

The East Asian Dollar Standard, Fear of Floating, and Original Sin

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Abstract

Before the crisis of 1997/98, the East Asian economies—except for Japan but including China—pegged their currencies to the US dollar. To avoid further turmoil, the IMF argues that these currencies should float more freely. However, the authors' econometric estimations show that the dollar's predominant weight in East Asian currency baskets has returned to its pre-crisis levels. By 2002, the day-to-day volatility of each country's exchange rate against the dollar had again become negligible. Most governments were rapidly accumulating a "war chest" of official dollar reserves, which portends that this exchange rate stabilization will come to extend over months or quarters. From the doctrine of "original sin" applied to emerging-market economies, the authors argue that this fear of floating is entirely rational from the perspective of each individual country. And their joint pegging to the dollar benefits the East Asian dollar bloc as a whole, although Japan remains an important outlier.

1. More Exchange Rate Flexibility in East Asia?

Before the 1997/98 Asian crisis, East Asian economies Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand had pegged their exchange rates to the dollar. Although these smaller East Asian countries used a variety of exchange rate systems, their common peg to the dollar provided an informal common monetary standard that enhanced macroeconomic stability in the region. China joined the system in 1994 when it unified its foreign exchange market and adopted a stable peg to the dollar. (Only Japan was a "pure" floater with wide fluctuations in the yen/dollar exchange rate.)

With the advent of the 1997/98 Asian crisis, the common East Asian monetary standard fell apart. Although China and Hong Kong retained their dollar pegs, the debtor countries Indonesia, Korea, Malaysia, Philippines, and Thailand were forced to float; i.e., let their currencies fall precipitately when they were attacked. Even the creditor countries which were not attacked, Taiwan and Singapore, engineered moderate depreciations. And, Japan, as the outlier, let the yen float downward substantially over 1997 through mid 1998 and thus aggravated the crisis for the other East Asian economies (McKinnon and Schnabl, 2003a).

The lesson drawn from the currency attacks on the debtor economies by the International Monetary Fund (IMF) and many other commentators was (is) that the pre-1997 system of "soft" dollar pegs itself was at fault. Before 1997, because of high risk premia, the interest rates in the East Asian debtor economies were much higher than on dollar or yen assets. Thus, in order to make loans in, say, Thai baht, Thai banks were tempted to accept low-interest dollar (or yen) deposits instead of relatively high-interest baht deposits. And this temptation to risk foreign exchange exposure was all

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the greater because the baht/dollar exchange rate was (softly) fixed. So, this critique runs, if the exchange rates of the debtor economies had been fluctuating more randomly, the Thai (or Korean, or Indonesian, or Malaysian, or Philippines) banks would see greater risk and be less prone to short-term overborrowing in foreign exchange in the first place. Further, by introducing more flexibility in exchange rates *ex ante*, the critics of soft dollar pegging contend that large discrete depreciations become less likely *ex post*; i.e., after some political or economic disturbance that provokes an attack.

This line of reasoning against restoring soft dollar pegs has been so persuasive that academic commentators and international agencies fear a return to the pre-1997 regime. Post-crisis the IMF has warned of “an important danger [. . .] in slipping back into *de facto* pegging of exchange rates against the US dollar” (Mussa et al., 2000, p. 33). For emerging markets open to international capital flows, Fischer (2001, p. 5–10) has argued that soft pegs are not sustainable. Post-crisis, he sees most emerging markets moving towards more flexible exchange rates. Indeed, Fischer sees movement towards a bipolar world where a few emerging markets such as Hong Kong adopt hard pegs, while all the others move toward greater exchange rate flexibility:

“In the last decade, there has been a hollowing out of the middle of the distribution of exchange rate regimes in a bipolar direction, with the share of both hard pegs and floating gaining at the expense of soft pegs. This is true not only for economies active in international capital markets, but among all countries. A look ahead suggests this trend will continue, certainly among the emerging market countries. The main reason for this change, among countries with open capital accounts, is that soft pegs are crisis-prone and not viable over long periods.” (Fischer, 2001, p. 22)

Similarly, based on monthly observations, Hernández and Montiel (2003) find that Indonesia, Korea, Philippines, Singapore, Taiwan, and Thailand have more flexible (but not purely flexible) exchange rates than in the pre-crisis period.

The IMF position in favor of more exchange rate flexibility in East Asia is reflected in its official classification of East Asian exchange rate arrangements. All East Asian countries that had *not* adopted clearly visible pegs (China, Hong Kong, and Malaysia) are classified as managed or independent floaters. Going one step further, the IMF sometimes pressures countries to announce an internal monetary standard—such as inflation targeting—as a substitute for relying on the exchange rate as their nominal anchor.

Against this by-now-conventional wisdom, we shall argue in favor of dollar pegging—at least for East Asia. Indeed, we argue that the IMF’s “worst” fears could well be realized: low-frequency dollar pegging (as in Malaysia) will follow the path of high-frequency pegging, and exchange rate volatility will diminish. The informal East Asian dollar standard could be accidentally resurrected by national central banks acting independently. Our analysis has both an empirical and a theoretical dimension.

First, we rationalize why developing countries with incomplete domestic financial markets use (soft) dollar pegging to mitigate short-term domestic payments risk on the one hand, while providing a useful nominal anchor for national monetary policies on the other. What underlying theories could explain soft dollar pegging as optimizing behavior?

Second, we show empirically that, Japan aside, the East Asian dollar standard is reestablishing itself in the post-crisis period. But to get a balanced view of the extent of this reformation, we distinguish “high-frequency” (i.e., day-to-day or week-to-week) dollar pegging from “low-frequency” (i.e., month-to-month or quarter-to-quarter)

dollar pegging. The return to soft dollar pegging is most evident at high frequencies of observation.

2. Low-frequency Dollar Pegging and the Common Nominal Anchor

To discuss the rationale for the return to the pre-crisis exchange rate arrangements, let us discuss low-frequency dollar pegging first. Based on monthly observations from 1980, Figure 1 shows that all East Asian countries except Japan stabilized the dollar values of their currencies up to the 1997/98 crisis—and, with the major exception of Indonesia, could be returning to such pegging in the near future. With base 100, the various country panels in Figure 1 use the same vertical scale for dollar exchange rates (except for Indonesia) so that the observer can more easily compare proportional changes.

East Asian countries used a variety of exchange rate systems ranging from a currency board hard peg in Hong Kong to a sliding or crawling peg in Indonesia before 1997. Although these pegs were often not openly admitted or were disguised as currency baskets, the common adherence to the dollar is easy to recognize. After a series of official devaluations before 1994, China has since maintained a hard, if informal, peg of 8.3 yuan to the dollar and a unified foreign exchange market.¹ Malaysia introduced a fixed exchange rate of 3.8 ringgit to the dollar in September 1998.

Trade Invoicing

The rationale for low-frequency dollar pegging does not primarily arise because of strong trade ties with the United States. The US accounts for only about 23% of overall exports of the smaller East Asian economies—and for only 14% of their imports. Instead, we focus on the fact that most of East Asian commodity trade is invoiced in dollars (McKinnon, 2000).

To show the predominance of dollar invoicing in East Asia, Table 1 displays Korea's invoicing practices from 1980 to 2002. In 2002, the percentage of Korean imports invoiced in US dollars was 80.6%, while the proportion of dollar invoicing of Korean exports was even higher at 86.8%—similar to the proportions observed in the preceding two decades. Because the other smaller countries are less industrialized than Korea, their currencies are even less likely to be used in foreign trade, with the proportion of dollar invoicing being correspondingly greater.

In striking contrast, yen invoicing in Korean trade is surprisingly small. In 2002, Table 1 shows that only 5.2% of Korean exports—and only 12–13% of Korean imports—were invoiced in yen. This is “surprising” because Japan is at least as important a trading partner with Korea as is the United States, and direct investment by Japan in Korea has been much higher. Table 1 also shows that the use of European currencies is negligible.

The use of the yen in invoicing intra-Asian trade is of particular interest because the economic linkages with Japan are particularly strong. From Table 2, which summarizes how different currencies are used in overall Japanese trade, we draw two conclusions. First, in contrast to other industrial countries, the dollar—and not the domestic currency (i.e., not the yen)—dominates. In 2002, 48.0% of Japan's worldwide exports and 68.7% of Japan's aggregate imports were invoiced in dollars, while only 34.4% of world exports and 24.6% of imports were invoiced in yen.

Second, although Japan's currency is a bit more important in trade with Asian neighbors, the differences are surprisingly small. In 2002, 53.3% of Japan's exports to Asia

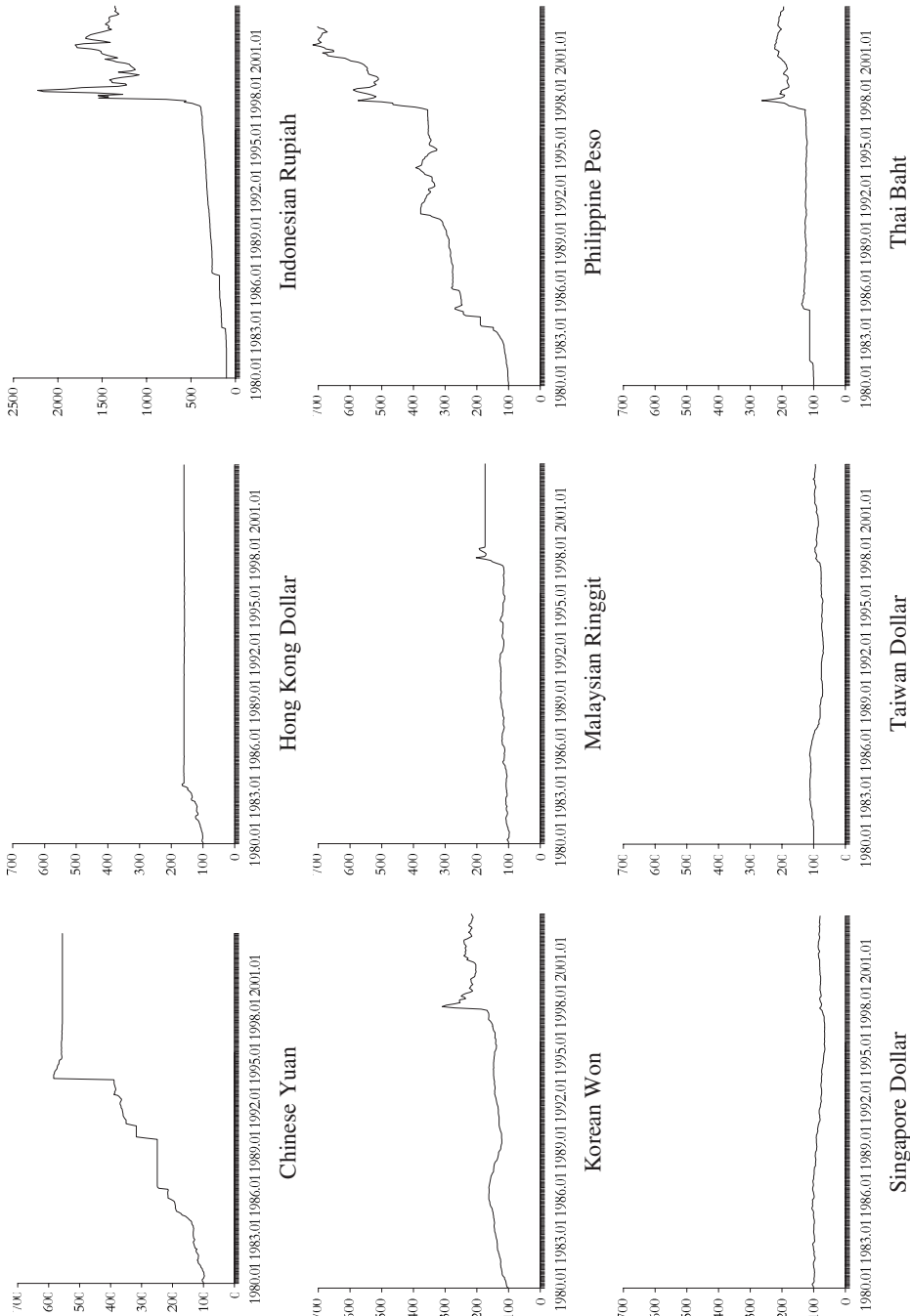


Figure 1. East Asian Exchange Rate Pegs against the Dollar, 1980:1–2003:12 (monthly)

