targeting in open economies.

Section II discusses conceptual issues involved in classifying exchange rate regimes while section III presents a statistical description of Korea's post crisis exchange rate policy. Section IV considers whether it makes sense for Korea to adopt a fixed

exchange rate policy any time in the near future and concludes in the negative. Section V

discusses a new way of applying OCA analysis in terms of the weight which should be

given to external developments in setting domestic monetary policy. Section VI discusses

the general criteria for discretionary intervention in the foreign exchange market and

discusses their application to Korea. Section VII offers some brief concluding remarks.

II. Classifying Korea's Post Crisis Exchange Rate Regime

There is no question that Korea's post crisis exchange rate regime is based on a

flexible or floating exchange rate. Within this broad category there are many varieties of

regimes, however, and where within 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 have labeled such heavy management of

officially flexible rates as "fear of floating", and 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, 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 will 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. As Jeffrey Frankel (2003) puts it in his recent classification of exchange rate regimes, "With a free float, the central bank does not intervene in the foreign-exchange market" (p. 5). Ito and Park (2003) refer to this "nonexistence of official intervention" as the "fundamentalist" definition of free floating.

Seldom is such a pure free float followed in practice. As Reinhart and Rogoff (2002) 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" (p. 43). The United States, Canada, and in recent periods, Mexico would be examples of only occasional foreign exchange market intervention. For years New Zealand is 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 upon 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. (Of course, 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 despite the record amount of intervention that was undertaken.

Reinhart and Rogoff similarly classify Korea's post crisis 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 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" (Bubula and Ötker-Robe (2002), p. 15). This they contrast with "Tightly or Other Managed Floating" where "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')" (Bubula and Ötker-Robe (2002), p. 15). 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, since "moderating the rate of change" and "countering the long-term trend" can both be forms of "leaning against the wind" intervention.

In other words, under both the IMF's categories of managed 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. Likewise, Reinhart and Rogoff's distinction between managed and free floating is based purely on the amount of exchange rate movement using a measure based on the mean absolute monthly percent change in the exchange rate over a rolling five-year. For some purposes such classifications based on the variability of the exchange rate alone may be useful, but for issues of the stability of exchange rate regimes and questions of possible exchange rate manipulation and beggar thy neighbor policies, the amount of official intervention is of crucial importance. The latter considerations emphasize that exchange rate policy needs to be evaluated both from the standpoint of the country in question and also its trading partners.

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 as were implemented by some countries, including the United States, during the 1930s. Today manipulation is usually more passive and typically acts to merely 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 US current account deficits[2], 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.

In the case of both China and Korea, a substantial increase in reserves in the post crisis 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. As will be discussed in a later section, however, Korea's reserve accumulations now appear to substantially exceed prudent needs.

Like most countries Korea does not publish data on its intervention activities. Thus an outsider cannot be sure just how effective are the government and central bank's strategies for intervention. Changes in international reserves are far from a perfect proxy for intervention, but the substantial increases in reserve levels strongly suggests that

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[2] For evidence on this point, see McKibbin, Lee, and Park (2004)

direct and indirect intervention has been substantial and has gone far beyond smoothing short-run fluctuations in the exchange rate. (Park, Chang, and Wang (2001) argue that they also find strong evidence of intervention from the empirical relationships between stock prices and exchange rates.)

It should be noted that where surrender requirements for foreign currency proceeds are in place, then 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 they 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 (2002) 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"

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.[3] 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. The literature on optimal, or more realistically, sensible strategies with respect to both will be discussed in section V and VI. Here we will merely note that there are some types of shocks for which sterilized intervention would be the optimal response. The danger is that sterilized intervention can also be used for other purposes such as postponing needed adjustments and if this becomes prolonged, it can create the preconditions for currency crisis.

Based on detrended monthly data from 1999:1 through 2003:12, the coefficient of changes in reserves on changes in the monetary base had a positive coefficient of 0.37, but this was less than the standard error. The coefficients on M2 and M3 were both negative and also insignificant. As indicated in figures 3 to 5, the levels of international reserves and various monetary aggregates all show strong upward trends, but there seems to be little short-run relationship between changes in reserves and changes in base money or monetary aggregates. It is interesting that reserve money growth shows much greater short-run variability than do changes in international reserves. See figure 6. Thus, there's

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[3] On estimates of capital mobility for Korea, see in analysis and references in Keil et al (2004) and Willett et al (2002).

little indication in the raw data of intervention policy seriously hampering the conduct of domestic monetary policy[4].

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 (2003), we have suggested in recent work that a major cause of the tendency toward greater instability of intermediate is that they offer greater incentives for, and fewer restraints against, prolonged inconsistencies between exchange rate and domestic monetary or macroeconomic policy (see Willett 2004). Thus the risks of generalizing currency crisis needs also to be considered. It is clear that intervention to prop up a currency is more likely to end in crisis than equal sized intervention to hold down a currency. However, as Park, Chang, and Wang (2001) 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. (p. 248)" Such speculative inflows can generate uncertainty and disrupt domestic monetary policy. This has certainly become a problem for China.

III. Statistical Description of Korea's Post Crisis 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

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[4] The influence of open economy considerations on Korea's monetary policy has recently been analyzed by Eichengreen (2004)

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. Some studies go further and also examine relationships with monetary policy, typically measured by changes in interest rates.

These recent studies are all based directly or indirectly on the concept of exchange market pressure and consider how it 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. While the degree of response of monetary or interest rate policy is crucial for descriptions of a country's overall monetary cum exchange rate policy regime, 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. As discussed in Nitithanprapas and Willett (2003), 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 than reduce exchange rate movements. Since 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 (2002) method 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 sub periods. We contrast our statistical analysis based on these sub periods with a characterization for the full sample. We begin our analysis of post crisis behavior in 1999:01 after the won had substantially completed its rebound from its over depreciation (a statistical analysis of the crisis and pre crisis periods will be included in a revision of this paper).

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 under managed 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 (on such issues, see Oh (2004) and Shin (2004)), but we do supplement our analysis of won-dollar behavior with the use of nominal and real effective exchange rates for Korea.

In the framework developed in Nitithanprapas and Willett (2003) the propensity to intervene indicates the degree to which authorities allow pressures in the currency market to move the exchange rate versus intervening to damping its movement. The following formula summarizes this idea.

$$\text{Intervention Index} = \frac{|\Delta RE|}{|\Delta ER| + |\Delta RE|}$$

Where ΔER is the percentage change rate of the exchange rate and ΔRE is the percentage rate of change of reserves. When market pressure is resolved entirely through the change of exchange rate without any intervention, i.e. a free float, the index is 0. When market pressure is resolved only through intervention, i.e. a complete fix, it is 1. Thus the higher the value of the intervention index, the greater is the propensity to intervene.

