In *Exchange Rate Policies for Emerging Market Economies*, edited by Richard Sweeney, Clas Wihlborg, and Thomas Willet, Westview Press, 1999

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Is Pegging the Exchange Rate a Cure for Inflation? East Asian Experiences

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Introduction

A common argument for pegging the exchange rate is that linking to a stable foreign currency enforces discipline on domestic monetary and fiscal policy which in turn stabilizes inflation expectations. Presumably the same result could also be achieved under a floating exchange rate regime if the domestic central bank is able to convince private agents of its ability to maintain low monetary growth. The argument for exchange rate pegging in this case is that it serves as a "precommitment mechanism" that increases the credibility of the central bank's announced low-inflation goal. Through commitment to a fixed exchange rate arrangement, policy makers may import some of the credibility for stable monetary control associated with foreign policies.

To varying degrees, East Asian economies have pegged their currencies to the U.S. dollar.[1] Most have also achieved relatively low inflation, certainly by the standards of developing countries. In the 1980s inflation in the region averaged 7 percent, close to the average for the industrial countries, but well below the average of nearly 30 percent for developing countries as a group, or the average of more than 50 percent for Latin America. Can the relatively successful performance of East Asian economies be attributed to their exchange rate policies?

We argue that the exchange rate pegging policies of East Asia economies are *not* the explanation for their low inflation. To the contrary, in most cases pegging hindered adjustment of the real exchange rate in response to external

shocks. Since 1985, those economies whose currencies have appreciated relatively less against the U.S. dollar in nominal terms have tended to experience higher inflation. This inflation experience has been generally associated with policymakers' efforts to stabilize the exchange rate in the face of large current account surpluses or capital inflow surges and related increases in money base growth.

Factors other than pegging the exchange rate appear to account for Asia's low inflation, in particular, relatively stable domestic political institutions and independent fiscal policy processes. The conclusion we draw from the East Asian experience is that exchange rate pegging has not led to lower inflation and, in some cases, has created difficulties in macroeconomic management.

The organization of the paper is as follows. The second section describes the nature of the exchange rate regimes in selected East Asian economies. The third section discusses the complications of monetary management in East Asian countries when they have attempted to limit adjustment of their exchange rates. It also discusses how for most countries pegging has not worked as a mechanism to dampen inflation. In the fourth section we explain how the low inflation achieved by East Asian countries can be attributed to other factors. The fifth section concludes the paper.

Exchange Rate Regimes in East Asia

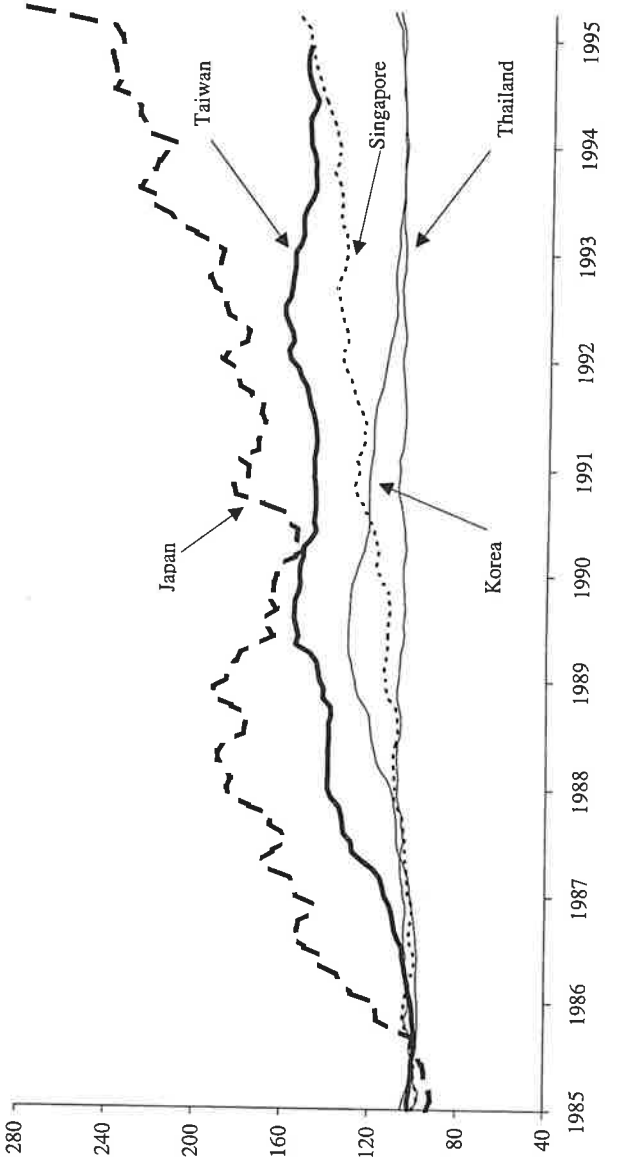
The exchange rate regimes of East Asian economies have varied widely. (See the Appendix for a description of each country's policies.) They have ranged from unilateral pegs to the U.S. dollar (Thailand until 1984, Hong Kong since 1983), to fixed or adjustable pegs to a currency basket (Indonesia, Malaysia, and Singapore; Korea until 1990, and Thailand since 1984), to managed floats (Taiwan up to 1989, Korea since 1990).

In spite of such differences in stated exchange rate policies across the region, policymakers in almost all economies have tended to limit adjustment of their currencies against the U.S. dollar. This is suggested by Figure 8.1 showing indices of monthly nominal bilateral exchange rates against the U.S. dollar over the period January 1985 to April 1995 (for the new Taiwan dollar to December 1994). The indices are constructed so that an increase implies an appreciation of the local currency. The top panel presents indices for economies whose currencies on average appreciated against the dollar; the lower panel shows indices for economies whose currencies have not appreciated or on average depreciated. The yen/dollar exchange rate index is included as a benchmark.

Two main observations may be made from Figure 8.1. First, in comparison to the yen, all East Asian currencies appreciated by much less against the dollar over this period. Between 1985 and 1989, the cumulative appreciation