Table 1. Invoice Currencies in Korean Trade, 1980–2002 (percentages)

	Exports (receipts)					Imports (payments)				
	\$	¥	DM	£	Other	\$	¥	DM	£	Other
1980	96.1	1.2	2.0	0.4	0.3	93.2	3.7	1.7	0.5	0.9
1985	94.7	3.7	0.6	0.3	0.7	82.4	12.3	2.0	0.5	2.8
1990	88.0	7.8	2.1	0.5	1.7	79.1	12.7	4.1	0.9	3.4
1995	88.1	6.5	2.4	0.8	2.2	79.4	12.7	3.8	0.7	3.4
2000	84.8	5.4	1.8	0.7	7.3	80.4	12.4	1.9	0.8	4.4
2002	86.8	5.2	5.8	0.8	1.4	80.6	12.1	5.4	0.6	1.3

Trade in services is not included. DM represents the euro starting from 2000.

Source: Bank of Korea: *Monthly Statistical Bulletin*.

Table 2. Invoice Currencies in Japanese Trade, 1980–2002 (percentages)

	World			US			Asia			EU		
	\$	¥	Other	\$	¥	Other	\$	¥	Other	\$	¥	Other
<i>Exports</i>												
1980	66.3	28.9	4.8									
1987	55.2	33.4	11.4	84.9	15.0	0.1	56.5	41.1	2.4	8.2	44.0	47.8
1990	48.8	37.5	13.7	83.7	16.2	0.1	48.1	48.9	3.0	6.4	42.1	51.5
1995 ^a	52.5	36.0	11.5	82.9	17.0	0.1	53.4	44.3	2.3	12.2	34.9	52.9
2000 ^a	52.4	36.1	11.5	86.7	13.2	0.1	50.0	48.2	1.8	13.0	33.5	53.5
2002 ^a	48.0	38.4	13.6	86.4	13.4	0.2	44.7	53.3	2.0	11.2	27.4	54.4
<i>Imports</i>												
1980	93.1	2.4	4.5									
1987	81.7	10.6	7.7	90.6	9.2	0.2	87.6	11.5	0.9	19.5	27.3	53.2
1990	75.5	14.6	9.9	88.2	11.6	0.2	78.8	19.4	1.8	16.3	26.9	56.8
1995 ^a	70.2	22.7	7.1	78.4	21.5	0.1	71.9	26.2	1.9	16.1	44.8	39.1
2000 ^a	70.7	23.5	5.8	78.7	20.8	0.5	74.0	24.8	1.2	17.5	49.7	32.8
2002 ^a	68.7	24.6	6.7	80.2	19.3	0.5	71.0	27.8	1.2	13.2	49.4	32.0

Asia = 19 to 22 Asian countries.

^a September.

Sources: Sato (1999), MITI: *Yushutsu (Yu'nyû) Kessai Tsûka-date Dôkô Chôsa*, and Ministry of Finance: *Bôeki Torihiki Tsûka-betsu Hiritsu*.

and 27.8% of her imports from Asia were invoiced in yen. By comparison, 44.7% of Japanese exports to Asia and 71.0% of Japanese imports from Asia were invoiced in US dollars.

Although Japan is the world's second largest industrial economy, the dollar is more widely used in Japanese trade with East Asia than is the yen. As Sato (1999, p. 574) puts it, the East Asian countries are unlikely to use the yen in their foreign trade except

when that trade is with Japan. The US dollar predominates in invoicing East Asian trade in general and intra-East Asian trade in particular—as when, say, Thailand trades with Malaysia. Thus, despite lively discussions as in Kwan (2001) about the possibility of a yen zone in East Asia, the revealed invoicing preferences of Asian importers and exporters indicate the contrary: the area has been, and is, a strong dollar zone from which the dollar shows no signs of being displaced. This dollar invoicing helps explain why the smaller East Asian economies, including China, are so anxious to peg to the dollar at both low and high frequencies.

The Macroeconomic Rationale for Low-frequency Pegging

Using a much bigger dataset going on beyond East Asia, Calvo and Reinhart (2002) showed what they called “fear of floating” in developing countries on a worldwide scale. Although a small number of eastern European transitional economies and ex colonies peg to the euro (Schnabl, 2004), the rest of the developing world pegs “softly” to the dollar. From monthly data, they showed that exchange rates in developing countries were much less volatile—and interest rates as well as exchange reserves much more volatile—than in the industrial countries.

Their rationale for the low-frequency (month-to-month or quarter-to-quarter) pegging they observed is nicely summarized by Reinhart (2000, p. 69) thus:

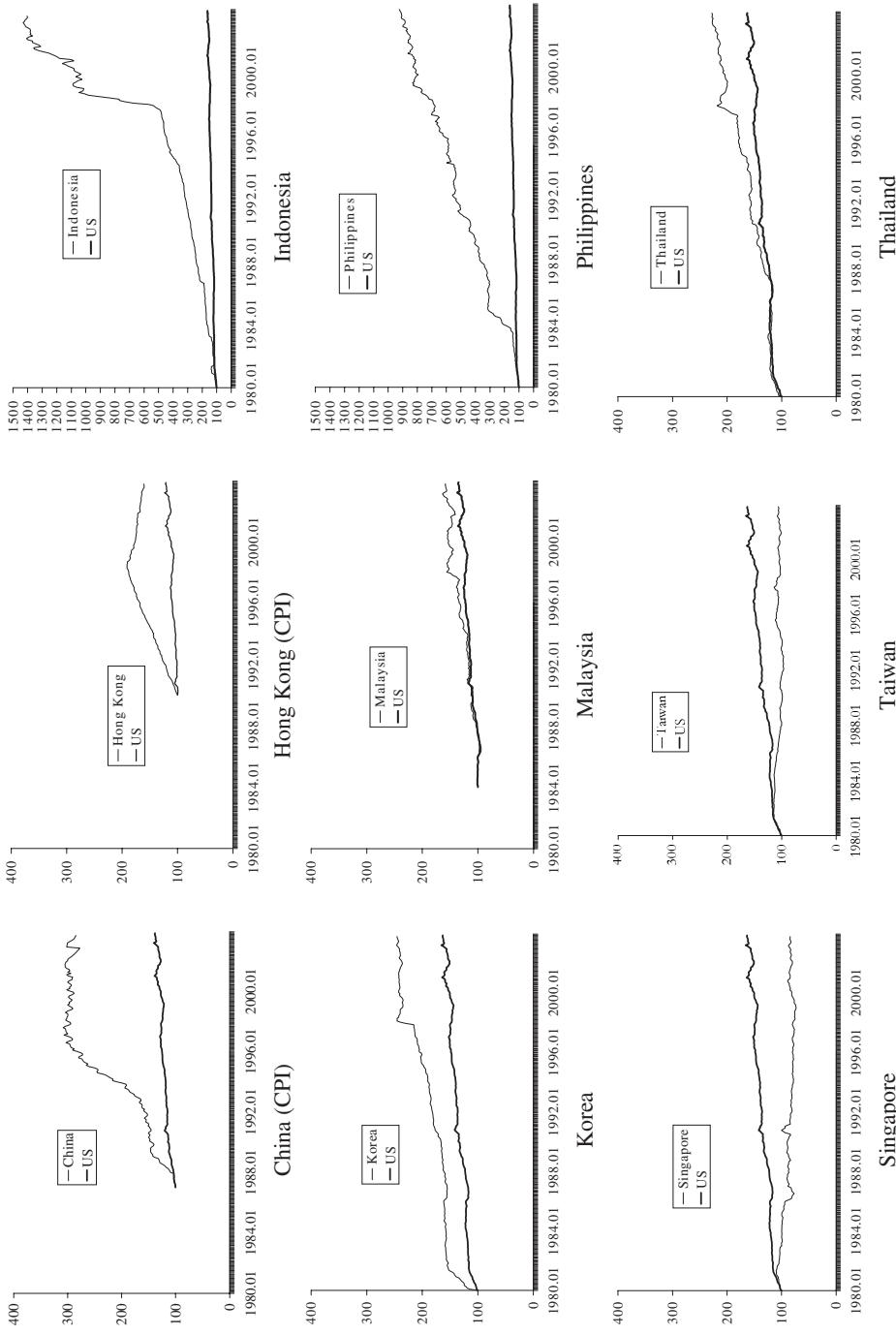
“The root causes of the marked reluctance of emerging markets to float their exchange rates are multiple. When circumstances are favorable (i.e., there are capital inflows, positive terms of trade shocks, etc.) many emerging markets are reluctant to allow the nominal (and real) exchange rate to appreciate. . . . When circumstances are adverse, the fear of a collapse in the exchange rate comes from pervasive liability dollarization. Devaluations are associated with recessions and inflation, and not export-led growth.”

There are two related aspects to their argument explaining fear of floating. Both are macroeconomic in nature. First, in the absence of capital controls, volatile capital flows could sharply affect nominal exchange rates and, because the domestic price level is relatively sticky, lead to large changes in a country’s real exchange rate. Its international competitiveness could fluctuate sharply from one month to the next.

Second, the common low-frequency peg to the dollar helps anchor any one country’s price level because such a high proportion of world trade is invoiced in dollars. In non-crisis periods, price increases in the traded goods sector are pinned down. The upward drift of prices in nontradable services is muted because of substitution relationships.²

How successful was the dollar anchor in East Asia? Figures 1 and 2 show the close link between exchange rate stability and price stability for tradable goods (wholesale prices). From 1980 to 1997, the various country panels in Figure 2 show that only the wholesale price indices of Indonesia and the Philippines rose significantly. Both countries had allowed their currencies to continually depreciate against the dollar, albeit in a controlled fashion. In contrast the wholesale prices of all the other smaller East Asian countries which did not depreciate, or depreciated very little, are grouped around the wholesale price index of the United States. Before 1997, Singapore had allowed its currency to float gently upward against the dollar, and thus had slightly less wholesale price inflation than did the United States. Thanks to this collective pegging to the dollar, the developing countries of East Asia had low or moderate inflation.