N-W indices are composed of trend coefficients as well as the intervention index. Since the natural logarithm of exchange rate and reserves are used to calculate intervention index, the trend coefficients are interpreted as monthly rates of change. These are transformed into annual rates of change rate 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 to equate the relationships of trends in exchange rates with variability around trends. To help fix ideas, compare a narrow band crawling peg 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, there are frequently shifts in trends and/or the base level of the exchange rate. Thus our approach allows for trends in exchange rates and rates of reserve change as well as calculating 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. We hope that the following analysis will convince the reader of the utility of this flexible approach. Since actual intervention is not public and we must rely on

published data on changes in reserves, we hope that the Bank of Korea will undertake an analysis of its own along these lines using actual intervention data.

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 intervention coefficient. 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 (2002) describe an early version of Hernández and Montiel (2003) as finding that Korea wasn't using reserves for smoothing operations, but rather showing 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.[5] See Table 1-4.

Because there has not been a strong long-term trend in the won after its post crisis recovery, our estimates for the intervention coefficient for the whole period coincide fairly closely with the averages of those calculated for the individual periods[6]. The intervention coefficients for the first and last periods are quite close to those for the whole period, running a little above .5. We find much stronger smoothing intervention in the second period (with a strong won), all running between .7 and .8 for the dollar and

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[5] In the published version of this paper, Hernández and Montiel (2003) make only the milder argument that the behavior of Korea's reserves are not consistent with smoothing operations only. Thus their analysis and ours are in qualitative agreement.
[6] There are four main sub periods and three transitory periods: sub period 1 is 1999:1~1999:10, transitory period 1 is 1999:11, sub period 2 is 1999:12~2000:10, transitory period 2 is 2000:11~2001:2, sub period 3 is 2001:3~2002:4, transitory period 3 is 2002:5~2002:6 and sub period 4 is 2002:7~2003:12.

nominal effective exchange rates, while most of the estimates for period three (of a weak

won) are considerably lower, with around 0.4 being a typical estimate. This period also

showed much greater dispersion across the various estimates. With the exception of

period two, the estimates of the intervention coefficients run well below those for the pre

crisis 1990s. See Table 4 (and Nitithanprapas and Willett (2003)). This supports the

findings of Hernández and Montiel (2003) against those of McKinnon and Schnabl

(2003). The won has indeed been more flexible after the crisis than before. Korea does

display evidence of fear of completely free floating, but such fear appears to be much less

strong then would be implied by a return to a de facto dollar standard.

Interestingly, 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 do suggest a tendency toward asymmetrical intervention.

In period three 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.[7]

The results do not provide strong evidence of a reserve target being met at some

point with the tendency to accumulate reserves falling toward the end of our sample.

While both the trend and intervention coefficients in period four are lower than in period

two, they are substantially higher than in period three.[8]

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[7] A month-by-month investigation of separate coefficients for intervention during periods of appreciation
and depreciation is now underway.

[8] Note also 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. Since reserve levels tend to vary much more than scaling factors such as GDP and the
monetary base and monetary aggregates, a constant ratio of reserves to any of these variables would also

16

There have been some indications in the press, however, that the Bank of Korea has begun to worry that reserves have reached excessive (or certainly satisfactory) levels, but a behavioral change in this direction doesn't show up in our sample period which runs through the end of 2003.

Our standard public choice or bureaucratic theories of exchange rate policy suggest that typically governments are more interested in keeping exchange rates undervalued in order to promote short run growth and employment than are central bank officials who 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.

IV. Should Korea Have a Fixed Exchange Rate?

The European experiment with monetary union has attracted a great deal of attention in other parts of the world and Asia has been no exception. A number of economists and some policy officials have called for a long run goal of monetary union in Asia. The goal of fostering increased monetary cooperation in Asia is an excellent one, but the assumptions that this should take the form of monetary union in the long run or a common basket peg in the nearer term are highly questionable strategies for achieving such goals. Such proposals have attracted the support of some highly prominent economists, but their arguments tend to be based on assumptions that do not generally hold empirically. The strongest of these arguments come from global monetarists such as

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likely generate a decreasing percentage rate of reserve accumulation. Thus our failure to find a decreasing trend suggests that reserves not yet reached the satiation level over our sample period.

Bob Mundell and Ron McKinnon who frequently argue that the smallest optimal

currency area is the whole world. Both are brilliant economists and their conclusion

follows logically from their global monetarist models. These models contain several

crucial assumptions, however, that do not enjoy general support in the real world. These

include that domestic economies are highly flexible, that equilibrium real exchange rates

have little if any variability, and that nominal exchange rate changes have little effect on

real exchange rates. Each of these assumptions may hold to a reasonable approximation

for some economies, but they do not for all or even a majority of countries and certainly

not for Korea.

A second type of argument for widespread fixed exchange rates is based on "fear

of floating" concerns that pure free floats will not be optimal for many if not most

countries. We are very sympathetic to this argument, but it doesn't necessarily imply that

fixed exchange rates should be widely chosen, because mainstream OCA theory suggests

not only that fear of floating is quite rational for many countries, but so is fear of fixing.[9]

Few economies closely approximate most of the criteria for fixed exchange rates to be

optimal. Endogenous OCA theory appropriately stresses that what are relevant are the

conditions ex post, not the conditions ex ante, and that the adoption of fixed rates will be

likely to induce trade patterns and the flexibility of economies that move in the direction

of making fixed rates more desirable. Similarly, many enthusiasts for exchange rate

stabilization and the use of exchange rates as a nominal anchor argue that fixing

exchange rates will have powerful discipline effects on government policies. The

experience of Argentina, however, suggests that the magnitude of such endogenous

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[9] See Willett (2003).

effects may often be weak.[10] If a country is close to meeting the OCA criteria ex ante then it is probably safe to plunge ahead, but as yet there is little evidence to suggest that endogenous adjustments will make a huge difference. We now have underway a crucial experiment in Europe on the power of endogenous adjustments. It is much too early to attempt to draw strong conclusions on these issues from the euro experience so far. At present it is prudent to adopt a wait and see attitude on the extent of endogeneity of OCA criteria.[11]

It is important to stress that for fixed rates to work well it is necessary for a country to meet fairly well all of the important OCA criteria, not just a few. Again, Argentina presents a sad example of the failure to take this into account. The degree of currency substitution or dollarization is an important criterion that has been added to the OCA criteria, and on this score fixing to the dollar made great sense for Argentina. Its low level of openness to trade and inflexibilities of the domestic economy combined with the failure to establish sufficient discipline over fiscal policy were sufficient to generate disaster, however.

One popular exercise in recent years has been to undertake empirical work showing that on some OCA criteria Asia does as well as Europe did at some recent stage. It is highly dangerous, however, to take such findings as strong support for a monetary union in Asia. In part because of susceptibility to advanced technical analysis, most such efforts have focused on patterns of shocks and synchronization of business cycles. These can be important considerations, but the openness and flexibility of economies are likely to be much more important ones. Further more, patterns of shocks may be quite variable

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[10] See, for example, Willett (2002).
[11] For important research on this issue with respect to Asian trade flows and business cycle patterns, see Shin and Wang (2004).

over time, so that it is not clear to what extent past performance is a good guide to the future in this area. This is a question that deserves a good deal more research. Lastly, many of the members of the euro area do not meet the major OCA criteria and, as was just discussed, it is too early to judge the effects of this on the performance of these countries.