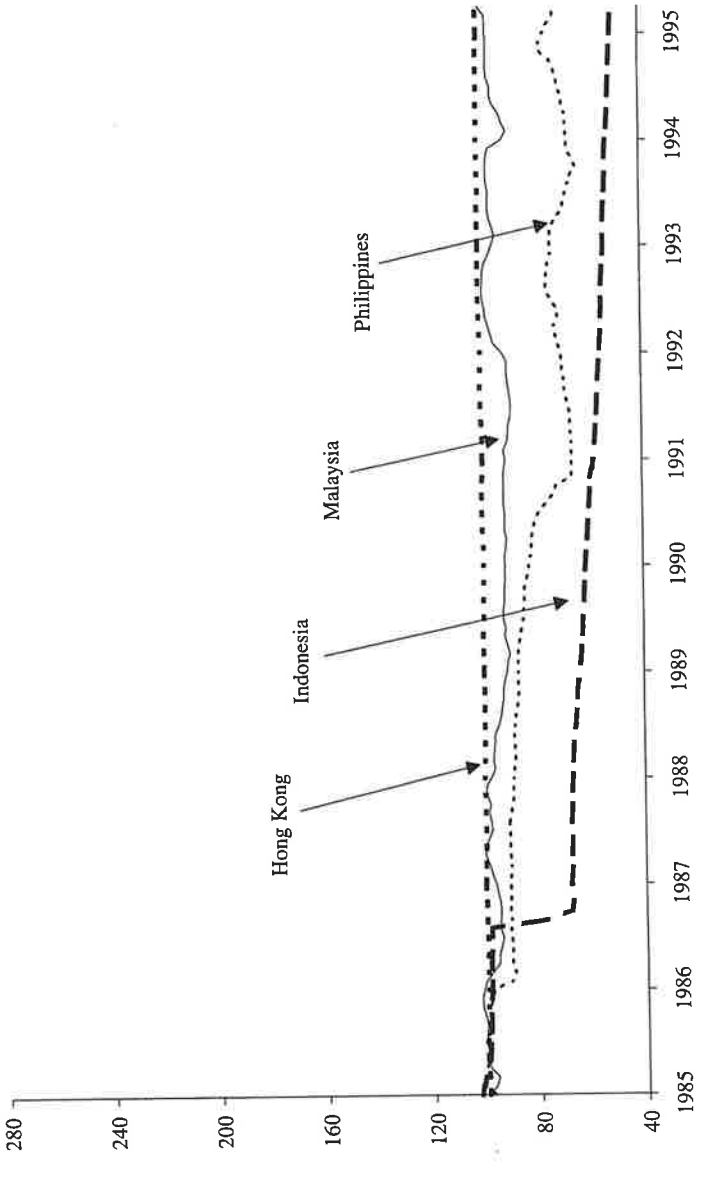
FIGURE 8.1 Nominal Bilateral Exchange Rate Indices (US$/local currency): Japan, Korea, Singapore, Taiwan and Thailand

1985 = 100



(continued)

FIGURE 8.1 (continued): Hong Kong, Indonesia, Malaysia, and the Philippines



of the yen against the dollar was almost 275 percent. Over the same period only the New Taiwan dollar and Singapore dollar appreciated significantly, but by less than 50 percent. Other East Asian currencies either remained relatively flat or depreciated against the dollar.

Second, with the exceptions of the Singapore dollar, which has appreciated more or less steadily, and the Indonesian rupiah, which has depreciated relatively steadily, clear trends in exchange rate movements for most countries are not evident. The Hong Kong dollar[2] and the Thai baht have been relatively stable against the U.S. dollar, and while the currencies of Taiwan, Korea, Malaysia, and the Philippines have displayed more volatility, they have tended to return to their previous level against the U.S. dollar or settled on new plateaus. Moreover, for all of these currencies (including those of Singapore and Indonesia) monthly fluctuations in exchange rates against the dollar appear to be smaller than those against the Japanese yen. The dampened trends and the relative smoothness of the series appear to reflect policies designed to stabilize the value of these currencies against the U.S. dollar.

The relative importance of the dollar in the exchange rate policies of East Asian countries is supported by research by Frankel and Wei (1994). Because policymakers typically do not disclose the weight placed on individual basket currencies, Frankel and Wei infer the implicit weights from regressions of local currency values against the U.S. dollar, Japanese yen, and German mark, using the Swiss franc as a numeraire. Table 8.1, based on Frankel and Wei's findings, indicates that over the period 1979 to 1992 the weight of the U.S. dollar in estimated currency baskets averaged over 90 percent for East Asian economies, compared to a 6 percent weight for the yen, and 3 percent weight for the German mark. Singapore and Malaysia tended to assign the lowest weight (71 and 73 percent, respectively) to the U.S. dollar, and responded significantly to fluctuations in the yen and the German mark. The other currencies assigned weights of 90 percent or higher to the U.S. dollar, and responses to yen or German mark fluctuations were small or insignificant.

What are the motivations for attempting to limit exchange rate movements against the dollar? One consideration is the impact of exchange rate fluctuations on international trade flows, arising from the high degree of openness of most East Asian economies. Given the historical importance of the United States as a trading partner and as a source of capital for most East Asian countries, pegging to the U.S. dollar is not surprising. As can be seen in Table 8.2, the United States historically accounts for the largest share of the exports of East Asian economies to the three major industrial countries (the United States, Japan, and Germany). The sole exception is Indonesia, which exports large quantities of oil to Japan. The U.S. also accounts for a significant proportion of the imports of East Asian economies, second to Japan.

TABLE 8.1 Average Implicit Weights for Dollar, Yen and DM (1979–1992)

	U.S. Dollar	*Yen*	*German Mark*
Hong Kong dollar	0.89***	-.01	.02
Indonesian rupiah	1.01***	.17**	-.00
Korean won	0.96***	-.01	-.00
Malaysian ringgit	0.73***	.06**	.12**
Philippine peso	1.09***	-.01	-.05
Singapore dollar	0.71***	.12***	.14***
New Taiwan dollar	0.94***	.04***	.05
Thai baht	0.92***	.05*	.03
Average weights	0.91	.06	.03

***denotes significant at 1 percent; **denotes significant at 5 percent; *denotes significant at 10 percent. Insignificant coefficients set to zero when averaging. All currencies are in terms of units of Swiss francs.
SOURCE: Frankel and Wei (1994).

In many developing countries, particularly those experiencing hyperinflation, exchange rate pegging is an essential part of a stabilization program involving government efforts to enhance the credibility of its commitment to a disinflation (at least initially). In East Asia, concern about inflation credibility appears to have played some role only in the exchange rate policies of Indonesia and the Philippines, both with historically high inflation. Indonesia, however, by following a crawling peg, sought to balance its inflation credibility concern with the desire to maintain international competitiveness.

Pegging to the dollar has had certain drawbacks for East Asian economies. Pegging has exposed them to foreign disturbances, particularly nominal shocks, against which they might have better insulated themselves by allowing greater exchange rate flexibility. Among the major shocks to East Asian economies in the last decade was the strong depreciation of the U.S. dollar against major currencies beginning in 1985 and the lowering of U.S. interest rates between 1989 and 1993. Difficulties may also arise with factors requiring equilibrium adjustment of the real exchange rate. In the case of some East Asia economies, relatively higher productivity growth than in the United States and significant economic and financial liberalization measures have created long-run pressures for real appreciation against the dollar.[3] Given this likely tendency for real appreciation, pegging to the dollar forced the real exchange rate adjustment to occur through more rapid inflation in these

TABLE 8.2 Shares in East Asian Trade

	Exports		*Imports*		*Exports + Imports*	
	1980	*1995*	*1980*	*1995*	*1980*	*1995*
Indonesia						
U.S.	20	17	13	10	17	13
Japan	49	30	31	28	43	29
Germany	2	4	6	8	3	6
Korea						
U.S.	27	19	22	22	24	21
Japan	17	14	27	24	23	19
Germany	5	5	3	5	4	5
Malaysia						
U.S.	16	22	15	16	16	19
Japan	23	13	23	28	23	21
Germany	4	3	5	5	4	4
Philippines						
U.S.	28	36	24	18	25	25
Japan	27	16	20	23	23	20
Germany	4	4	4	4	4	4
Singapore						
U.S.	12	18	14	15	13	17
Japan	8	8	18	21	14	15
Germany	3	3	3	3	3	3
Thailand						
U.S.	13	18	14	11	14	14
Japan	15	17	21	30	19	24
Germany	4	3	4	5	4	4

SOURCE: IMF, *Direction of Trade Statistics*.

economies. For these reasons, pegging to the dollar can complicate, rather than enhance, monetary control and efforts to curb inflation.