This common dollar anchor was more robust because all East Asian countries except Japan were on it. Then international commodity arbitrage within the whole East Asian



Source: IMF; IFS, Central Bank of China. Indonesia except petrol. Hong Kong 1990.01=100, Malaysia 1984.01=100, China 1987.01=100.

Figure 2. Wholesale Price Indices of East Asian Countries, 1980:01–2003:12 (monthly)

dollar zone, and not just with the United States, could better pin down the domestic price level of any one participating country. Indeed, in the great 1997/98 crisis when Indonesia, Korea, Malaysia, Philippines, and Thailand were suddenly forced to devalue—and curtailed imports while trying to stimulate exports—this forced a deflation in the *dollar* prices of goods traded in the region (McKinnon, 2001). Thus China and Hong Kong which did not devalue experienced significant deflation in their domestic prices.

Pre-1997 exchange rate targeting was consistent with fiscal discipline and the absence of excessive monetary expansion. As stressed by the World Bank's (1993) report on the East Asian Miracle and by the IMF in the aftermath of the Asian crisis, government budgets in the smaller East Asian economies had been virtually balanced. Before the crisis, the small East Asian countries had low budget deficits or were even running budget surpluses. Inflation was moderate. Their budget deficits were low even by the standards of industrialized countries.³ Instead of currency overvaluation in the usual sense arising from uncontrolled domestic inflation, the currency attacks in the five crisis economies were mainly provoked by an undue buildup of short-term dollar indebtedness over 1994–96 followed by the “extraneous” sharp depreciation of the yen in 1997/98 (McKinnon and Schnabl, 2003a).

3. High-frequency Dollar Pegging and “Original Sin”

The nominal anchor argument cannot be used to rationalize *high-frequency* pegging on a daily or weekly basis. Instead we hypothesize that high-frequency pegging reflects the fact that the capital markets of emerging markets are incomplete—the doctrine of “original sin” as put forward by Eichengreen and Hausmann (1999, p. 3):

“Original sin” . . . is a situation in which the domestic currency cannot be used to borrow abroad or to borrow long term, even domestically. In the presence of this incompleteness, financial fragility is unavoidable because all domestic investments will have either a currency mismatch (projects that generate pesos will be financed with dollars) or a maturity mismatch (long-term projects will be financed by short-term loans). . . . Critically, these mismatches exist not because banks and firms lack the prudence to hedge their exposures. The problem rather is that a country whose external liabilities are necessarily denominated in foreign exchange is by definition unable to hedge. Assuming that there will be someone on the other side of the market for foreign currency hedges is equivalent to assuming that the country can borrow abroad in its own currency. Similarly, the problem is not that firms lack the foresight to match the maturity structure of their assets and liabilities; it is that they find it impossible to do so. The incompleteness of financial markets is thus at the root of financial fragility.”

In developing countries, in what sense are financial markets incomplete? In the first place, a fixed-interest bond market is typically absent. The reasons are many. On the private side, domestic firms tend to be small, without well-developed accounting systems, and cannot issue bonds on their own name. Firms with longer term projects cannot issue fixed-interest bonds or mortgages for finance at comparable terms to maturity. Instead, they must roll over short-term bank loans—or, at best, borrow at medium term with variable interest rates tied to short rates.

Even on the government side, developing countries may well have shaky financial histories, inflation and interest rate volatility coupled with exchange controls, that inhibits potential buyers of government bonds from making medium- or long-term commitments. Insofar as a market in government bonds exists into the medium term, interest rates are typically adjusted to reflect some very short-term rate. An ostensible “one-year” bond might have its interest rate tied to that on overnight treasuries.

In the second place, an active forward market in foreign exchange against the dollar—or any other currency—is also absent in most developing countries. While a missing domestic bond market is obviously bad for domestic capital markets, why should it affect forward transacting by risk-averse traders wanting to hedge their open positions in foreign exchange? Potential market makers such as banks cannot easily cover transactions involving selling the domestic currency forward for, say, dollars because they cannot hold a convenient array of interest-bearing domestic bonds liquid at different terms to maturity. Indeed, domestic interest rates (*vis-à-vis* foreign) are not available for determining what the proper premium on forward dollars should be.

(In contrast, forward exchange transacting between any two industrial countries can thrive because each has a well-developed domestic bond market denominated in its domestic currency. Long-term forward markets, with a well-defined forward premium equal to the interest differential between the two national bond markets at each term to maturity, can thrive at much lower cost.)

The Microeconomic Rationale for High-frequency Pegging to the Dollar

Absent an efficient forward market in foreign exchange, risk-averse importers and exporters cannot conveniently hedge. Nor can banks easily cover open positions in foreign exchange.

Suppose first that the private sector of our underdeveloped economy was *not* a net debtor to the rest of the world and its imports and exports were more or less balanced. Then domestic importers could possibly buy dollars forward from domestic exporters at shorter terms to maturity—although such matching would be difficult (high transaction costs) because the domestic forward market for foreign exchange lacks liquidity. Absent liquid domestic money-market instruments at all terms to maturity, banks—who typically act as agents for domestic importers and exporters in the forward exchange markets—could not easily cover themselves.

Now suppose that the private sector is a net short-term debtor, largely in dollars, to the rest of the world. Then, notwithstanding the country’s government having positive official dollar reserves, the hedging problem for private traders is compounded. Collectively, domestic debtors with future foreign exchange obligations should buy dollars forward to cover themselves. But foreigners collectively are unwilling to sell dollars forward net because they cannot find liquid interest-bearing domestic-currency assets (i.e., bonds) to hold in the interim. Whence the inevitable currency mismatch: economic agents with net foreign exchange (dollar) exposure—usually very short-term—cannot hedge even if they wanted to.

So what are the implications for official foreign exchange policy? To offset the nonexistent private market in forward exchange, the government is induced to provide an informal hedge by keeping the exchange rate stable in the short to medium term. Private banks and enterprises can then repay their short-term foreign currency debts, which are largely denominated in dollars, with minimal exchange rate risk. If a

country's financial markets are condemned by original sin, its regulatory authorities have strong incentives to undertake high-frequency exchange rate pegging in order to mitigate payments risk (McKinnon, 2001). And the emerging market countries in East Asia are no exception, as we shall show empirically.

Alternatively, the same missing-domestic-bond-market argument could be used to justify official intervention to create a "market" in forward exchange. Presuming that the government has plentiful dollar reserves, it could risk selling dollars forward to individual importers, or to financial institutions, which have forward exchange exposure. Even if the government has the best of intentions, however, this leaves open the question of what the appropriate forward premia on dollars should be for these various individualized contracts. Worse, a government could easily use such contracts to subsidize its "friends" in the private sector. All around the world, patronage scandals erupt when governments have tried to simulate forward markets. At the outset of the East Asian crisis in June 1997, suddenly it was discovered that the central bank of Thailand had sold forward most of the country's foreign exchange reserves to finance companies and other "deserving" Thai business men. Similarly, late in 1997, the new incoming Korean government found that the Bank of Korea had committed much of its official dollar reserves to the overseas subsidiaries of Korean commercial banks.

So, a more neutral and more visible second-best strategy (the first-best being to create a domestic bond market!) for reducing foreign exchange risk is for the government to keep the exchange rate from moving much on a day-to-day or week-to-week basis. At higher frequencies of observation than those considered by Calvo and Reinhart (2002), there is "fear of floating." Except for the small economies in eastern Europe attached to the euro, the dollar is the natural currency to which to peg. It is the principal invoice and vehicle currency in East Asia and elsewhere in the developing world. And later we shall show that East Asian countries do peg softly to the dollar at high frequencies.

But pegging to the dollar to limit exchange risk still leaves open two big problems in risk management. The first is the question of extraneous exchange rate fluctuations between the dollar and other major currencies. The second is moral hazard in the sense that economic agents, whether domestic banks or firms, prefer to gamble rather than to hedge their bets in the foreign exchanges. Let us discuss each in turn.

Extraneous Exchange Rate Risk and Double Hedging

The first problem is that of "extraneous" exchange rate changes between major currencies, as in East Asia when the yen fluctuates against the dollar. For example, from Table 1, we know that a small but significant (about 12–13%) proportion of Korean imports are invoiced in yen. Let us suppose that in the short and medium terms these yen prices are sticky. Similarly, all dollar prices that Korean importers (or exporters) face are sticky and invariant to fluctuations in the yen/dollar rate. Thus, if the won is pegged to the dollar, Korean importers of yen-invoiced goods are at risk.

Suppose a Korean importer is obligated to pay 100 yen in 60 days. Then any random appreciation of the yen against the dollar within the 60-day interval will increase the won cost of servicing that debt. If the won prices for which the importer can sell his Japanese goods in Korea are sticky, then he could buy forward 100 yen *for dollars* in order to hedge the transaction. Because both Japan and the United States have well-developed bond markets, a well defined and highly liquid forward interbank market between yen and dollars is cheap to use. Thus, the Korean importer, using his bank as his agent, can buy forward all the yen he needs for dollars. And with the won kept

predictably stable against the dollar in the spot markets, he can use spot won to buy the dollars 60 days hence when his yen payment is due.

So we have a theory of the optimal—albeit second-best—*double hedge* against currency risk. The bulk of the goods traded by any East Asian emerging market economy are priced to market (sticky priced) in dollars. For these goods, the government's soft pegging against the dollar in the short and medium terms is an informal hedge against exchange risk which compensates for the absence of a forward market between the domestic currency and dollars. However, for that subset of imports or exports which are invoiced in yen, euros, sterling, or some other major currency that fluctuates widely against the dollar, then supplementary hedging in the well-developed forward markets between dollars and the major currency in question is also necessary. As we shall show later, this strategy of reducing exchange risk by double hedging—starting with a peg to just one major international currency—dominates the trade-weighted currency-basket approach involving the developing country in question “pegging” to several major international currencies with different weights.

Moral Hazard

So far, we presumed that merchants and banks were well behaved: they wanted to hedge against currency risk. But we know that deposit insurance banks and other bailout provisions for some firms creates moral hazard that makes at least some of them willing to gamble at the government's expense. In particular, banks might actively increase their net foreign exchange exposure as well as making domestic loans with a high risk of default (McKinnon and Pill, 1999). Thus, governments in developing countries typically try, albeit imperfectly, to constrain banks from taking open positions in foreign exchange—and these ordinary prudential regulations are sometimes supplemented with some form of capital control.

We have just shown that, under original sin, governments want to peg (albeit softly) to the dollar to allow legitimately risk-averse firms and banks to informally hedge their forward exchange exposure. But does this soft pegging not encourage badly behaved banks to overborrow by accepting dollar or yen deposits with very low interest rates to make loans at much higher interest rates in the domestic currency? After all, much of the genesis of the 1997/98 East Asian crisis came from banks overexposing themselves in dollars or yen.