As suggested above, the OCA criteria imply that many, if not most, countries are not good candidates for either of the extremes of the spectrum of exchange rate regimes. We know, however, that, especially in a world of substantial capital mobility, intermediate regimes can be highly unstable. Our reading of the evidence is that there is strong support for the unstable middle hypothesis, but that this unstable area need not extend all the way to the extremes of the two corners.

It would be much too strong to argue that a common basket peg could not make sense for some groups of countries. Any such efforts should pay careful attention to the unstable middle problem, however. Quite likely such a common peg would need to have the flexibility of John Williamson's BBC proposal. Such regimes have sometimes avoided currency crises, but often not. Arguably a common regime would be even more difficult to operate in a stable manner than unilateral ones. A likely important requirement for such regimes to work well is that they are operated by central bankers with a good deal of effective independence rather than by political officials.

Following the logic of the neofunctionalist integrationists in Europe, the need to coordinate monetary policies in order to avoid crises can be a catalyst forcing international cooperation. Our reading of the evidence, however, suggests that such discipline effects work only when the needed policy adjustments are small. When they

are large, adjustment is frequently insufficient and policy conflicts and/or crises result. It isn't wise to assume that limited regimes such as common baskets can produce quantitative leaps in the degree of monetary coordination. Much safer is a strategy where exchange rate coordination follows rather than leads monetary coordination.

The other way round, of course, tends to have greater attraction to political officials who like to appear statesmanlike and often fail to realize the constraints on domestic policy that are required for strong exchange rate coordination to be successful or expect them not to bind until someone else is in office.

Coordinated sterilized intervention can sometimes play a useful role, but it isn't nearly enough to make workable a regime of flexible bands unless they are set so wide as to become virtually meaningless. Thus it would likely be a wise rule to require anyone who advocates regimes of exchange rate coordination to add in the same breath that this requires substantive monetary policy coordination.

V. Categorizing Exchange Rate Regimes in Terms of the Weight Given to Exchange Market Developments in Setting Monetary Policy

This is perhaps easiest to see where we classify intermediate regimes in terms of the weight given to exchange market developments in the setting of monetary policy, rather than in terms exchange rates or the amount of sterilized interventions. From this perspective, a small, fairly open economy should certainly give greater attention to exchange market developments than a large, relatively closed one. Thus Canada, Mexico,

and New Zealand should all give more weight to the exchange rate in setting monetary policy than should the United States.[12]

This would occur automatically for countries following inflation targeting. For some economies, it may be optimal to go beyond this and give direct weight to the exchange rate over and above its influence on domestic prices. Up to a point this could be consistent with flexible inflation targeting that allows for some concern with short run employment and output effects as long as this does not compromise longer-term inflation goals.

On the other hand, countries such as Canada, Mexico, and New Zealand have all chosen not to give 100 percent to the exchange market (balance of payments) as would be necessary for a fixed rate regime. (Of course even with completely fixed rates, there could be some scope for independent monetary policy in the short run if capital mobility were not high.) Thus some types of intermediate regimes as defined in terms of the weight given to exchange market consideration in setting domestic monetary policy are quite consistent with the floating in the sense of no official intervention in the foreign exchange market.

It is not always recognized that it is this issue of the orientation of monetary policy to which most of the OCA literature are addressed. This is largely different from the criteria for the desirability of sterilized intervention. These criteria, which will be discussed in the following section, focus on the behavior of speculation and types of shocks.

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[12] Just how much weight these countries have given is an issue of some dispute. See, for example, the analysis and references in Siklos (2004).

VI. Criteria for Discretionary Exchange Market Intervention

There is a vast literature on criteria for exchange market intervention. The least controversial analytically is sterilized intervention to offset imperfections in private speculation. The easiest of such possible deficiencies of private speculation to identify in practice is when markets become disorderly. While there isn't any complete agreement on precise criteria, one can usually tell a disorderly market when one encounters it. Typically there has been some event that has generated great uncertainty and the market has become temporarily much more risk averse than normal. (i.e., risk tolerance has declined while perceptions of risk have increased). In consequence, relatively small transactions can often lead to large movements in the market price. Such market disorder, in the classic sense, generally does not last long.

More difficult to classify are periods of high-risk aversion that may last for a considerable period such as occurred in Asia in 1997-98 and globally after the Russian default and LTCM crisis in 1998. Such market conditions are often described as being the result of destabilizing speculation based on herd behavior. Our interpretation of these crises, however, is that there was much less activity destabilizing speculation than is often assumed and often what is as or more important was a sudden drying up of stabilizing speculation. Remember that the analytic destruction between stabilizing versus destabilizing speculation rests on whether speculative actions tend to move price (in this one case the exchange rate), toward or away from its equilibrium value. Judgments about equilibrium values, of course, often differ widely among experts so this criterion is often of quite limited used in classifying particular situations. Even where

sufficient agreement of empirical judgments could be found to make the distinction between destabilizing and insufficiently stabilizing speculation operational, one might question whether this isn't just academic hairsplitting, positing a distinction without a difference. This is far from the case, however, in a world of substantial capital mobility.

Where speculation is actively destabilizing, it would normally be optimal to offset it with sterilized official intervention. With very high capital mobility, however, such sterilized intervention would be largely ineffective. Thus such destabilizing speculation could force a serious dilemma on domestic monetary policy – whether to adjust policy to reduce destabilizing movements of the exchange rate, or keep it aimed at domestic objectives and suffer large exchange rate changes.

Where the incipient exchange rate movements is instead due to a temporary increase in risk aversion that leads primarily not to destabilizing speculation, but to insufficient stabilizing speculation, then capital mobility in effect temporarily falls and sterilized intervention can become effective. This in turn could substantially lessen the dilemma forced on domestic monetary policy.

We have argued that for a number of the Asian crisis countries, of which Korea is a prime example, the substantial overshooting of exchange rates was due in considerable part not just to capital outflows, but a drop in capital inflows against the background of substantial current account deficits.[13] To the extent that this conclusion is correct, an increase in the amount of sterilized intervention during the crisis could have substantially reduced exchange rate overshooting. Unfortunately, data problems make it difficult for us to judge just how well this story fits Korea. The large current account deficit part certainly fits. For 1996 Korea's current account deficit was approximately $23 billion. It

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[13] See Willett (2000).

is the size of capital outflows that is more difficult to measure. Issues involve both data coverage and the time periods to be considered.

Contrary to the common view that puts most of the blame for capital account instability on international portfolio investors, they were far from the major source of capital outflows from Korea. The dollar value of foreign holdings in the Korean stock did fall drastically, from over $17 billion at the end of the third quarter of 1996 to barely over $5 billion one year later. However, most of this drop was due to falls in stock prices and the won against the dollar, not capital outflows. Quarterly data on the dollar value of capital flows shows actual portfolio equity outflows in only two quarters, almost $2 billion in fourth quarter 1997 and less than one-half billion in third quarter 1998. Total portfolio flows including debt were negative in the fourth quarter of 1997, turned positive for the first half of 1998 and then turned negative again from the third quarter 1998 through the end of 1998. Over the year from mid 1997 to mid 1998 total portfolio flows were $9 billion. On the other hand, over this period short term international bank debt fell by $40 billion, from approximately $72 to $32 billion, with the majority of the drop coming in the first half of 1998. Over all, the financial account in the balance of payments ran a negative $25 billion for this period and $29 billion for the period through the end of 1998.