Shocks and Monetary Control [4]

To illustrate how pegging to the dollar has complicated monetary control and led to inflationary pressures, consider the impact of two major shocks to East Asian economies: the strong downward movement beginning in 1985 of the U.S. dollar against major currencies, such as the Japanese yen and the German mark, and the decline of U.S. (nominal) interest rates between 1989 and 1993. The dollar depreciation of 1985 to 1987 created a competitive export advantage for economies in the region, particularly the newly industri-

alized economies of Korea, Taiwan, and Singapore, leading to significant increases in their trade balances. To the extent that the forces moving the value of the U.S. dollar against major currencies were largely unrelated to the economic fundamentals facing the newly industrialized East Asian economies, this created pressure for some real appreciation of their equilibrium real exchange rates against the dollar. Given sticky prices, pegging of nominal exchange rates implied that their currencies were undervalued in real terms. The lower U.S. interest rates encouraged investors to look for foreign investment opportunities, including in East Asia, and spurred capital inflows to countries in the region. Such inflows were particularly large in those cases where market participants felt that pegging had produced an undervalued currency that would eventually have to appreciate. These shocks thus resulted in significant changes in capital and current account flows in the various economies in the region that, as a result of efforts to peg through intervention, posed significant challenges for monetary control.

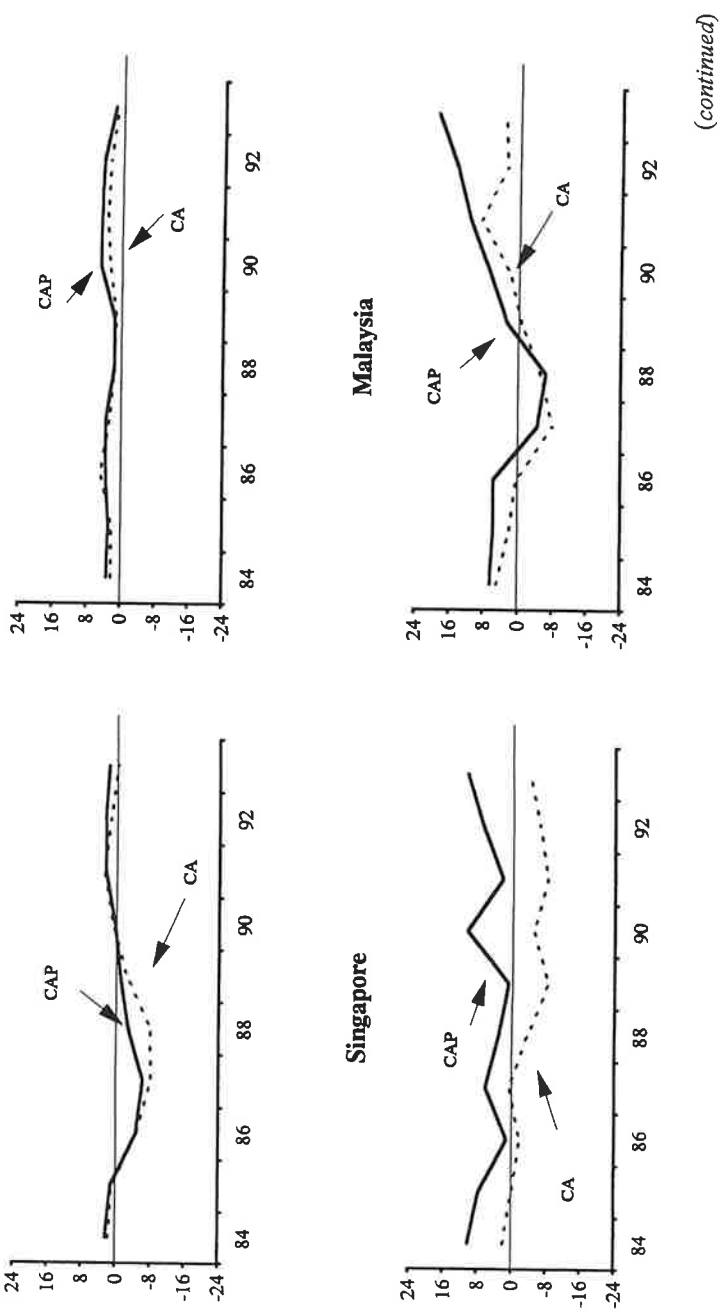
Capital and Current Account Flows

To examine the impact of these developments on monetary policy in East Asia, Figure 8.2 plots annual data on net capital inflows (CAP) and current account deficits (CA) for seven East Asian economies over the years 1984 to 1993.[5] Net capital flows are defined to include balance-of-payments errors and omissions; the current account includes private and official transfers. To facilitate comparison across economies the data for each are scaled by GDP.[6]

While the magnitudes of observed capital flows do not fully reflect ex ante pressures to the extent that policy changes such as monetary restraint, currency appreciation, or the imposition of capital controls limit incipient inflows, they nevertheless capture broad trends. Observe that the mid- and late 1980s witnessed dramatic changes in capital flows for all of these countries. Capital inflows rose significantly in Thailand in 1988, in Malaysia in 1989, and in Indonesia, the Philippines, and Singapore in 1990. At their respective peaks, capital inflows as a percentage of GDP were above 13 percent for Thailand and Malaysia, above 10 percent for Singapore, 6 percent for the Philippines, and almost 5 percent for Indonesia. Korea and Taiwan have had periods of both large capital outflows and capital inflows since the mid 1980s. Korea experienced significant net capital outflows in the period 1986 to 1989, peaking at 6 percent of GDP in 1987, followed by net inflows beginning in 1990. Taiwan experienced large capital inflows in 1986 and 1987, amounting to almost 10 percent of GDP in 1987; net capital outflows of a roughly equal magnitude occurred from 1989 to 1990.

It may also be observed that net capital inflows (outflows) have generally been associated with current account deficits (surpluses). Along with the increases in their capital inflows in the late 1980s, Thailand, Malaysia, Indonesia, and the Philippines have recorded larger current account deficits.