Although very contentious, there are two offsetting considerations. First, the IMF contends that soft pegging took away much of the immediate risk from borrowing in dollars because “bad” banks did not have to worry about near-term exchange rate fluctuations (Fischer, 1999). Thus, in this conventional view, for any given interest differential, the moral hazard would have been better contained had the currencies of each of the Asian countries floated more freely against the dollar. Against this, however, is the view that the risk premium in domestic interest rates is a direct function of how stable the domestic money is relative to the center currency (i.e., the dollar). Thus if the domestic exchange rate against the dollar varies erratically in a free float, domestic interest rates will be higher and so will the margin of temptation to overborrow in foreign exchange (McKinnon and Pill, 1999).

In summary, one cannot say *a priori* whether or not soft pegging aggravates the moral hazard in badly regulated banks to overborrow. But for well-behaved banks and merchants (i.e., those that are properly risk-averse), soft pegging to the dollar reduces their forward exchange risks.

Capital Controls versus Limits on Net Foreign Exchange Exposure by Banks

Governments typically try to contain moral hazard in banks by various kinds of regulations. What then are the implications of such regulation for optimal exchange rate policy?

The government could impose strict capital controls which ensure that private banks don't hold or owe foreign currencies. This would drive the banks out of the profitable business of accepting low-interest rate foreign exchange deposits to finance higher yield domestic-currency loans. The inflow of short-term capital and associated dollar indebtedness would be restricted, which could well be what a prudent government prefers. However, full-scale capital controls on taking any *gross* positions in foreign exchange have the unfortunate side effect of limiting double hedging. Domestic importers and exporters cannot then hedge their extraneous foreign exchange risk because their banks could not take forward positions in markets among major currencies.

Less draconian than full-scale capital controls, government regulatory agencies could still prohibit banks (and possibly other financial institutions) from taking *net* open positions in foreign exchange. In this case, banks could still do covered interest arbitrage and thus provide forward exchange cover for their retail customers. For example, if a Thai importer wanted to hedge his extraneous exchange rate risk by buying yen with dollars 90 days forward, the Thai bank could sell the necessary forward yen to the importer. But the Thai bank would be required to cover itself immediately by buying yen for dollars spot or forward—most likely in the international interbank market for foreign exchange.

Similarly, preventing banks from having no net foreign exchange exposure need not hinder some development of the domestic bond market with a rudimentary forward exchange market between the domestic currency and the dollar. Even though the forward market was not (yet) very liquid, the banks could still sell dollars forward to importers and match this by buying dollars forward from exporters—provided that the country's private sector was not a large net dollar debtor. But domestic banks would still be prevented from being international financial intermediaries; i.e., borrowing in foreign currencies to lend in the domestic one. For the economy overall, this would forestall a buildup of net short-term foreign currency indebtedness like that preceding the 1997/98 Asian crisis.

The Impossibility of Freely Floating Exchange Rates?

When governments impose tough prudential regulations against banks taking foreign exchange risks, can exchange rates float freely? With either general capital controls or prudential regulations against net foreign exchange exposure by banks in place, we hypothesize that governments have little choice but to peg their exchange rates—perhaps only “softly” from one day to the next. Why?

The interbank spot and forward exchange markets are at the center of foreign exchange trading the world over. In any country, its banks normally have direct access to this international market and are the dealers that match buy and sell orders for the domestic currency. Absent any government intervention, these dealers must continually take open positions—for or against the domestic currency—in order to “make” the foreign exchange market. In textbooks on international finance, banks are the natural “stabilizing” speculators when there is confidence in the domestic currency. In a well-behaved market, expectations regarding short-term movements in exchange rates are

naturally regressive. That is, when the domestic currency depreciates, market-makers believe that it will eventually rebound—and vice versa. Then a reasonably smooth bank-based float is feasible.

Now suppose that domestic commercial banks are not allowed to take open positions in foreign exchange. Moreover, in the presence of original sin, there is no liquid market in domestic bonds. Then *foreign banks are unwilling to take open positions in the domestic currency*. Thus, with a tightly regulated domestic banking system and/or capital controls, a satisfactory free float is impossible. With no natural market-makers in the system, the exchange rate would move so erratically as to be intolerable. In most developing countries, governments recognize this problem—at least implicitly. Day-to-day, the central bank then makes the market often by simply pegging—albeit softly and informally—the domestic currency to the dollar.

In summary, we have two complementary reasons why governments in developing countries usually opt to keep their exchange rates stable on a high-frequency basis:

1. Without a well-organized market in forward exchange (original sin), the government wants to provide an informal forward hedge for importers and exporters.
2. But fear of overborrowing leads many prudent governments to limit net foreign exchange exposure by domestic banks—in the extreme by using capital controls. These regulatory restraints then prevent the banks from being active dealers to stabilize the exchange rate.

In the industrialized countries, these problems are not so acute. Because of a well-developed domestic market in forward exchange, their banks need not be so tightly regulated to prevent foreign exchange exposure. In part because of the active forward exchange market, the problem of containing moral hazard in banks is less—a virtuous circle. So the industrial countries can more easily tolerate a free float, as we shall see. But first consider the exchange rate practices of developing countries in East Asia.

4. The Post-crisis Return to High-frequency Pegging: a Formal Empirical Test

Our empirical analysis of high-frequency dollar pegging in East Asia proceeds in two stages. First we test whether the developing countries of East Asia really have, in noncrisis periods, been keying on the dollar more than the yen or euro—and whether basket pegging, where all three currencies are given some weight, was the norm. Was this keying permanently interrupted by the great East Asian crisis of 1997/98? Second, we test for any changes in the volatility of these dollar pegs in the post-crisis period compared to the pre-crisis period.

With Japan being such an important trader and an even more important source of capital in East Asia, post crisis many authors have proposed pegging to a broader currency basket (Rajan, 2002). For instance, Kawai and Akiyama (2000) and Kawai (2002) have proposed to increase the weight of the Japanese yen in the East Asian currency baskets. Williamson (2000) recommends a 33% weight of the Japanese yen.

The Composition of Currency Baskets

Using the regression model developed by Frankel and Wei (1994), we show that the smaller East Asian countries have more or less ignored these recommendations. Instead they have clandestinely returned to high-frequency dollar pegging on a day-to-day basis.

Before the crisis, a few East Asian currencies were *de jure* pegged to a basket of major currencies, but typically the weights assigned to various currencies in the official basket were not announced. To detect the weights of various currencies, Frankel and Wei use an “outside” currency—the Swiss franc—as a *numéraire* for measuring exchange rate volatility for any East Asian country (except Japan). These volatilities could then be partitioned among movements in major currencies against the Swiss franc. For example, if changes in the Korean won against the Swiss franc are largely explained by the changes of the US dollar against the Swiss franc, we can conclude that the Korean won is virtually pegged to the US dollar. Alternatively it could be pegged to the Japanese yen or German mark.

To show this, we regress the exchange rates of each of the nine East Asian currencies on the US dollar, the Japanese yen, and the German mark⁴ with the Swiss franc as *numéraire*.⁵ Equation (1) is the regression model.

$$e^{\text{EastAsiancurrencySwissfranc}_t} = \alpha_1 + \alpha_2 e^{\text{DollarSwissfranc}_t} + \alpha_3 e^{\text{YenSwissfranc}_t} + \alpha_4 e^{\text{MarkSwissfranc}_t} + u_t. \quad (1)$$

The multivariate OLS regression⁶ is based on first differences of logarithms in these exchange rates. The residuals are controlled for heteroskedasticity which can be assumed to be strong during the crisis and the post-crisis period. The daily data are compiled from Datastream. According to Frankel and Wei, the α coefficients represent the weights of the respective currencies in the currency basket. If the East Asian currency is closely fixed to one of the major currencies appearing on the right-hand side of equation (1), the corresponding α coefficient will be close to unity. If a coefficient is close to zero, we presume no exchange rate stabilization against that particular currency.

As in McKinnon (2001), we run the regression for three periods: pre-crisis, crisis, and post-crisis.⁷ The pre-crisis period (869 observations) is from February 1994, when China unified its foreign exchange market, to May 1997. We specify the crisis period (415 observations) to start in June 1997 when the peg of the Thai baht came under strong pressure and was abandoned. Our crisis period ends in December 1998 when the currency attacks had ended. The post-crisis period (1304 observations) starts in January 1999 and goes up to December 2003.

Pre-crisis: February 1994 to May 1997 Table 3 reports the regression results for the pre-crisis period and shows the tight peg around the US dollar. The α_2 coefficients in equation (1) are all close to unity and reveal the strong efforts by Asian governments to keep the currencies stable against the dollar on a day-to-day basis. The α_2 coefficients range from 0.82 for the Singapore dollar up to 1.00 for the Chinese yuan, Hong Kong dollar, and Indonesian rupiah. The correlation coefficients (R^2) being close to unity indicates that fluctuations of the East Asian exchange rate against the Swiss franc can be almost fully explained by fluctuations of the dollar against the Swiss franc.

More specifically, the α_2 coefficients of the Chinese yuan, the Hong Kong dollar and the Indonesian rupiah are unity. Pre-crisis, Indonesia let its currency crawl smoothly downward at 4–5% per year, but nevertheless it kept the rupiah virtually fixed to the dollar on a day-to-day basis. China and Hong Kong maintained their fixed pegs to the dollar with no downward crawl. The α_2 coefficients of the Korean won, the Philippine peso, and the Taiwan dollar are very close to unity with lower, but still large, t -statistics. For the Thai baht and the Malaysian ringgit, the α_2 coefficients are still close to 0.9 with some small weight on the yen as measured by α_3 .

Table 3. *Pegging on a High-frequency Basis, Pre-crisis, 1 February 1994 to 30 May 1997*

	Constant α_1	Dollar α_2	Yen α_3	DM α_4	R^2
Chinese yuan	-0.00 (-1.15)	1.01*** (158.63)	-0.01 (-1.48)	-0.02 (-1.70)	0.97
Hong Kong dollar	0.00 (0.30)	1.00*** (454.79)	0.00 (0.25)	-0.01 (-1.36)	1.00
Indonesian rupiah	0.00 (3.19)	1.00*** (144.93)	-0.01 (-0.92)	0.01 (0.85)	0.97
Korean won	0.00 (1.42)	0.97*** (66.27)	0.06*** (3.31)	0.01 (0.29)	0.93
Malaysian ringgit	-0.00 (-1.48)	0.88*** (54.80)	0.09*** (5.30)	0.01 (0.45)	0.90
Philippine peso	-0.00 (-0.34)	0.97*** (43.34)	0.02 (0.74)	-0.01 (-0.45)	0.86
Singapore dollar	-0.00 (-1.32)	0.82*** (34.37)	0.14*** (4.83)	0.08*** (2.97)	0.86
New Taiwan dollar	0.00 (0.84)	0.98*** (57.30)	0.03** (1.38)	-0.01 (-0.54)	0.93
Thai baht	-0.00 (-0.61)	0.92*** (81.25)	0.08*** (5.17)	-0.01 (-0.35)	0.95

t-statistics in parentheses. *significant at the 10% level. **significant at the 5% level. ***significant at the 1% level. 869 observations. White heteroskedasticity-consistent standard errors and covariance.

Source: Datastream. Daily data.

Singapore pegged less closely to the dollar. Its α_2 was still 0.82 and highly statistically significant, but some small weight was given to the yen and mark. Indeed, on a lower frequency basis, before 1997 the Singapore dollar drifted smoothly upward against the US dollar at about 1–2% per year. Singapore's somewhat different behavior is quite consistent with its being a creditor country with longer term domestic capital markets. With a less fragile domestic financial system, the authorities were less concerned with pegging to the dollar and could give more weight to other currencies such as the yen.