While we would not have confidence in any precise estimate, over all the data suggests that a large but manageable scale of official intervention (had reserves been available) could have substantially reduced the amount of the huge over depreciation of the won.

Note that such sterilized intervention would not have been able to save the pre

crisis peg. There is disagreement among experts over whether prior to the crisis the won

was a little overvalued or a little undervalued or just right, but there is no question that

the recognition of substantial problems in Korea's financial sector implied a sizeable fall

in the equilibrium value of the won. There can be little question that a major depreciation

was needed. We have seen no convincing analysis, however, that argues that the won

needed to fall all the way from 849.88 in Jan. 1997 to 1701.53 in Jan. 1998. Clearly

domestic monetary policy needed some tightening. Whether what actually occurred was

too little or too much is difficult to say (although of course this doesn't always keep

particular economists from voicing strong opinions). It does seem to us, however, with

the benefit of hindsight, that the amount of exchange rate overshooting could have been

substantially reduced through greater sterilized intervention.

Despite former Deputy Managing Director Stan Fischer's call for the IMF to

seriously consider substantially increasing its capacity to operate as a quasi lender of last

resort during capital account crisis, there is little indication of support for a major

movement in this direction by either the IMF or its principal shareholders. Thus Korea's

policy of substantial reserve accumulation to make it better prepared to handle possible

future crisis has been quite wise. However, reserves have now reached levels that are

more than adequate[14].

Other criteria for intervention focus on effects on the domestic economy. Even

with strict inflation targeting, in open economies, central banks need to pay attention to

the implications of exchange market developments for future inflation. It is now well

understood that because of adjustment lags monetary policy should respond more to

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[14] See Kim et al (2004)

expected future than to post inflation, otherwise dynamic instability may result. In this context, exchange rate developments are likely to be a component of central banks' operating strategies, although this need not involve direct intervention in the foreign exchange market. Beyond strict inflation targeting, central banks and governments may want to give consideration of the economic benefits of price level versus exchange rate stability where there is a conflict between the two. As Keynes once put it, what is the relative importance of internal versus external price stability? Obviously the more open is the economy, the greater is the weight that should be given to the latter, but beyond this qualitative judgment we are far from a professional consensus on how these should be weighted or even how inflation targeting is best implemented in open economies.[15] These are important areas for further research.

Going one step further from strict inflation targeting, many would argue that once inflation is brought down to low levels and is credibly expected to remain there, then there is some scope for active management to lower average levels of unemployment and raise average levels of growth by taking action to offset some types of shocks and/or reduce the magnitudes of recessions. Under such flexible inflation targeting, priority normally should be given to domestic monetary and fiscal polices. However, especially whether these may be constrained for various reasons, policies to generate exchange rate depreciation or limit appreciation are sometimes advocated to help promote domestic economic recovery. Japan in recent years is a major case in point, and has been the subject of considerable controversy. One problem is that even if effective for promoting domestic recovery, such strategies may impose inappropriate adjustment burdens on

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[15] See the discussions and references in Eichengreen (2001), (2004) and Willett (2003).

other countries. The IMF is tasked with monitoring such developments, but has been surprisingly quiet in the case of Japan's huge intervention.

Three have been suggestions that this was due largely to the views of former Managing Director Horst Kohler. If so, this issue may receive more IMF attention in the future. China has also been singled out for criticism for heavy intervention to keep the RMB from appreciating.

Given Korea's substantial trade links with both China and Japan this should be an issue of attention for the Korean government. Of course, in the US and Europe concerns have also been voiced, although less prominently, that Korea has also followed a beggar thy neighbor strategy. As is shown in table five, while Japan and China's levels of reserves and post crisis changes in reserves are much larger than for Korea in absolute terms, as a percentage of GDP, Korea's reserves are now roughly the same as China's and substantially higher than Japan's. In part because of such a low initial level, its growth rate of reserves is also substantially higher.

Substantial intervention in the early days of the post crisis period is not easy to evaluate. A considerable appreciation was justified to compensate for the initial over depreciation, but 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 chocking off the recovery from the crisis" (p508).

VII. Concluding Remarks

Our review of Korea's post crisis exchange rate policy leads us to conclude that the broad strategy of a managed float combined with an inflation target, what Morris Goldstein has labeled managed floating plus, is the right one. Within this strategy, however, there appears to have been excessive reserve accumulation. In the wake of the almost complete depletion of reserves during the 1997 crisis, a substantial rebuilding of reserves was certainly called for. It would make a major contribution to international financial stability if more countries outside of Asia would follow Korea's example on this score. There is no one exact scientific way to judge reserve adequacy 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 (see Kim et al, 2004) and raises concerns that continuing increases are motivated more by mercantilistic concerns and/or short run stabilization policy objectives than by prudent reserve rebuilding and short-run smoothing intervention.

In their recent papers proposing a framework for Korean exchange rate policy Dooley, Dornbusch, and Park (2002) advocate the combination of inflation targeting with managed floating and suggest specific guidelines for management. They are skeptical of John Williamson's BBC proposal (basket, band, crawl) largely on the grounds that "We do not believe that it will be possible to identify an equilibrium exchange rate…" p. 497. We concur in that judgment.

Dooley, Dornbusch, and Park specifically propose that sterilized intervention be used to moderate fluctuations in excess of three percent a day and six percent a week against a basket of the dollar, euro, and yen. They note, however, that "there is no scientific basis to determine a good band width" (p.495). The same applies with respect

29

to setting daily or weekly limits. We have no particular insight into what such limits should be, but note that Korea appears to have followed a policy of greater short run smoothing than recommended by Dooley, Dornbusch, and Park perhaps because, as they suggest, "in…Korea where hedging facilities are expensive and limited to a few firms in the trade sector, the authorities have been under constant pressure to moderate fluctuations in the won-dollar exchange rate" (p. 511).

A major part of the justification for heavy short run management of the Korean exchange rate is that the foreign exchange market is thin and underdeveloped. As Dooley, Dornbusch, and Park note, however, some degree of variability is needed to make private speculation profitable.[16] Thus to the extent that the problem is insufficient stabilizing speculation rather than actively destabilizing speculation, it might be wise to allow some degree of excessive variability in the short run to help facilitate the development of a broader and better functioning private market for the longer term. Furthermore, artificially suppressing the market signals of true underlying risk can lead to too little hedging of international transactions. Large unhedged positions were, of course, a major cause of the severity of the Asian crises.

Dooley, Dornbusch, and Park indicate concerns about the possibility of excessive intervention and argue for strong rules in this area. They propose that a specific target for net reserves be set and, if reserves deviate from this by more than twenty-five percent, the imbalance should be corrected over a six-month period. As Jun Il Kim (2002) notes in his comments on this paper, this specific formulation may be too rigid and could generate long swings in the exchange rate.