FIGURE 8.2 Net Capital Inflow and Current Account Deficit: Korea, Indonesia, Singapore and Malaysia (percentage of GDP) *(continued)*



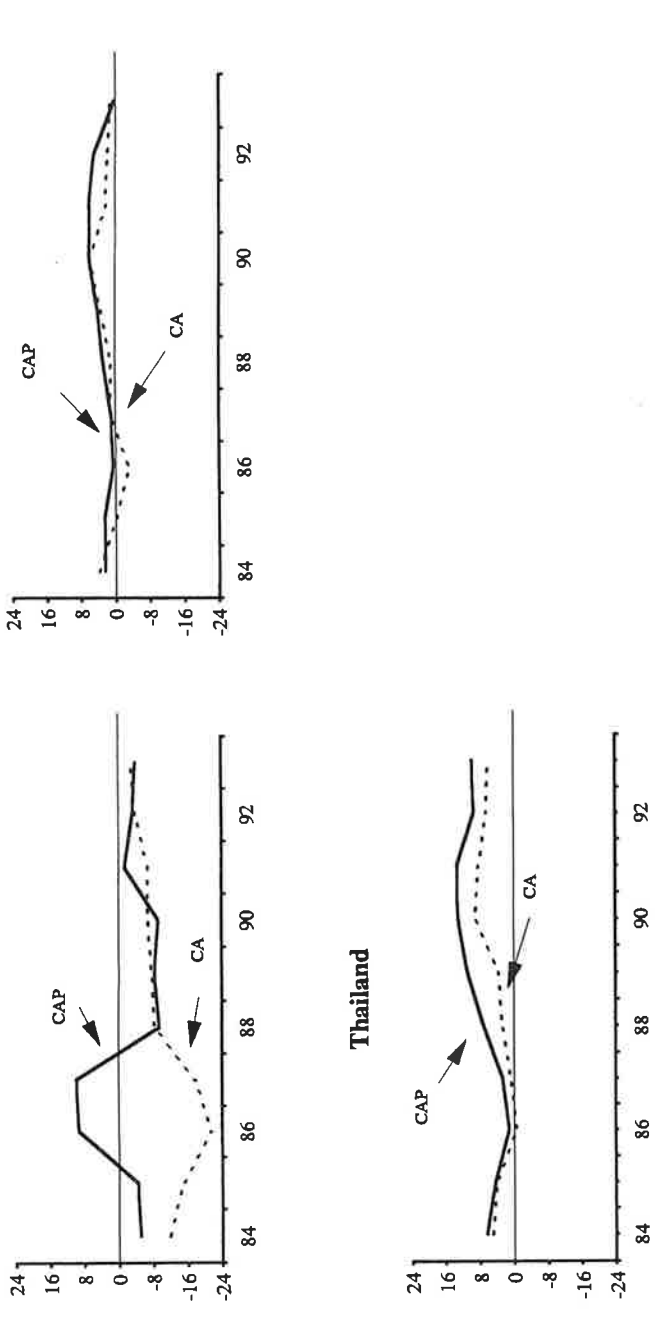


FIGURE 8.2 (continued): Taiwan, the Philippines and Thailand

Korea experienced current account surpluses along with its capital outflows in the 1980s and deficits along with its net capital inflows in the 1990s. Taiwan and Singapore represent exceptions to this pattern. Taiwan experienced enormous current account surpluses in the mid 1980s (on the order of 20 percent of GDP) at the time of its large capital inflows; these surpluses declined significantly as capital outflows increased. Singapore's net capital inflows have also been associated with current account surpluses.

By the logic of balance of payments accounting, the gaps between capital inflows and current account deficits imply an accumulation of official foreign reserve assets.[7] In Thailand and Malaysia, the gap between capital inflows and the current account deficits that emerged in the late 1980s financed increases of official reserve assets that peaked at over 7 percent of GDP in Thailand in 1989 and over 11 percent of GDP in Malaysia in 1992. Reserve accumulation in Indonesia amounted to 2 percent of GDP in 1990; in the Philippines it peaked at almost 4 percent of GDP in 1991. In Korea, with current account surpluses exceeding net capital outflows beginning in 1985, reserve accumulation rose to more than 5 percent of GDP in 1988. In Taiwan and Singapore, capital inflows and current account surpluses combined to push reserve accumulation above 30 percent of GDP in the former in 1986 and above 15 percent of GDP in the latter in 1990.[8]

The sharp increases in official reserves in East Asian economies indicate that the balance of payments surpluses were met with a heavy degree of foreign exchange intervention by monetary authorities as they sought to limit upward pressure on their nominal exchange rates by increasing their holdings of foreign reserve assets. With this goal of moderating exchange rate movements, policymakers faced the choice of whether to allow the reserve accumulation associated with the capital inflows to stimulate demand and growth, or whether to restrain this possibly destabilizing effect by sterilization. Without sterilization, the capital inflows would tend to raise the money supply by raising the net foreign reserve component of the money base, thereby lowering interest rates.

Sterilization

Sterilized intervention was pursued to varying degrees in most East Asian countries to curb the upward pressure on monetary aggregates. One indirect indication of sterilization is the extent to which changes in net foreign assets are accompanied by offsetting changes in domestic credit. If net foreign asset increases are offset by declines in net domestic credit by the monetary authorities, the monetary base is unaffected. Table 8.3 presents data for particular capital flow episodes of each economy on annual money base growth and annual changes in the net foreign asset and domestic credit components of the base, each as a ratio of the previous year's monetary base level. (The two ratios sum to the rate of annual money base growth by construction.)

TABLE 8.3 Contributions to Monetary Base Growth (in percent)

	Average of Two Prior Years	Year of Capital Inflow Episode[a] 0	1	2	3
Indonesia (1990)					
Monetary Base	10.8	16.3	3.3	19.6	-
Foreign Reserves	-3.0	58.1	62.3	74.0	-
Domestic Credit	13.7	-41.8	-59.4	-54.4	-
Korea (1986)					
Monetary Base	2.7	16.2	48.9	30.2	31.8
Foreign Reserves	6.0	4.3	18.0	81.0	19.5
Domestic Credit	-3.3	11.8	30.9	-50.8	12.3
Malaysia (1989)					
Monetary Base	10.0	28.5	23.7	19.1	12.2
Foreign Reserves	11.0	28.6	36.0	18.6	76.4
Domestic Credit	-0.8	-0.0	-12.4	0.5	-64.1
Philippines (1990)					
Monetary Base	27.6	17.7	20.1	13.0	10.1
Foreign Reserves	18.6	-33.6	63.7	44.8	36.7
Domestic Credit	9.0	51.3	-43.6	-31.8	-26.6
Singapore (1990)					
Monetary Base	14.2	7.2	10.6	10.6	8.9
Foreign Reserves	47.8	96.1	65.9	81.6	89.3
Domestic Credit	-33.6	-88.9	-55.2	-71.0	-80.4
Taiwan (1986)					
Monetary Base	13.6	29.1	27.5	25.7	32.5
Foreign Reserves	64.3	187.8	111.4	-4.6	-19.9
Domestic Credit	-50.6	-158.8	-83.9	30.4	52.4
Thailand (1988)					
Monetary Base	16.3	14.9	16.9	18.6	13.3
Foreign Reserves	30.4	48.4	74.6	62.5	56.2
Domestic Credit	-14.2	-33.6	-57.7	-43.9	-43.0

[a] First year of episode noted in parentheses next to country name.
SOURCE: Glick and Moreno (1995).

Observe that in the first year of capital inflow surges, the associated increases in net foreign assets were accompanied by declines in domestic credit in Thailand, Indonesia, Taiwan, and Singapore. Significant declines in domestic credit occurred in Malaysia a year after the onset of its surge in 1989, and in Korea two years after foreign asset reserves began rising in 1986. In the Philippines the capital inflow surge was initially accompanied by a loss of official reserves because of an accompanying large current account deficit; domestic credit was raised to accommodate increased fiscal surpluses. When the capital inflows continued in the following two years and foreign reserves rose, the authorities sterilized by reducing domestic assets.