In contrast to the high weights of the dollar, Table 3 shows that the α_3 coefficients for the yen and the α_4 coefficients for the mark are small or close to zero. Small weights can be observed for the Japanese yen for Korea, Malaysia, Singapore, Taiwan, and Thailand—but in general the weights are low, ranging from 0.03 (new Taiwan dollar) to 0.14 (Singapore dollar).

Crisis: June 1997 to December 1998 During this period, attempts to stabilize East Asian currencies against the dollar broke down. Large capital outflows and high volatility in the foreign exchange markets defeated any official stabilization efforts. As shown in Figure 2, only China and Hong Kong continued with unwavering dollar pegs. All other countries abandoned their peg at low as well as high frequencies.

For high-frequency observations, Table 4 shows the estimations of equation (1) for the crisis period. For α_2 the significantly smaller *t*-values for all countries except China and Hong Kong represent higher standard errors and thus higher volatility in the exchange rate against the dollar. The goodness-of-fit for these regressions falls completely apart: R^2 fell sharply.

Table 4. Pegging on a High-frequency Basis, Crisis, 1 June 1997 to 31 December 1998

	Constant α_1	Dollar α_2	Yen α_3	DM α_4	R^2
Chinese yuan	-0.00 (-0.39)	0.99*** (165.56)	0.00 (0.68)	0.01 (1.45)	0.99
Hong Kong dollar	0.00 (0.01)	1.00*** (194.07)	0.01** (1.99)	0.00 (0.11)	0.99
Indonesian rupiah	0.00 (1.12)	0.48 (1.01)	0.64** (2.36)	-0.16 (-0.28)	0.03
Korean won	0.00 (0.62)	1.22*** (7.05)	0.05*** (0.59)	0.05 (0.58)	0.13
Malaysian ringgit	0.00 (1.39)	0.70*** (5.19)	0.33*** (3.95)	0.11 (0.62)	0.20
Philippine peso	0.00 (1.42)	0.75*** (5.24)	0.25*** (4.51)	0.27 (1.25)	0.24
Singapore dollar	0.00 (1.01)	0.69*** (10.16)	0.33*** (6.53)	0.02 (0.18)	0.49
New Taiwan dollar	0.00 (1.24)	0.87*** (15.19)	0.08** (2.91)	0.11 (1.69)	0.59
Thai baht	0.00 (1.04)	0.64*** (4.45)	0.32*** (3.81)	0.21 (1.10)	0.15

Notes: See Table 3, except 415 observations.

Source: See Table 3.

The decline in R^2 is particularly marked for the rupiah, won, ringgit, peso, and baht. Noncrisis Singapore and Taiwan coped with the crisis by lowering the weight of the US dollar and increasing the weight of the Japanese yen, which itself had depreciated sharply. Except for China and Hong Kong, the weight of the yen (i.e., the α_3 coefficients) increased during the crisis.

Clearly, by refusing to devalue in the great crisis, China and Hong Kong helped contain the inadvertently beggar-thy-neighbor devaluations in Indonesia, Korea, Malaysia, Philippines, and Thailand. Indeed, Malaysia's pegging of the ringgit in September 1998—albeit at a depreciated level—also helped contain contagious exchange rate changes in the region.

Post-crisis: January 1999 to December 2003 After the 1997/98 crisis, however, dollar pegging—at least when measured on a high-frequency (day-to-day) basis—has made a remarkable return. As shown in Table 5, the α_2 coefficients for all countries again have returned towards the high values of the pre-crisis period. Except for Indonesia and to some extent the Philippines, the goodness-of-fit as measured by R^2 for each country's regression equation again becomes tight. The smaller East Asian crisis countries have largely returned to the pre-crisis practice of informal dollar pegging.

True, as argued by Kawai (2002), the Japanese yen seems to have assumed a certain post-crisis role in some currency baskets, particularly those of Indonesia, Thailand, Korea, and Singapore; but the yen weights remain low in comparison to the US dollar. Small values for the goodness-of-fit of the regressions for the Indonesian rupiah and the Philippine peso indicate, however, that both countries have been less successful in stabilizing their currencies after the Asian currency crisis. In particular, Indonesian foreign exchange policy and domestic inflation remain out of control.

Table 5. *Pegging on a High-frequency Basis, Post-crisis, 1 January 1999 to 31 December 2003*

	<i>Constant</i> α_1	<i>Dollar</i> α_2	<i>Yen</i> α_3	<i>DM</i> α_4	R^2
Chinese yuan	0.00 (0.00)	1.00*** (228.69)	-0.00 (-0.07)	-0.01 (-1.36)	0.99
Hong Kong dollar	0.00 (0.13)	1.00*** (545.81)	0.00** (2.20)	0.00 (0.49)	1.00
Indonesian rupiah	0.00 (0.15)	0.95*** (15.31)	0.21*** (4.03)	-0.01 (0.00)	0.32
Korean won	-0.00 (-0.01)	0.85*** (37.44)	0.18*** (9.72)	-0.00 (-0.01)	0.74
Malaysian ringgit	-0.00 (-0.07)	1.00*** (979.34)	0.00** (35.98)	0.00 (0.01)	1.00
Philippine peso	0.00* (1.85)	0.93*** (32.41)	0.10*** (4.05)	-0.01 (-0.45)	0.64
Singapore dollar	0.00 (0.38)	0.75*** (41.66)	0.20*** (13.40)	0.05*** (1.93)	0.80
New Taiwan dollar	0.00 (0.76)	0.94*** (84.61)	0.03* (3.14)	0.02 (0.92)	0.92
Thai baht	0.00 (0.97)	0.78*** (39.30)	0.18*** (11.06)	0.02** (0.64)	0.77

Notes: See Table 3, except 1304 observations.

Source: See Table 3.

A formal statistical test of the post-crisis return to dollar pegging at high frequencies supports this view. To detect whether the weights of dollar and yen in the East Asian currency baskets have changed significantly in the post-crisis period, we perform the Wald test for all currencies except the Chinese yuan, the Hong Kong dollar, and the Malaysian ringgit, which are now firmly pegged to the dollar for any frequency of observation. The Wald test is performed based on the comprehensive model described in note 7. This allows us to test whether the coefficients (weights) of dollar and yen have changed in the post-crisis period in comparison to the pre-crisis period within one consistent framework.⁸

We proceed in two steps. First, the null hypothesis is that the coefficient for the dollar weight α_2 is the same in the pre-crisis and post-crisis periods. If the probability of the Wald test is low (say smaller than 5%) we reject the null hypothesis. Otherwise we accept the null hypothesis that the weights of the dollar in the East Asian currency baskets have not changed.

Table 6 reports the results. The null hypothesis is that the α_2 coefficient of the dollar weight for each country is the same before and after the crisis. At the 5% level of significance, we cannot reject the null hypothesis for Singapore, Taiwan, and Thailand. For Indonesia, Korea, and the Philippines there is no significant difference in the dollar weights before and after the crisis.

In a second step we test whether the yen weights in the East Asian currency baskets have changed. Some authors such as Kawai (2002) and Ogawa and Ito (2002) have argued that the East Asian countries should increase the weights of the Japanese yen in their currency baskets to avoid economic turmoil in times of yen depreciation. To test whether the East Asian countries have followed this proposition, the null hypothesis is that the weights of the yen are the same in the pre-crisis and post-crisis periods.

Table 6. Wald Test for Change of Dollar Weights in East Asian Currency Baskets

	<i>Weight pre-crisis</i>	<i>Weight post-crisis</i>	<i>Wald test probabilities</i>
Indonesian rupiah	0.99	0.94	0.78
Korean won	0.97	0.85	0.12
Philippine peso	0.97	0.93	0.39
Singapore dollar	0.82	0.75	0.02
New Taiwan dollar	0.98	0.94	0.05
Thai baht	0.92	0.78	0.02

Source: Datastream.

Table 7. Wald Test for Change of Yen Weights in East Asian Currency Baskets

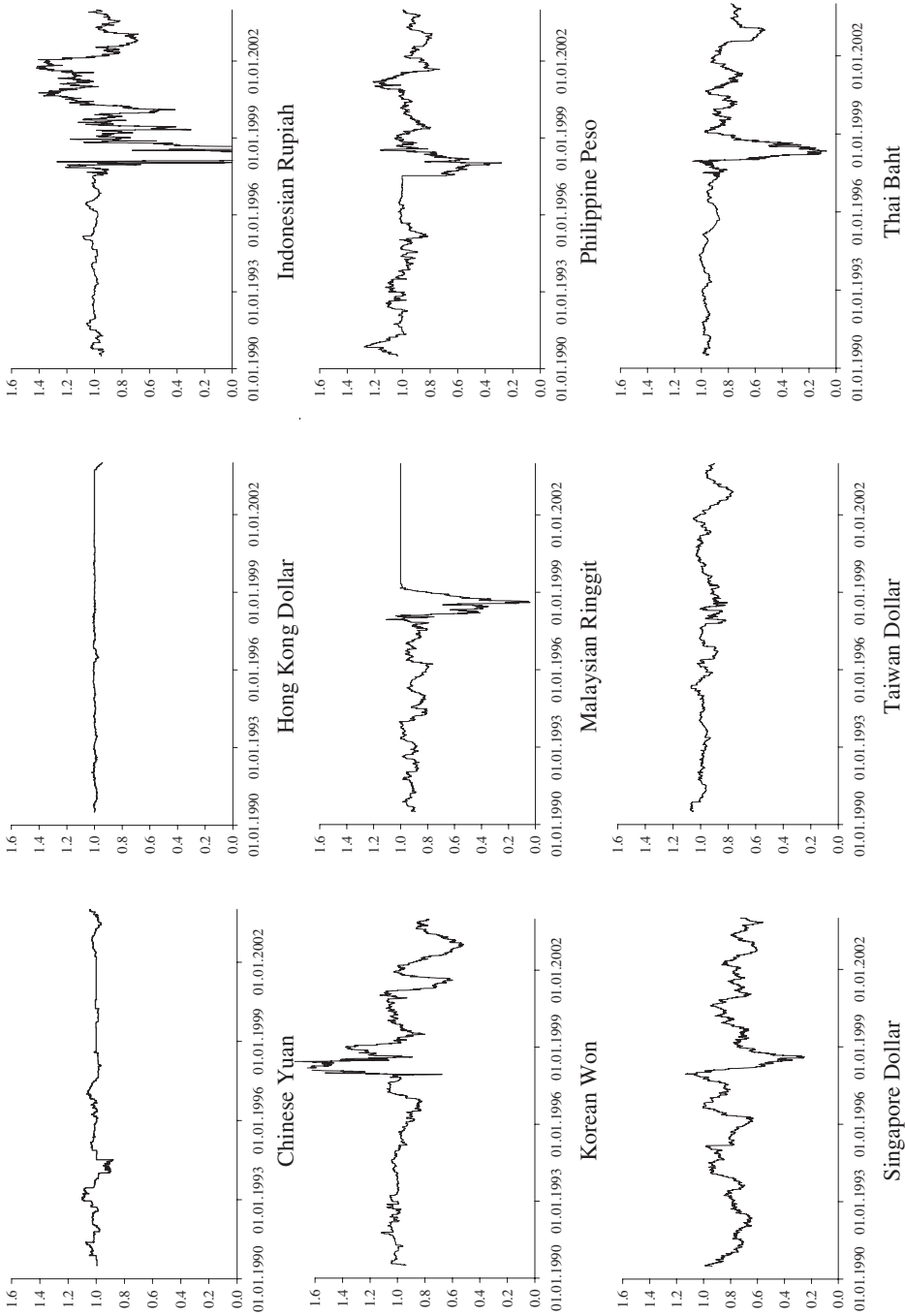
	<i>Weight pre-crisis</i>	<i>Weight post-crisis</i>	<i>Wald test probabilities</i>
Indonesian rupiah	-0.01	0.21	0.20
Korean won	0.06	0.18	0.09
Philippine peso	0.01	0.09	0.14
Singapore dollar	0.14	0.20	0.05
New Taiwan dollar	0.03	0.02	0.99
Thai baht	0.08	0.18	0.08

Source: Datastream.