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[16] See also the comments by Krueger (2002).

Such issues were investigated in the discussion of the Committee of Twenty on possible reforms of the international monetary system following the breakdown of the Bretton Woods exchange rate mechanism in the early 1970s. There was considerable interest in the development of a reserve indicator system to limit payments imbalances by both surplus and deficit countries. A general conclusion is that if officials do not begin to make adjustments until stock limits are hit, this is likely to generate dynamic instability in flows much as strict backwards looking inflation targeting could lead to greater variability in future inflation.[17] With respect to reserves, one needs a policy of graduated incentives to avoid excessive accumulations or deccumulations. The best (or least bad) ways to accomplish this should be a priority topic for analysis.

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 concerning the best strategies for managing the won's float from both Korean and global perspectives. It is our hope that the analysis in this paper will be helpful in suggesting directions for future policy research.

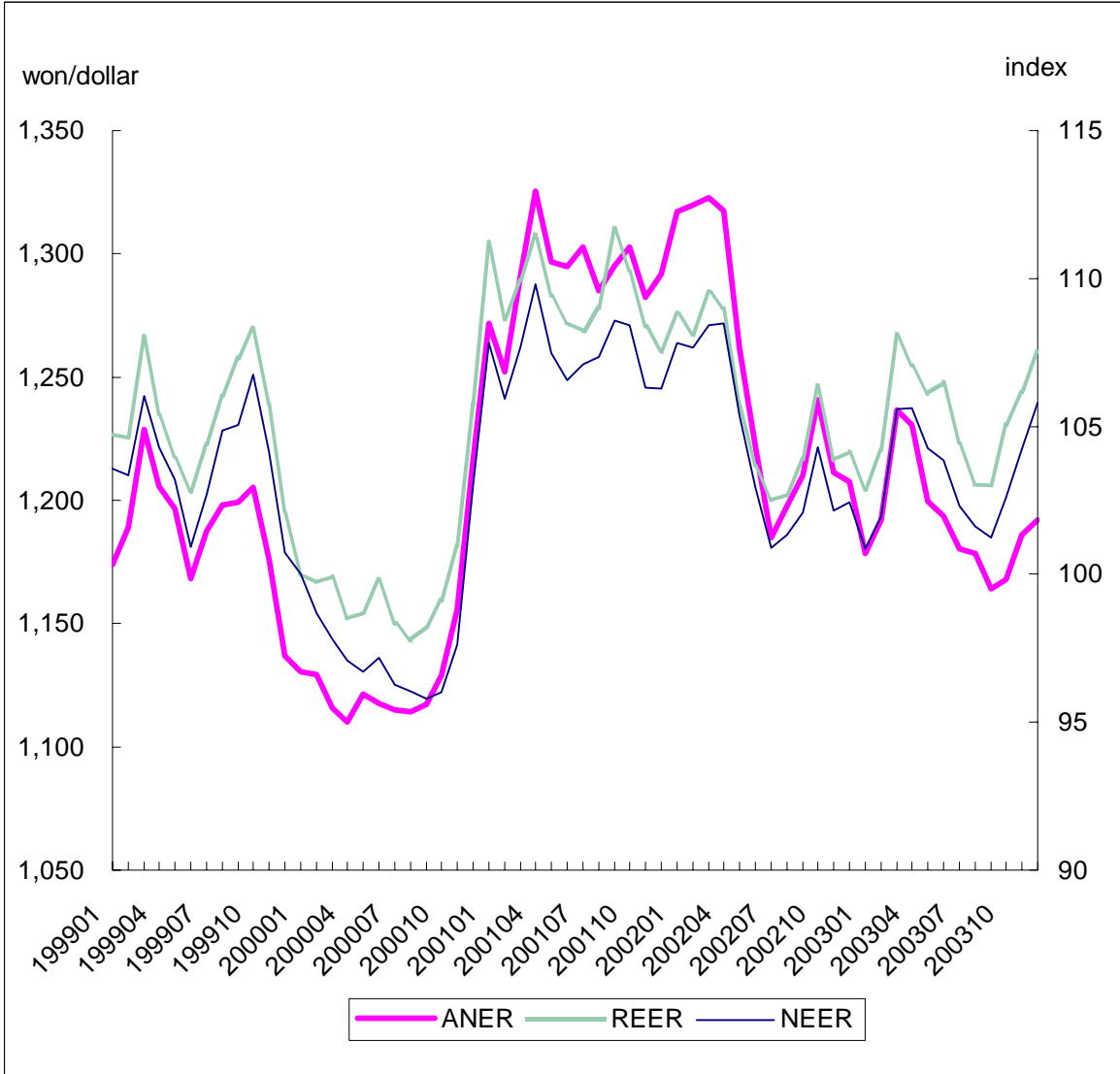[17] On the C-20 discussions, see Willett (1977) and Williamson (2000).