The relative development of financial markets influenced the way that sterilization policies were implemented among individual East Asian countries. Most countries sought to limit the serious distortions in their financial markets that would have resulted from the broad use of direct credit controls. However, in many cases, open market sales were limited by the absence of marketable government securities in the portfolios of the monetary authorities. As a result, monetary authorities resorted to a number of alternative devices for curbing money growth.

Some central banks issued their own liabilities to absorb excess domestic credit (Korea, Taiwan, the Philippines, Indonesia). However, sterilization through open market sales was costly since it typically involved the simultaneous purchase of low-yielding foreign assets and sale of high-yielding domestic assets. In other cases, the monetary authorities made pragmatic use of public institutions such as social security funds, state banks, and public enterprises as monetary instruments (Singapore and Malaysia). In some economies sterilization was implemented through changes in reserve requirements and liquidity ratios, as well as through direct credit constraints that affect the capacity of commercial banks to lend and thus the money multiplier between broad money and the monetary base. Korea, Taiwan, and Malaysia all relied heavily on reserve requirements as a monetary policy instrument after the onset of foreign reserve asset surges. However, using reserve requirements as a sterilization tool is also costly. Increasing requirements, by raising the cost of commercial banking, promotes disintermediation over time as new financial institutions and instruments arise to bypass controls.

Apart from attempting to sterilize the monetary impact of capital inflow surges, monetary authorities in the region have from time to time responded to balance of payments surpluses through changes in financial regulations designed to encourage capital outflows or discourage inflows. For example, Taiwan introduced a major liberalization of controls on capital outflows in July 1987. The outward movement of capital in 1988 offset a large part of the ongoing current account surpluses and dampened the magnitude of reserve accumulation. At the same time, Taiwan responded to capital inflow surges by freezing the foreign liabilities of domestic banks. Partly in an effort to curb the effect of currency speculation, Taiwan also restricted foreign access to domestic equity markets. In response to persistent capital inflows, in 1994 Malaysia's central bank limited commercial banks' holdings of foreign funds that were not trade related or intended for investment in plant, equipment, or inventory stocks. It also took measures that effectively raised reserve requirements on foreign deposits, set a ceiling on the net external liabilities of domestic banks, and prohibited the sale of short-term financial instruments to foreigners.[9]

Impact on Money Aggregates

The efforts to sterilize the potential effects of net foreign asset changes on the monetary base met with mixed success.[10] Because sterilization was not always implemented immediately and not always effectively, in a number of countries the reserve accumulations were accompanied by a significant increase in monetary base growth, as shown in Table 8.4. Korea, Taiwan, Malaysia, and Indonesia experienced the most difficulty in limiting increases in monetary base growth. In Korea, annual monetary base growth rose to 16 percent in 1986, fivefold above the average for 1984 and 1985. It rose to almost 50 percent in 1987, before slowing in 1988 and 1989, and falling sharply in 1990. In Taiwan, monetary base growth increased sharply in 1986, more than doubling the average growth rate of the previous two years, and peaked at more than 30 percent per annum in 1989, before declining sharply in 1990. Taiwan's net accumulation of foreign reserves ceased in 1988. However, the rate of monetary base growth remained high, because of open market purchases by the central bank of liabilities sold in sterilization operations in the previous two years. In the case of Malaysia, the growth rate of the monetary base rose from 10 percent in 1987–1988 to almost 30 percent in 1989, and remained relatively high thereafter. (Malaysia appeared to be more successful in sterilizing a second surge of net foreign reserve assets in 1992, with monetary base growth slowing to 12 percent.) In Indonesia, the monetary base growth rate rose from 11 percent in 1988–1989 to 16 percent in 1990.

Thailand and Singapore appeared to be somewhat more successful in limiting the impact of foreign reserve accumulation on their monetary base growth. In Thailand, monetary base growth fell from 16 percent in 1986–1987 to 15 percent in 1988, the first year of the capital inflow surge, and was not much higher in succeeding years. In Singapore, base growth was significantly lower in 1990 than in previous years, despite an increase in reserve assets almost equal in magnitude to its entire monetary base.

Observe in Table 8.4 that in association with the greater growth of the monetary base, broad money growth was higher during the capital inflow period than previously in all countries, with the exception of Singapore.[11] Although Korea, Taiwan, and Malaysia had relatively less success in curbing the growth of the monetary base, as noted above, these countries increased reserve requirements on bank deposits to limit broad money growth and inflationary pressures. This explains why money growth (and inflation) in Malaysia, for example, was in fact lower than in Thailand despite the former's higher rate of base growth. From 1989 to 1993, broad money growth averaged over 20 percent a year in Thailand and 17 percent a year in Malaysia.

TABLE 8.4 Selected Monetary Indicators (in percent)

		Year of Capital Inflow Episode[a]			
	Average of Two Prior Years	*0*	*1*	*2*	*3*
Indonesia (1990)					
Monetary Base Growth	10.8	16.3	3.3	19.6	-
Broad Money Growth	31.6	44.6	17.5	19.8	-
Currency Appreciation	-0.2	-8.7	-3.8	-1.0	-0.8
Price Inflation	5.8	9.4	9.9	5.0	10.2
Korea (1986)					
Monetary Base Growth	2.7	16.2	48.9	30.2	31.8
Broad Money Growth	11.6	18.4	19.0	21.5	19.8
Currency Appreciation	-4.9	-5.7	-2.2	18.8	9.7
Price Inflation	2.8	1.3	6.0	7.2	5.1
Malaysia (1989)					
Monetary Base Growth	10.0	28.5	23.7	19.1	12.2
Broad Money Growth	6.9	16.1	12.8	14.5	19.1
Currency Appreciation	-7.1	6.4	-3.5	-0.4	10.1
Price Inflation	2.0	2.1	3.3	4.2	4.9
Philippines (1990)					
Monetary Base Growth	27.6	17.7	20.1	13.0	10.1
Broad Money Growth	27.4	22.5	17.3	13.6	-
Currency Appreciation	0.9	-22.1	7.0	8.7	-7.1
Price Inflation	12.3	16.2	13.1	8.1	8.4
Singapore (1990)					
Monetary Base Growth	14.2	7.2	10.6	10.6	8.9
Broad Money Growth	18.0	20.0	12.4	8.9	8.4
Currency Appreciation	6.4	8.2	6.8	2.7	4.8
Price Inflation	2.4	3.9	2.8	1.8	3.0
Thailand (1988)					
Monetary Base Growth	16.3	14.9	16.9	18.6	13.3
Broad Money Growth	16.8	18.2	26.2	26.7	19.8
Currency Appreciation	-9.0	2.3	6.5	-1.2	1.0
Price Inflation	2.6	3.2	6.1	6.6	4.7
Taiwan (1986)					
Monetary Base Growth	13.6	29.1	27.5	25.7	32.5
Broad Money Growth	21.6	26.0	26.4	18.5	16.1
Currency Appreciation	1.5	3.7	13.4	4.4	15.2
Price Inflation	0.2	2.8	1.8	1.1	3.2

[a] First year of episode noted in parentheses next to country name.
SOURCE: Glick and Moreno (1995)

Exchange Rate Adjustment and Inflation

How successful were exchange rate policies in simultaneously maintaining exchange rate stability and curbing inflation? Figure 8.3 shows how the nominal and real bilateral exchange rates of East Asian countries behaved against the dollar from 1985 up to the mid 1990s. The real exchange rates are constructed from consumer price indices; the exchange rate indices are constructed so that an increase implies an appreciation of the domestic currency in either nominal or real terms. It is apparent that in those countries where the nominal exchange rate did not appreciate, domestic price increases tended to exceed U.S. price increases. In contrast, those countries which allowed some nominal appreciation experienced smaller price increases or greater price declines relative to the United States. This is confirmed by Figure 8.4, a scatter diagram relating cumulative nominal exchange rate appreciation and domestic consumer price inflation relative to the United States over the period January 1985– December 1994; it displays a distinct negative relationship.