In this complementary test as reported in Table 7, we cannot reject the null hypothesis for Singapore at the 5% level. But at the 10% level there is evidence for changed yen weights in the Indonesian, Korean, and Thai currency baskets. In Korea, the weight of the yen seems to have increased from about 6% to about 18%, in Indonesia from zero to 21%, in Singapore from about 14% to 20%, and in the Thailand from about 8% to about 18%. Both tests indicate that Indonesia, Korea, Singapore, and Thailand have increased the weights of the Japanese yen in their currency baskets to some extent, but the dollar remains the dominant anchor currency.

Using rolling regressions, the country panels in Figure 3 summarize the dollar's weight in each East Asian currency basket during the 1990s. Based on daily data, the rolling 130-day α_2 and α_3 coefficients are plotted for each of the East Asian countries (except Japan). A window of 130 days corresponds to an observation period of six months (five observations per week). The first window starts on 1 January 1990 and ends on 29 June 1990. The α_2 and α_3 coefficients are calculated for the first period. Then the window is shifted by one day and the α_2 and α_3 coefficients are calculated again, up to December 2003. A value of unity stands for a 100% weight of the respective currency in the respective currency basket. If the coefficient rises above 1, the estimation process is unstable.

Figure 3 shows the time path of the dollar weights in the East Asian currency baskets. China and Hong Kong have a very stable dollar weight of unity for the whole observation period. For the other countries in the pre-crisis period, the dollar weights are also close to unity, but slightly more volatile. However, during the 1997/98 crisis, the exchange rate stabilization broke down in Indonesia, Korea, Malaysia, Philippines, and



Source: Datastream. 1 corresponds to 100%. Note: A α_2 -coefficient close to unity shows strong dollar pegging.

Figure 3. Dollar's Weight in East Asian Currency Baskets, 130-trading-day Rolling Regressions for α_2 , 1990:01-2003:12 (daily)

Thailand. In these crisis economies, Figure 3 shows sharp declines of their α_2 coefficients. Also, Singapore lowers the dollar's weight in its currency basket during the crisis.

After the crisis, Figure 3 shows that countries have evolved differently. The stabilization process seems still out of control in Indonesia. Malaysia has increased the dollar's weight to 100%. In Korea, Philippines, Singapore, Taiwan, and Thailand the trend is somewhat uncertain. For Korea, Thailand, and Singapore the weights of the dollar in the currency baskets seem to decline as we concluded from the Wald tests reported above. For Taiwan and the Philippines the weights are more stable and roughly the same as in the pre-crisis period.

In general we observe that the post-crisis weights of the dollar and yen in the currency baskets of Korea, Philippines, Taiwan, and Thailand seem more flexible (volatile) than in the pre-crisis period, but that the dollar continues to predominate.

Reducing Daily Exchange Rate Volatility against the Dollar

Knowing the dollar's α_2 coefficients and the yen's α_3 coefficients from equation (1) is not the whole story on exchange rate volatility. In principle, the dollar could get the highest relative weight (as per Frankel and Wei, 1994) in the currency basket without the absolute day-to-day volatility of any one East Asian currency against the dollar returning to its pre-crisis level.

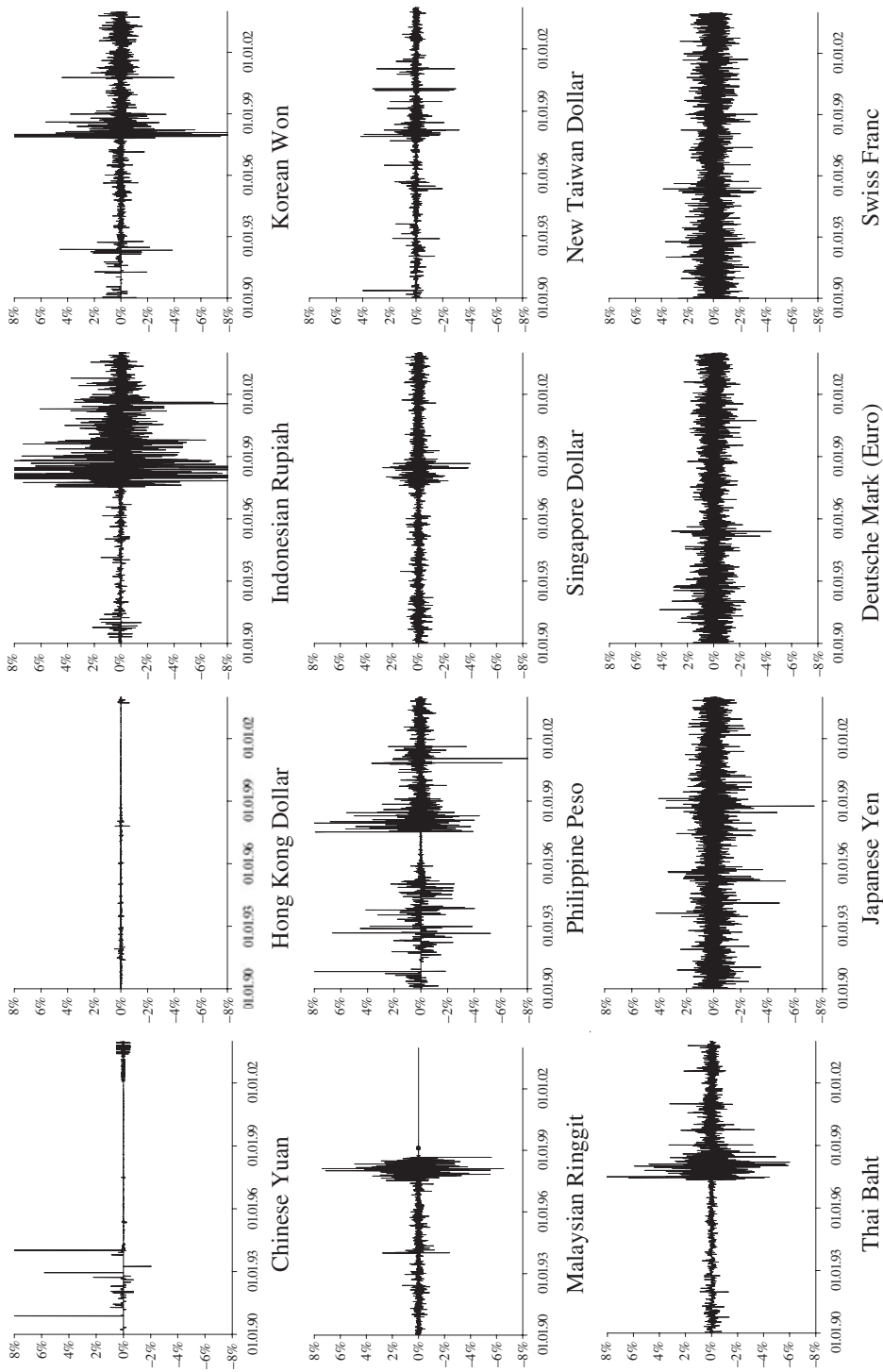
Thus, a more direct (but complementary) test is necessary. We measure volatility as the percentage daily change of the national currency against the dollar (first log differences) from January 1990 through December 2003. The y-axes in the different country panels in Figure 4 have the same scale of $\pm 8\%$ against the dollar for all currencies.

To understand what is high and what is low volatility, we need a standard of comparison. Calvo and Reinhart (2002) suggest that the only truly floating exchange rates are those of the inner group of mature industrial countries, such as the United States, Japan, Germany, or Switzerland. Because these countries have mature, long-term domestic capital markets, their governments have little incentive for day-to-day exchange rate stabilization. Figure 4 compares the daily dollar volatilities of the East Asian countries to those of Germany, Japan, and Switzerland.⁹

As shown in Figure 4, the daily volatility of the dollar exchange rates of Germany, Japan, and Switzerland are indeed an order of magnitude higher than those of our East Asian countries in the non-crisis periods. Not only is the daily exchange volatility of these industrial countries very high, but it does not change significantly over time. In contrast, the volatility of the East Asian currencies is generally much lower, but with greater variability over time.

Specifically, the hard pegs of China and Hong Kong exhibit extremely low day-to-day volatility as well as a high stability over time. Discretionary changes in the Chinese yuan in the early 1990s occurred before the introduction of the hard peg in February 1994. Since then, the yuan has been even more stable on a day-to-day basis than has the Hong Kong dollar.

For all the other East Asian economies, we observe a changing pattern of daily volatility over time. Up to 1997/98, high-frequency volatility was low except in the Philippines, which experienced higher volatility in the first half of the 1990s—although not as high as in the industrialized countries. During the Asian crisis, turmoil in the capital and currency markets is reflected in much greater day-to-day volatility, which is most striking for Indonesia, Korea, Malaysia, Philippines, and Thailand.



Source: Datastream. Volatility is daily percentage changes against the dollar.

Figure 4. Exchange Rate Volatility against the US Dollar of Selected Crisis and Non-crisis Currencies, 1990:01–2003:12 (daily)

For the post-crisis period, we observe a more heterogeneous pattern. First, Singapore and Taiwan, not as strongly affected by the crisis, returned rather fast to the pre-crisis pattern. Note that Singapore stabilizes its currency on the basis of a more diversified currency basket, and therefore its overall exchange rate volatility is smaller than Figure 4 suggests. Second, Malaysia has adopted capital controls and a hard peg to the dollar, so that its exchange rate volatility has declined to zero.

Third, Korea and Thailand have significantly reduced exchange rate volatility, but it seems still to be slightly higher than before the crisis. The larger weight of the yen in the Thai and Korean currency baskets makes a complete return to the pre-crisis level of dollar pegging more difficult. Finally, although Indonesia and the Philippines have been quite successful in reducing the day-to-day volatility of their exchange rates compared to the crisis, volatility is still much higher than before.