Figure 1. Monthly Average Won-Dollar Exchange Rate, Nominal Effective Exchange
Rate and Real Effective Exchange Rate from Jan. 1999 to Dec. 2003
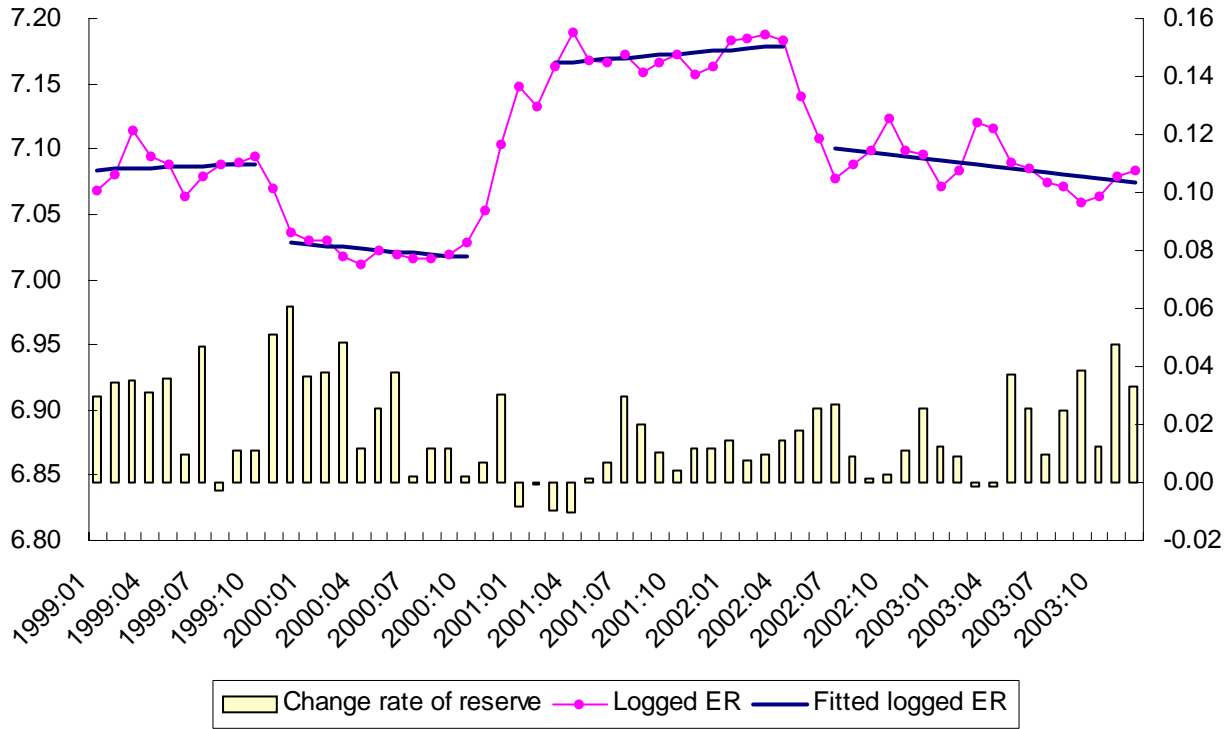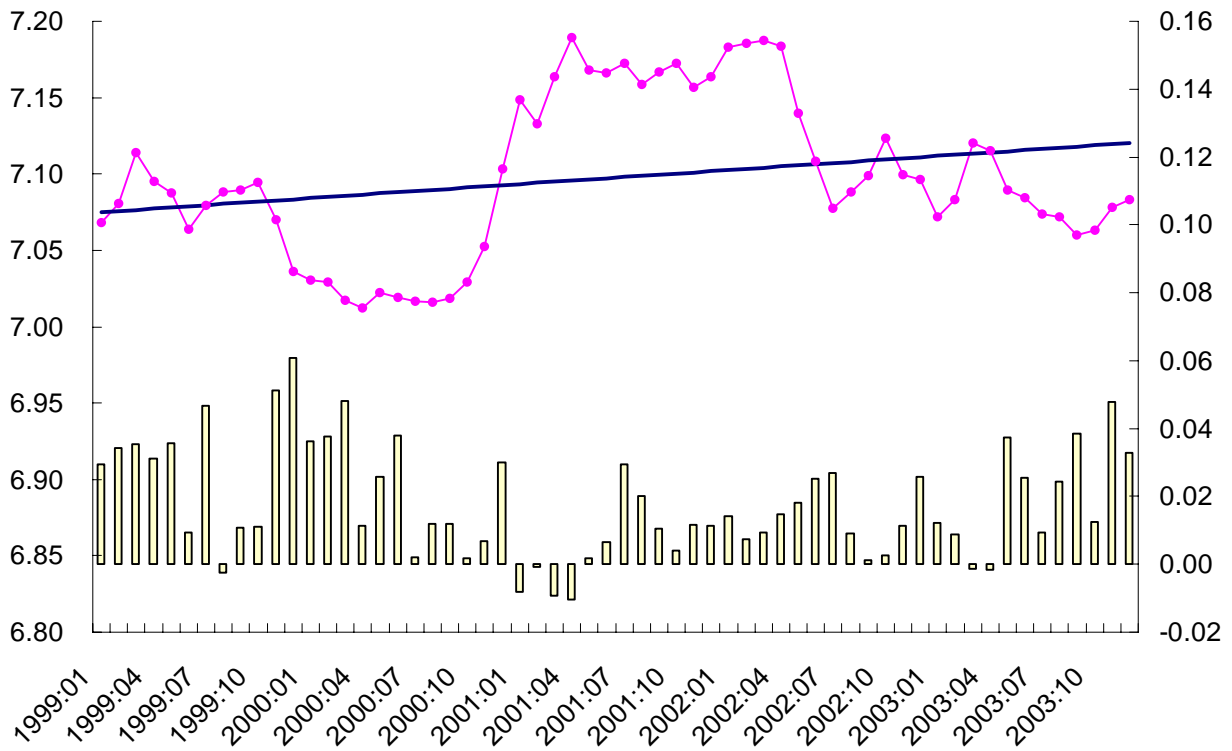
Figure 2. Logged Won-Dollar Nominal Exchange Rate and Change Rate of Reserve during Sub Periods
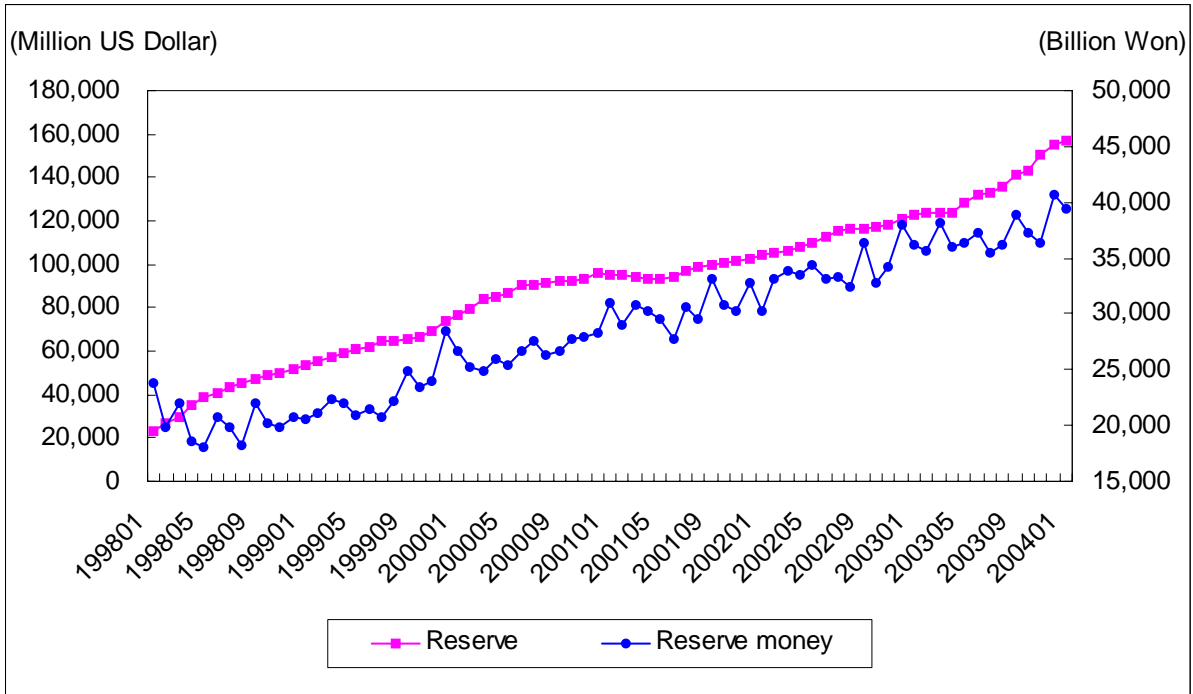
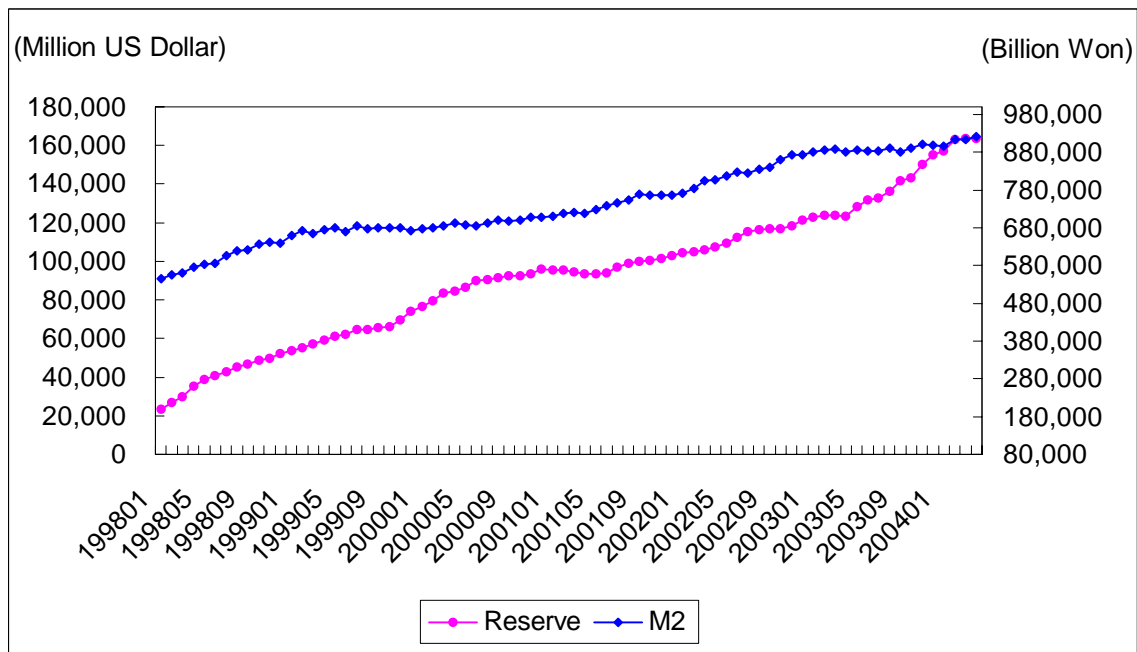Figure 3. Foreign Reserve Accumulation and Reserve Money