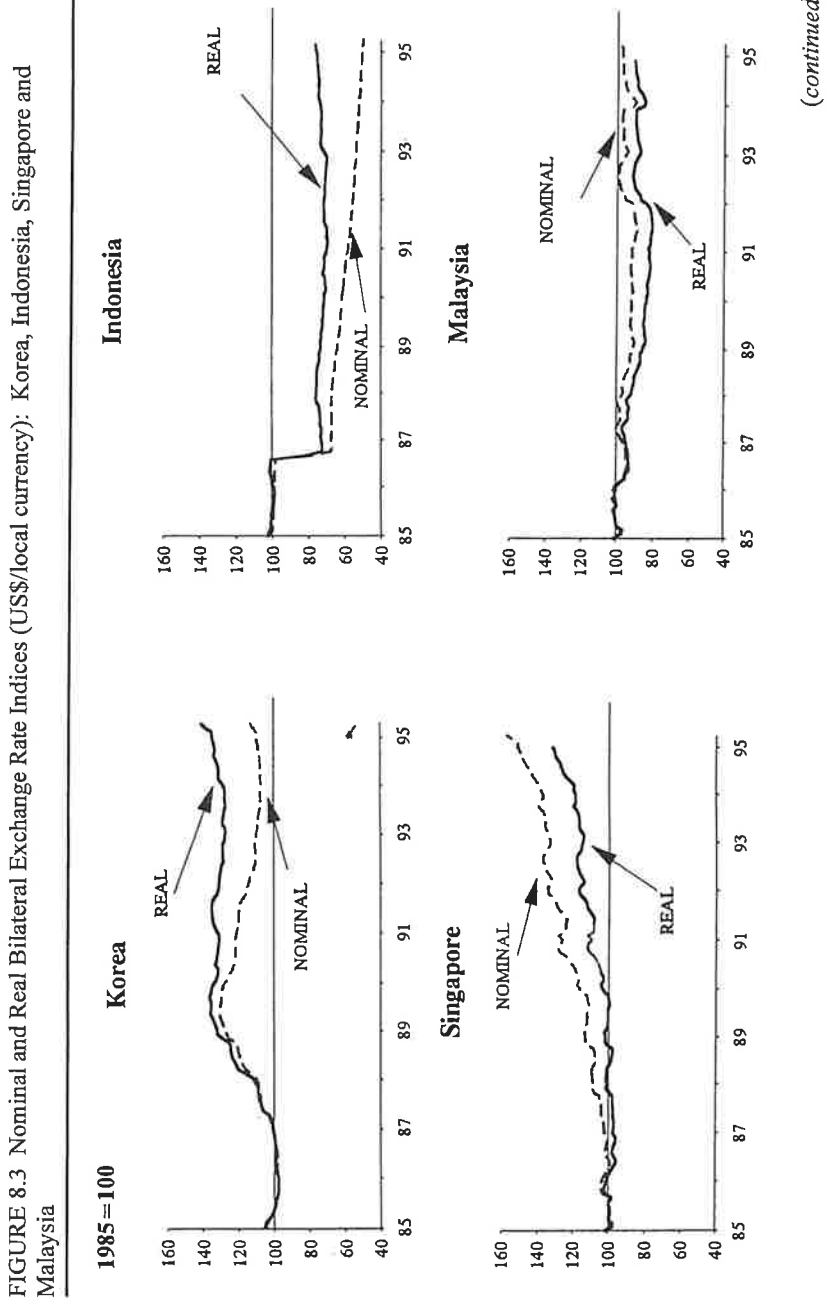
The negative relationship between nominal currency appreciation and relative domestic inflation rates suggests that pegging to the dollar by and large led to undervalued real exchange rates. Since the tendency to peg limited the equilibrium adjustment through changes in the nominal exchange rate, adjustment occurred instead through changes in relative inflation over time.

The contrast between adjustment through the nominal exchange rate or relative prices is best illustrated by Hong Kong and Singapore. Hong Kong has had a rigidly fixed exchange rate parity against the dollar since 1983 and real appreciation was effected entirely by a rise in the price level relative to the U.S. exceeding 50 percent since early 1985.[12] Singapore, by contrast, has allowed its nominal exchange rate to appreciate by about 50 percent against the U.S. dollar, limiting cumulative price increases to 20 percent less than the U.S. over the decade from 1985 to 1994.

Korea and Taiwan provide less extreme contrasts. The real appreciation of the Korean won was effected both by nominal exchange rate appreciation and, similarly to Hong Kong, by a rise in the relative price level. As in Singapore, nominal exchange rate appreciation in Taiwan exceeded real appreciation, implying that the price level rose about 8 percent less than in the United States since 1985.

Thailand's experience is similar to that of the more advanced newly industrialized East Asian economies. It has experienced a 17 percent real appreciation since 1985, most of which was effected through nominal appreciation (9 percent) and the remainder through a relative price level rise (8 percent). The Philippines, by contrast, experienced a substantial nominal exchange rate depreciation since 1985 (21 percent) so that the real apprecia-

FIGURE 8.3 Nominal and Real Bilateral Exchange Rate Indices (US$/local currency): Korea, Indonesia, Singapore and Malaysia