The evidence given in Figure 4 is supported by Table 8, which reports the standard deviations of daily exchange rate fluctuations against the dollar. In the pre-crisis period, the standard deviations of the day-to-day exchange rate volatility of all East Asian currencies are much smaller than the standard deviations of the so-called free floaters (Japan, Germany, and Switzerland) which are our comparison set. The standard deviations of the hard pegs (China and Hong Kong) are close to zero during and after the crisis. For Indonesia, Korea, Malaysia, Philippines, and Thailand, the standard deviations in Table 8 increase massively during the crisis period, with Singapore and Taiwan increasing less. In contrast, exchange rate variability against the Japanese yen is high, similar to the industrialized countries.

Since the crisis, the standard deviations of all affected countries have declined again (Table 8). Except for Malaysia, this exchange rate volatility of the crisis economies for the whole post-crisis period (1999–2003) is still larger than before the crisis. However, the volatility was relatively higher at the beginning of the post-crisis period in 1999 than more recently in 2003.

To underline this last point, suppose our post-crisis period includes only daily observations in the year 2003. Then the right-hand column in Table 8 shows that many East Asian currencies—such as the Philippine peso, the Taiwan dollar, and to some extent

Table 8. Standard Deviations of Daily Exchange Rate Fluctuations against the Dollar (percentages)

	<i>Pre-crisis</i>	<i>Crisis</i>	<i>Post-crisis</i>	<i>2003</i>
Chinese yuan	0.03	0.01	0.00	0.00
Hong Kong dollar	0.02	0.03	0.00	0.00
Indonesian rupiah	0.17	4.43	1.15	0.42
Korean won	0.22	2.35	0.44	0.51
Malaysian ringgit	0.25	1.53	0.01	0.00
Philippine peso	0.37	1.31	0.53	0.27
Singapore dollar	0.20	0.75	0.27	0.36
New Taiwan dollar	0.19	0.50	0.21	0.15
Thai baht	0.21	1.55	0.39	0.26
Japanese yen	0.67	1.00	0.64	0.53
Deutsche mark	0.60	0.58	0.66	0.63
Swiss franc	0.69	0.66	0.71	0.72

Source: Datastream.

the Thai baht—are now less or about equally volatile against the dollar than they were before the crisis. In 2003, only Indonesia and Korea had still a significantly higher standard deviation. All East Asian countries except Indonesia seem to have more or less returned to the pre-crisis level of high-frequency pegging.

5. The Case Against Basket Exchange Rate Pegging

A major reason for the Asian crisis was the deep devaluation of the yen in 1997/98 (McKinnon and Schnabl, 2003a). When the smaller East Asian economies peg to the dollar, they become collectively more vulnerable to fluctuations between the dollar and yen. When the yen is high against the dollar, their exports—and inflows of foreign direct investment from Japan—boom. When the yen depreciates, their international competitiveness falls, sometimes precipitously as in 1997/98.

In the aftermath of the Asian crisis, many authors—including Williamson (2000), Kawai (2002), and Ogawa and Ito (2002)—have proposed increasing the weight of the Japanese yen in the East Asian currency baskets. Because Japan and the smaller East Asian economies are closely linked in trade, they contend that a larger weight of the Japanese yen in the currency baskets of the smaller East Asian economies would reduce variance in trade flows. Japan in particular would like to reduce variance in its own international competitiveness from fluctuations in the yen/dollar rate by having its increasingly important East Asian neighbors give more weight to the yen in setting their exchange rates. For instance, Williamson proposes to give a weight of 33% to the dollar, the yen, and the euro, respectively.

However, we have tried to show that unilateral pegs to the dollar might well be preferred to the currency-basket approach—certainly from the perspective of the smaller East Asian economies. First, because the dollar invoicing of trade throughout the whole East Asian region is so prevalent, collective pegging to the dollar provides a quite strong nominal anchor for the national price levels of the smaller countries, albeit in noncrisis periods. Of course the success of this nominal anchor depends heavily on the stability of the US price level and US monetary policy. But in recent years, American prices have been quite stable while Japan has experienced deflationary pressure. Those advocating basket pegging are more concerned with minimizing the variance in a country's *real* effective exchange rate rather than with stabilizing its domestic *nominal* price level. Indeed, a commitment to stabilize real effective exchange rates leaves the nominal price level indeterminate.

Secondly, at a more microeconomic level, pegging to just one major international currency helps individual merchants and bankers better hedge their own foreign exchange risks. Because of the missing bond and forward exchange markets in developing countries, governments provide an informal hedge by keeping the domestic currency stable against the dominant currency; i.e., the dollar in East Asia. This then exposes merchants to “extraneous” fluctuations of the yen against the dollar which, however, they can partially hedge by making use of the well-developed forward market between yen and dollars. If a Korean importer of Japanese products needs to pay 100 yen in 60 days, he can buy yen 60 days forward for dollars, and then trade won for dollars in 60 days at a presumed unchanged (soft peg of the won against the dollar) exchange rate—what we call “double hedging”.

However, under a basket peg, the spot exchange rate of the dollar against the won in 60 days would be more uncertain. Because the dollar is the natural intervention currency that governments use, the Korean authorities would be obligated to keep changing the won/dollar rate as the dollar fluctuates against the yen and euro. This then

would confuse the Korean merchant's hedging strategy—particularly if the weights of the major currencies in the basket were somewhat uncertain, and the timing of official changes in the won/dollar rate in order to track the yen was also uncertain. In effect, people who argue that basket pegging would reduce risk are only looking at movements in spot exchange rates as if merchants could not hedge. That is, they are not accounting for the forward hedging strategies that almost all merchants use.

Finally, picking the appropriate official weights in a currency basket is problematic. A simple trade-weighted basket would not reflect the dollar's overwhelming predominance as a currency of invoice, where external dollar prices of goods and services are sticky and don't vary much with changes in the yen/dollar rate. Nor would it reflect the currency of denomination of outstanding foreign currency debts (Slavov, 2002).

All in all, the best exchange rate strategy for any small East Asian economy may be the simple "corner solution" of pegging just to the dollar, as is the normal current practice by East Asian governments. However, we do not deny that large fluctuations in the yen/dollar exchange rate create serious problems of risk management for the East Asian dollar peggers (McKinnon and Schnabl, 2003a), and even bigger problems for Japan itself (Goyal and McKinnon, 2003). But the straightforward solution to this East Asian exchange rate dilemma is for Japan to peg the yen to the dollar in a convincing fashion—which may require American cooperation, as discussed in McKinnon and Ohno (1997)—rather than beseeching nine or so other East Asian countries to give more weight to the yen by introducing basket pegging.

6. Conclusion: an Eventual Return to Low-Frequency Pegging?

With the benefit of hindsight, the post-crisis return to high-frequency dollar pegging (Table 8 and Figure 3) is hardly surprising. For emerging markets in East Asia and elsewhere suffering from incomplete capital markets (original sin), high-frequency dollar pegging is an important tool for hedging foreign exchange risk and stabilizing exchange rates. But could this clandestine return to high-frequency pegging augur an eventual return to low-frequency pegging as well?

Learning from the vulnerability to yen/dollar depreciation, many East Asian countries seem to be allowing more exchange rate variability at lower frequencies in the post-crisis period. In support of the finding of Hernández and Montiel (2003), Figure 1 shows more dollar exchange rate drift after than before the crisis on a month-to-month basis. For Indonesia, Korea, Philippines, Singapore, Taiwan, and Thailand, monthly exchange fluctuations are greater than before—although those for China, Hong Kong, and Malaysia remain (close to) zero.

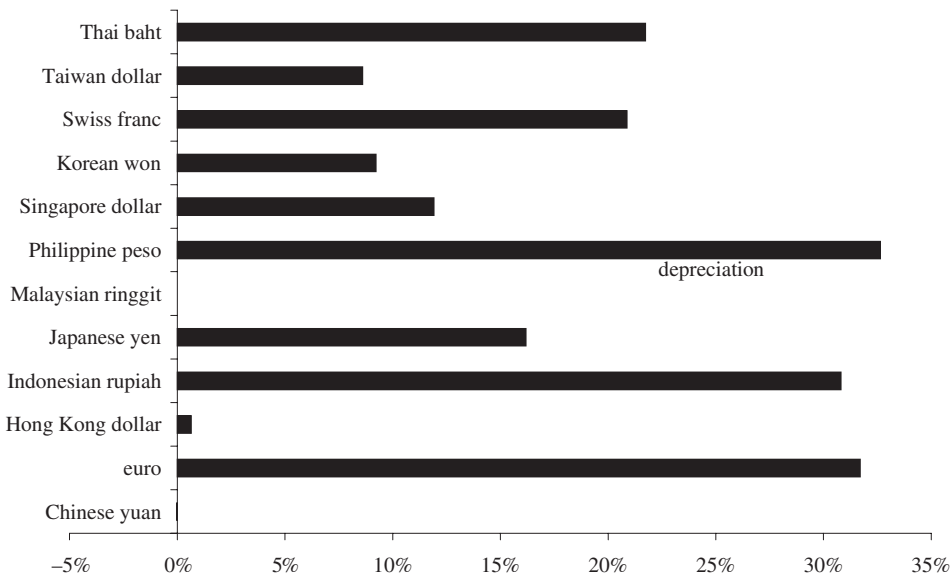
A more formal analysis of low-frequency exchange rate stabilization against the yen is given by Table 9, which allows us to compare the standard deviations of monthly exchange rate fluctuations against the dollar in the pre-crisis and post-crisis periods. We observe that for all East Asian countries—except the hard peg countries China, Hong Kong, and Malaysia—the monthly exchange rate variability against the dollar is still significantly higher than in the pre-crisis period (Table 9), but much less than in the crisis itself.

An alternative approach for showing exchange rate smoothing at low frequencies in the East Asian post-crisis era is to use the euro's fluctuations against the dollar as the benchmark. As is largely true in practice, we assume that the European Central Bank, behaving as a free floater, leaves the dollar/euro rate to market forces. We

Table 9. Standard Deviations of Monthly Exchange Rate Fluctuations against the Dollar (percentages)

	<i>Pre-crisis</i>	<i>Crisis</i>	<i>Post-crisis</i>
Chinese yuan	0.25	0.03	0.00
Hong Kong dollar	0.08	0.07	0.04
Indonesian rupiah	0.26	26.54	5.28
Korean won	1.01	11.53	1.96
Malaysian ringgit	1.06	6.69	0.00
Philippine peso	1.19	5.25	1.71
Singapore dollar	0.76	2.88	1.20
New Taiwan dollar	1.01	2.63	1.37
Thai baht	0.43	8.88	1.62
Japanese yen	3.66	3.64	2.43
Deutsche mark	2.20	2.33	2.57
Swiss franc	2.62	2.60	2.55

Source: IMF: *IFS*.