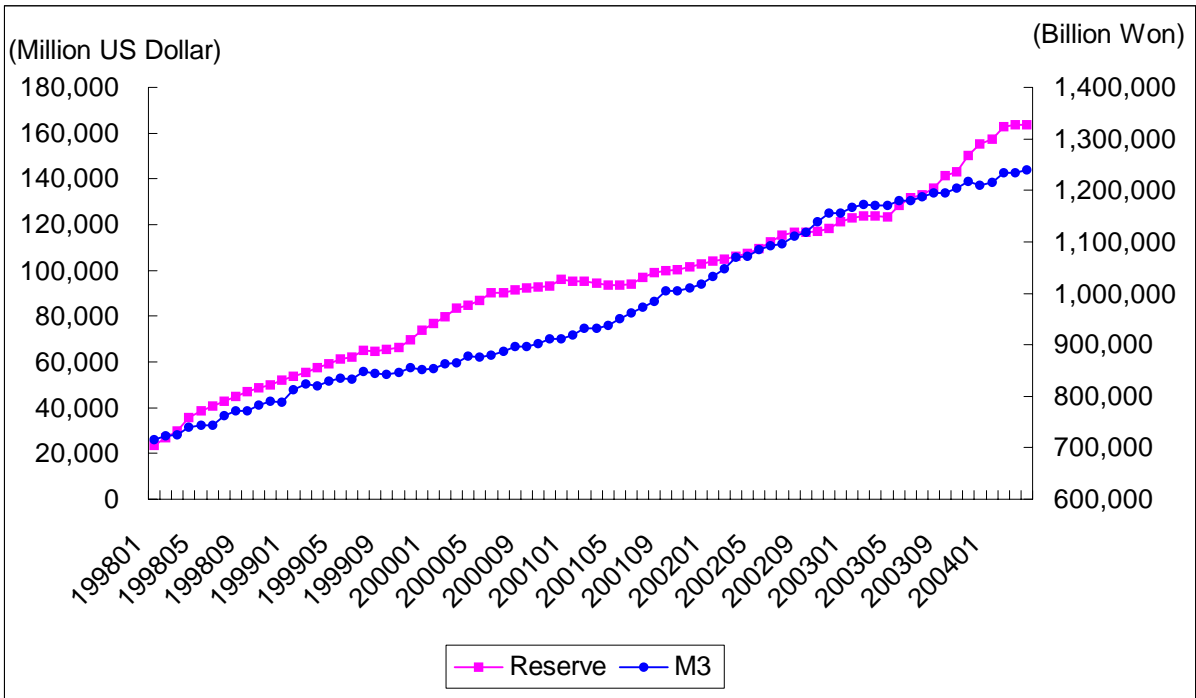Figure 4. Foreign Reserve Accumulation and M2

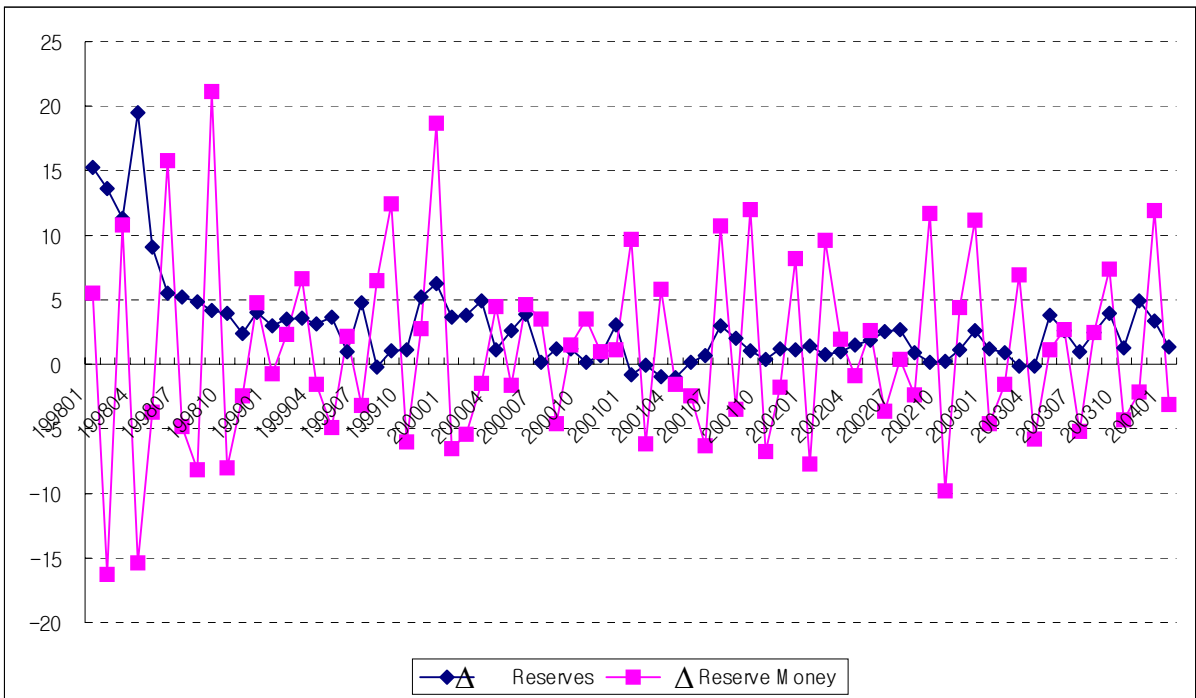34

Figure 5. Foreign Reserve Accumulation and M3

Figure 6. Change in Reserve and Monetary Base

Table 1. Trend Coefficients and Intervention Index for Average Nominal Exchange Rate against Dollar