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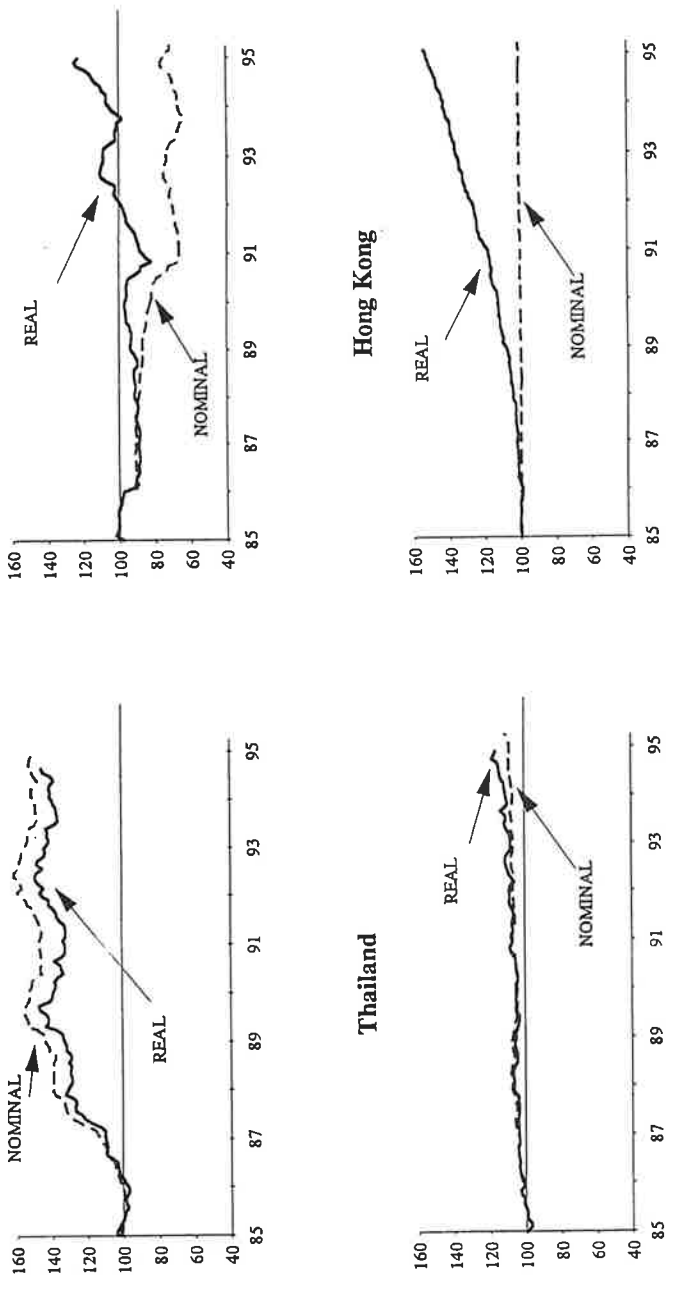
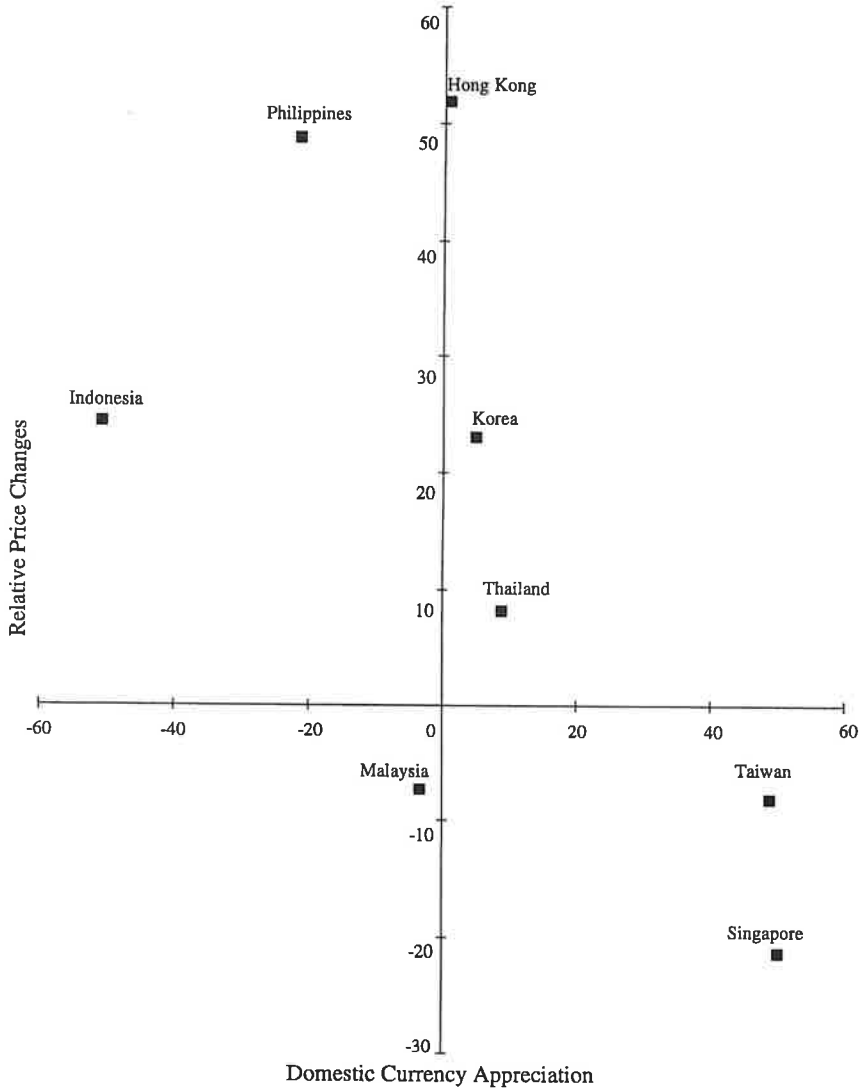


FIGURE 8.3 (continued): Taiwan, the Philippines, Thailand, and Hong Kong

FIGURE 8.4 Bilateral Nominal Exchange Rate and Relative Price Changes Against the Dollar, 1985–1994 (cumulative percent)



NOTE: Positive values indicate domestic currency appreciation relative to U.S. dollar or higher domestic CPI inflation relative to U.S. CPI inflation.

tion of its currency is entirely associated with a large rise in the price level (49 percent relative to the United States). While both Malaysia and Indonesia experienced real exchange rate depreciations since 1985, they were effected in quite different ways. Malaysia had a relatively trendless nominal exchange rate peg but slow price growth—7 percent less than the United States over the period. Indonesia's currency, by contrast, depreciated more than 51 percent in nominal terms, which, combined with a relative price level rise of 24 percent, led to a 27 percent real depreciation.

Explaining Low Inflation

We have argued above that exchange rate pegging has not worked as a mechanism to dampen inflation for many of East Asian countries. In general, those countries such as Taiwan and Singapore that allowed their currencies to appreciate in the face of capital inflows and other factors tended to have lower inflation rates. Thus exchange rate pegging has made it more difficult to maintain low rates of inflation than would have been the case if their exchange rates had been more flexible.

The question remains why East Asian countries generally had low inflation rates, particularly in comparison to other developing regions of the world. In the 1980s inflation in the region averaged 7 percent, close to the average for the industrial countries, but well below the average of nearly 30 percent for developing countries as a group, or the average of more than 50 percent for Latin America.

Inflation Bias[13]

Recent research suggests that an inflation bias will arise in economic policy if the perceived benefits exceed the costs. The perceived benefits from inflation will be higher if output growth is less than desired, or if political conditions raise the incentive to finance large budget deficits through inflationary policies. The costs of inflation will tend to be higher if an economy is highly open and high inflation leads to a loss of international competitiveness.

The perceived benefits from inflation in East Asia appear to be lower than in other regions. One reason is that the average growth of GNP per capita of over 5 percent from 1965 to 1990 in East Asia was more than twice that of other regions of the world (including the industrialized economies). Taiwan, Indonesia, Hong Kong, Singapore, and Korea are five of the top six countries in the world in terms of GDP per capita growth since 1965. Under these circumstances, there is less pressure to boost economic growth temporarily through a surprise inflation.