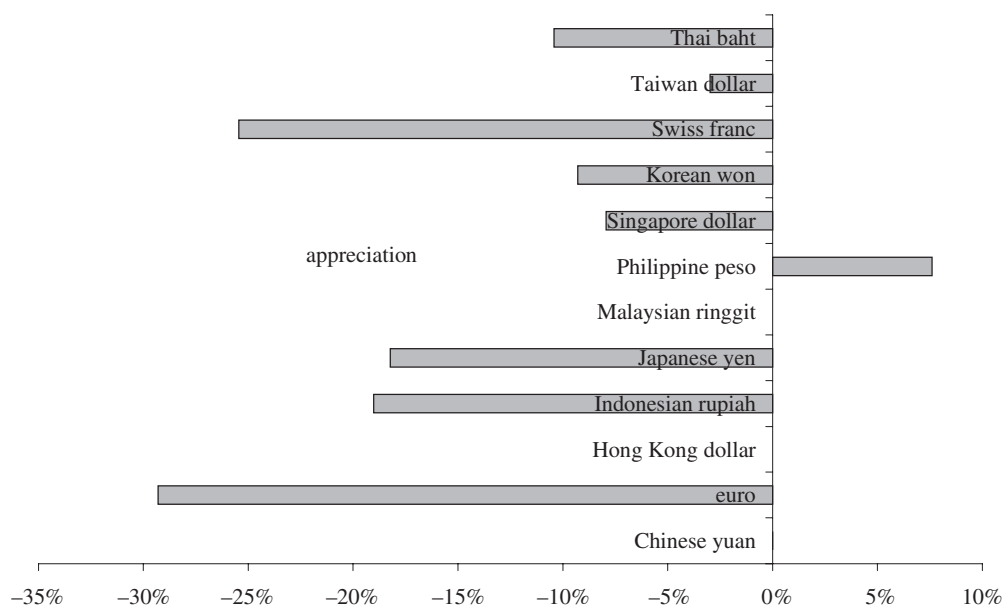


Source: Datastream.

Figure 5. Exchange Rate Changes against the US Dollar, 1 January 1999 to 31 December 2001

partition the data into two subperiods: 1999–2001 when the dollar appreciated generally against the euro, and 2002 up to December 2003 when the dollar generally depreciated against the euro.

Figure 5 plots the cumulative depreciation of the euro and all East Asian currencies for the period of dollar appreciation. All East Asian currencies except the Philippine



Source: Datastream.

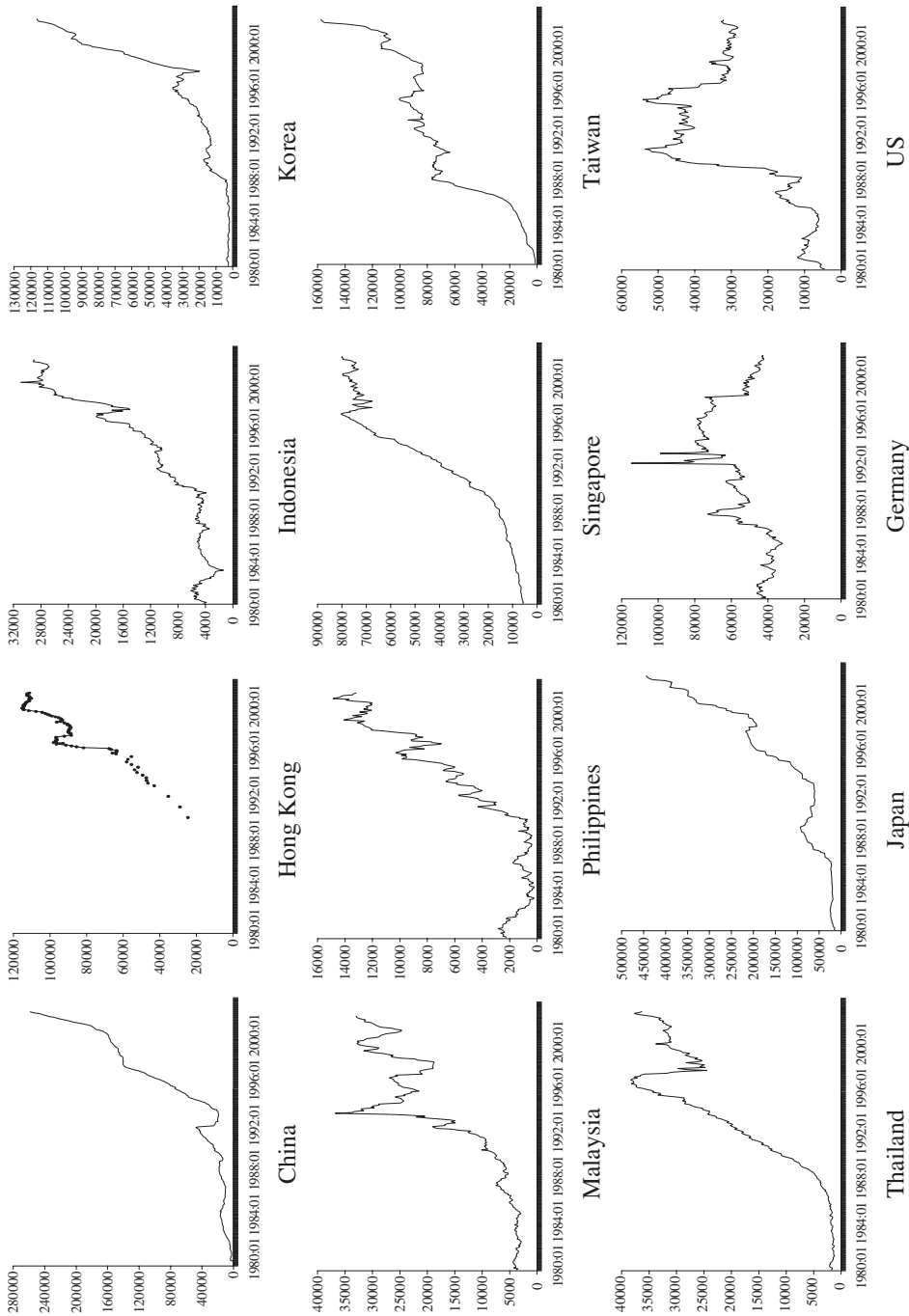
Figure 6. Exchange Rate Changes against the US Dollar, 1 January 2002 to 31 December 2003

peso, but including the Japanese yen, depreciated less than the euro against the dollar. Since the beginning of 2002, when the dollar started depreciating, the picture is reversed: Figure 6 shows that all East Asian currencies appreciated considerably less than did the euro. (At the same time, with the exception of Indonesia, the smaller East Asian economies appreciated less than did Japan—thereby also safeguarding their competitiveness against Japan.)

In resisting this exchange market pressure for currency appreciation, each East Asian central bank intervened heavily to buy dollars. As shown in Figure 7, the official foreign reserves in East Asian countries have increased surprisingly fast in China, Hong Kong, Indonesia, Korea, Malaysia, Philippines, Taiwan, Thailand, and particularly Japan. Indeed, in 2003, the Japanese government intervened truly massively: official reserves rose by 186 billion US dollars, which is greater than Japan's trade surplus.

In the crisis countries Indonesia, Korea, and the Philippines, foreign exchange reserves have risen far above their pre-crisis levels. In contrast, the official foreign exchange reserves of the benchmark free floater Germany ("Euroland") hardly changed. Only Singapore, which devotes most of its foreign reserves to a government-run overseas investment corporation, has kept "official" reserves close to their pre-crisis level. Far beyond simply rebuilding their pre-crisis levels of exchange reserves, East Asian governments have evidently been intervening massively to prevent their exchange rates from appreciating.

In summary, all East Asian countries now seem to be pursuing similar low-frequency exchange rate strategies with respect to the dollar, but to different degrees. China, Hong Kong, and Malaysia maintain hard fixes to the dollar. Japan, while adhering in principle to exchange rate flexibility, restricts appreciation pressure by sporadic but



Source: IMF: IFS, Million Dollars. Note different scales on the y-axis.

Figure 7. Official Foreign Exchange Reserves of Crisis and Non-crisis Countries in Millions of Dollars, 1980:01–2003:12 (monthly)

quite massive (and possibly unsterilized) foreign exchange interventions (Hillebrand and Schnabl, 2003).

Over the long run, sustaining exchange rate stability in East Asia at low frequencies will mainly depend on the region's two largest economies, China and Japan. So far, China has taken the lead by firmly keeping its exchange rate stable at 8.28 yuan/dollar since 1994—despite domestic pressure and foreign advice to depreciate in the 1997/98 crisis, and foreign pressure to appreciate in 2002/03. Although fluctuations in the yen/dollar rate have been much more of a disturbing influence, particularly the deep depreciation of the yen that aggravated the great East Asian crisis of 1997/98, the post-crisis signs are now favorable. Japan itself, by smoothing out sharp exchange rate fluctuations of the yen against the dollar, seems to have already contributed to greater exchange rate stability in East Asia.¹⁰

To be sure, more formal “parity” commitments to peg the yuan and yen to the dollar would encourage the smaller East Asian countries to similarly peg their dollar exchange rates—thus creating a zone of greater monetary and exchange rate stability for the increasingly integrated East Asian economy. However, even if Japan returns to being a dangerous outlier with wide fluctuations in the yen/dollar rate, having the other East Asian countries stabilize their dollar exchange rates collectively seems more rational than the IMF's cumulative institutional wisdom of pushing for greater exchange rate flexibility, with no well-defined constraint on how any one country's rate affects its neighbors.

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Notes

1. Before the 1990s, China's official exchange rate against the dollar was often changed, and different rates existed for commercial transactions. Only the official exchange rate is reported in Figure 1, but the foreign exchange market has been unified since 1994.
2. The difference between the price level for traded and nontraded goods (the Balassa–Samuelson effect) is significant only for Hong Kong and Korea.
3. In developing countries, fiscal and monetary discipline are closely linked because the domestic bond markets are underdeveloped. With the access to domestic and international bond markets restricted, printing money is the common means to finance public expenditure unless revenue from traditional taxes is substantial. A fixed exchange rate deprives the government of the inflation tax as revenue because undue monetary expansion would depreciate the domestic currency. Fiscal discipline is the only way to ensure the exchange rate's stability (Chin and Miller, 1998).
4. As the leading currency of the European currency system, representing the euro since 1 January 1999.
5. It can be argued that the Swiss franc is not an arbitrary *numéraire* with respect to the German mark because the exchange rates of both currencies moved in parallel to the US dollar (Hernández and Montiel, 2002, p. 37–9). However, since the German mark did not play a

significant role in the currency basket of the East Asian countries, and since the Swiss franc moves more independently of the yen and the dollar, we can neglect this point.

6. Previous tests did not yield any evidence for any cointegrating vector between the four exchange rates.

7. A more comprehensive model which aggregates the three subperiods into one model and distinguishes the three subperiods by dummy variables leads by and large to the same results. We report the results for the three isolated subperiods because the respective R^2 give additional information about the goodness-of-fit for every single subperiod.

8. Using the comprehensive model which distinguishes the pre-crisis and post-crisis period by dummy variables, the coefficients diverge only slightly from the results for the three independent regressions as reported in Tables 3, 4 and 5.

9. These countries are free floaters against the dollar, but not necessarily against other currencies. For instance, before January 1999, Germany was a member of the European Monetary System, which implied a stabilization of its exchange rate against other EMU currencies. Also Switzerland might tend to reduce exchange rate volatility against the euro (Schnabl, 2004).

10. Beyond regional exchange rate stability, both China and Japan could suffer major deflations if, as international creditor economies, their currencies floated upwards. But this is a story for another time. See McKinnon and Schnabl (2003b) for China, and Goyal and McKinnon (2003) for Japan.