Period	Trend Coef.		Type of Data	Intervention Index
	Exchange rate	Reserve		
Whole Period				
1999:1~2003:12	0.92	19.36	A (38/60)	0.526
			B (34/60)	0.571
			C	0.513
			D	0.566
Sub Periods				
One				
1999:1~1999:10	0.05	31.37	A (4/10)	0.541
			B (6/10)	0.535
(Transition: -5.65%)			C	0.534
			D	0.587
Two				
1999:12~2000:10	-1.31	30.95	A (6/11)	0.777
			B (8/11)	0.784
(Transition: 14.40%)			C	0.754
			D	0.722
Three				
2001:3~2002:4	1.21	14.66	A (9/14)	0.376
			B (7/14)	0.457
(Transition: -10.06%)			C	0.403
			D	0.545
Four				
2002:7~2003:12	-1.90	21.69	A (11/18)	0.562
			B (10/18)	0.568
			C	0.533
			D	0.527

1. The trend coefficients are annual rate of change. A positive number of trend coefficient for exchange rate means depreciation while positive number for trend coefficient for reserve denotes increasing reserve.
2. The numerator of the parenthesis in the 'type of data' column is the number of observations of leaning against wind and denominator is the total number of observations.
3. The numbers in the parenthesis of 'transition' below the sub period are the percent change of the exchange rate during the transitory periods.
4. A: detrended and filtered data, B: non-detrended and filtered data, C: detrended and all data, D: non-detrended and all data.

Table 2. Trend Coefficients and Intervention Index for Nominal Effective Exchange Rate

Period	Trend Coef.		Type of Data	Intervention Index
	Exchange rate	Reserve		
Whole Period				
1999:1~2003:12	0.50	19.36	A (34/11)	0.516
			B (37/11)	0.578
			C	0.522
			D	0.574
Sub Periods				
One				
1999:1~1999:10	0.16	31.37	A (6/10)	0.590
			B (6/10)	0.545
(Transition: -5.62%)			C	0.538
			D	0.585
Two				
1999:12~2000:10	-5.60	30.95	A (6/11)	0.789
			B (9/11)	0.706
(Transition: 12.19%)			C	0.775
			D	0.698
Three				
2001:3~2002:4	-0.03	14.66	A (4/14)	0.206
			B (8/14)	0.514
(Transition: -7.00%)			C	0.441
			D	0.598
Four				
2002:7~2003:12	1.40	21.69	A (10/18)	0.542
			B (10/18)	0.591
			C	0.539
			D	0.562

1. The trend coefficients are annual rate of change. A positive number of trend coefficient for exchange rate means depreciation while positive number for trend coefficient for reserve denotes increasing reserve.
2. The numerator of the parenthesis in the 'type of data' column is the number of observations of leaning against wind and denominator is the total number of observations.
3. The numbers in the parenthesis of 'transition' below the sub period are the percent change of the exchange rate during the transitory periods.
4. A: detrended and filtered data, B: non-detrended and filtered data, C: detrended and all data, D: non-detrended and all data.

Table 3. Trend coefficients and intervention index for Real Effective Exchange Rate against Dollar

Period	Trend Coef.		Type of Data	Intervention Index
	Exchange rate	Reserve		
Whole Period				
1999:1~2003:12	0.84	19.36	A (38/60)	0.490
			B (34/60)	0.524
			C	0.470
			D	0.527
Sub Periods				
One				
1999:1~1999:10	0.20	31.37	A (6/10)	0.545
			B (6/10)	0.571
(Transition: -5.72%)			C	0.521
			D	0.572
Two				
1999:12~2000:10	1.21	30.95	A (3/11)	0.556
			B (6/11)	0.575
(Transition: -10.94%)			C	0.633
			D	0.636
Three				
2001:3~2002:4	1.21	14.66	A (6/14)	0.357
			B (8/14)	0.485
(Transition: -5.96%)			C	0.340
			D	0.490
Four				
2002:7~2003:12	-1.90	21.69	A (8/18)	0.533
			B (9/18)	0.542
			C	0.534
			D	0.534

1. The trend coefficients are annual rate of change. A positive number of trend coefficient for exchange rate means depreciation while positive number for trend coefficient for reserve denotes increasing reserve.
2. The numerator of the parenthesis in the 'type of data' column is the number of observations of leaning against wind and denominator is the total number of observations.
3. The numbers in the parenthesis of 'transition' below the sub period are the percent change of the exchange rate during the transitory periods.
4. A: detrended and filtered data, B: non-detrended and filtered data, C: detrended and all data, D: non-detrended and all data.

Table 4. Trend coefficients and intervention index from May 1996 to Oct. 1997

Period	Trend Coef.		Type of Data	Intervention Index
	Exchange rate	Reserve		
ANER	11.48	-9.30	A (9/18)	0.779
			B (12/18)	0.818
			C	0.780
			D	0.712
NEER	6.29	-9.30	A (8/18)	0.824
			B (8/18)	0.836
			C	0.813
			D	0.759
REER	3.91	-9.30	A (6/11)	0.771
			B (5/11)	0.734
			C	0.782
			D	0.717

1. NAER, NEER, and REER are nominal average exchange rate against the dollar, nominal effective exchange rate, and real effective exchange rate, respectively.
2. The trend coefficients are annual rate of change. A positive number of trend coefficient for exchange rate means depreciation while positive number for trend coefficient for reserve denotes increasing reserve.
3. The numerator of the parenthesis in the 'type of data' column is the number of observations of leaning against wind and denominator is the total number of observations.
4. A: detrended and filtered data, B: non-detrended and filtered data, C: detrended and all data, D: non-detrended and all data.

Table 5. Comparison of Reserve Levels and Growth among Korea, Japan and China

	Stock of Reserves		Change	Annual Growth Rate	Ratio of Reserves to 2002 GDP (in %)	
	Dec. 1997	Apr. 2004 (A)		(in %)	Apr. 2004 (A)	Change from Dec. 1997
Korea	20.4	163.6	143.2	38.9	28.4	24.8
Japan	219.6	805.4	585.8	21.8	19.4	14.1
China	142.8	453.5	310.8	20.2	36.7	25.1

Note: Reserves are in billions of US dollars.

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