A second reason is that budget deficits in emerging Asian economies are by and large sustainable, or easily financed through conventional means. This implies less incentive to inflate in order to monetize public deficits than in countries with less sustainable fiscal deficits. For example, money creation as a percentage of GDP was always less than 4 percent in Malaysia, Thailand, and Korea between 1970 and 1989. In Argentina, Mexico, and Zaire—three economies with high average inflation rates over this period—money creation often exceeded 8 percent of GDP and at some points during the period exceeded 10 percent.

A number of factors have limited fiscal deficits in East Asia. In some cases the size of budget deficits is limited by law. For example, in Thailand deficits are limited to a small percentage of the year's total expenditure, and there is a cap on the percentage of the budget that can be spent servicing the foreign public debt. Budget authorities also must consult the central bank to assess the inflationary impact of budget deficits. In Indonesia, expenditures have been limited to the amount financed by domestic revenues and foreign aid since 1967.

Budget deficits also have been curbed by insulating the budget process from political pressure. For example, in Thailand and Indonesia, detailed budget formulation is primarily the responsibility of civil servants rather than politicians, and parliamentary rule restricts the legislature's ability to alter the budget. Some of the more successful Asian economies also have been able to avoid central bank subsidies to banks or large state enterprises. This type of financing often is not reflected in budget data, but it can be highly inflationary.

The inflationary impact of budget deficits has been limited even in those cases where the deficits are large. For example, Malaysia's very rapid growth and high rates of private saving allowed it to sustain large fiscal deficits (averaging 11 percent of GNP in the 1980s) without triggering inflation. Rapid growth and private saving increased the demand for money and domestic financial assets, thus raising the proportion of the deficit that could be financed by printing money without inflation, as well as the overall level of government borrowing that was willingly financed by domestic and foreign residents.

Turning to the costs of inflation, the dependence of emerging Asian economies on international trade implies that high inflation may generate relatively high economic costs if it results in real exchange rate appreciation and a corresponding loss of international trade competitiveness. Moreno (1994b) observes that emerging Asian economies are highly open—the ratio of exports plus imports to GNP ranges from a low of about 30 percent for the Philippines and Indonesia to a high of 260 percent for Singapore—and also that greater openness in these economies is associated with lower infla-

tion—the Philippines and Indonesia have the highest rates of inflation, while Singapore has the lowest. Comparing the Asian and Latin American economies, he finds that the former are on average far more open and have less inflation than the latter. Using more formal statistical analysis for a large sample of countries for the period since 1973, Romer (1993) supports this conclusion by showing that openness (as measured by the ratio of imports to output) is significantly associated with lower inflation.

Precommitment Mechanisms

The above discussion argues that a smaller inflation bias helps explain why Asian countries have lower inflation rates. Nevertheless, to the extent that some inflation bias remains, policymakers will find it difficult to credibly precommit to noninflationary policies that maximize social welfare. The reason is that agents know that once price setting agreements are made in an economy, it will be in the central bank's best interest to inflate. Inflationary expectations will be set accordingly, and the inflation rate will be too high from the point of view of social welfare. It is therefore of interest to inquire whether, in addition to having a smaller inflation bias, Asian economies have adopted institutional mechanisms that allow credible commitments to noninflationary policies. Such institutional mechanisms include (1) a credible commitment to a nominal policy rule, such as an exchange rate or monetary target; (2) an independent monetary authority with a conservative central bank governor; and (3) long-lived policymakers or governments which will be around to bear the long-run costs of inflation and not just its short-term benefits.

The extent to which East Asian economies use nominal targets to limit inflation varies. As demonstrated in the third section of this chapter, although these economies peg the exchange rate against the dollar to varying degrees, such pegs were not always conducive to stabilizing inflation. A number of Pacific Basin economies adopted monetary targets, and the massive efforts at sterilization reported above suggest that excessive growth in monetary aggregates is an important policy concern. Nevertheless, it is not clear that such monetary targets were explicitly used as a commitment device to limit inflation.[14]

It is often suggested that delegating monetary policy to a central banker who is particularly adverse to inflation, and insulating the central bank from political pressure, allow a credible longer-term policy commitment that can solve the inflation bias. This view is supported by statistical evidence that the legal and operational independence of the central bank is associated with low inflation rates among industrial economies (Cukierman, Webb and Neyapti 1992).

However, central bank independence does not help explain the low-inflation performance of East Asia. Moreno (1994b) observes that central banks in emerging Asian economies are not legally independent as a rule. Using Cukierman et al.'s measure (an index giving higher legal independence for long terms to central bank CEOs, independent instrument-setting authority, an explicit price-stability objective, and restrictions on central bank lending to the public sector), Moreno calculates an average independence index value for East Asian economies of about 3.0, slightly lower than the 3.3 average for all developing economies, and well below the values of 6.9 for Germany and 4.8 for the United States. However, average inflation in East Asia was much lower than the 29 percent rate for all developing countries. The contrast is even more striking when comparing East Asian economies to Latin America, where the independence index averaged 3.6 and inflation averaged 55 percent.[15]

It is also possible to avoid the inflation bias problem if policymakers value their reputations or are penalized heavily for deviating from a low-inflation policy. The stability and long-lived nature of most of the governments in East Asia means that reputation effects may be more important than in other parts of the world.

To make this argument concrete, suppose that the horizon is infinite and policymakers have a typical loss function where they value output gains and dislike inflation. Consider the case where the government starts by consistently following a noninflationary policy, but then is tempted to deviate and generate an inflation surprise. If an inflation surprise is generated, then the net gain is equal to the one-period gain less the present discounted value of losses in subsequent periods. The lower the discount rate, i.e. the more forward looking is the government, the lower is the present discounted net gain from an inflationary surprise and the more likely the government will continue with the precommitment policy.

Long-lived and more stable governments should ease the inflation bias problem by making longer-term policy commitments credible. Indeed, this is consistent with a body of evidence suggesting that political stability (e.g., few shifts in government) is associated with low inflation rates (Cukierman, Edwards, and Tabellini 1993; Motley 1997). But to what extent do emerging economies in Asia have relatively stable governments that can credibly commit to longer-term policies? Data from a study by Barro and Sala-i-Martin (1995) indicate that political instability, as measured by the frequency of political revolutions and assassinations, was relatively low in those East Asian countries with the best inflation performances—Malaysia, Singapore, Hong Kong, and Taiwan. In Indonesia, Thailand, Korea, and the Philippines, however, political instability was higher than the average of 97 countries in the study. On the other hand, work force instability, as measured by the frequency of strikes, was relatively low for all East Asian countries.

Conclusions

A pegged exchange rate is often seen as an effective device to limit inflation. Asian economies did peg to the U.S. dollar to varying degrees, but this probably does not explain their limited inflation. In the past decade, those economies that allowed their currencies to appreciate against the U.S. dollar experienced relatively less inflation than their neighbors in the region.

Asia's low inflation may be explained in part by the reduction in the inflation bias that resulted from rapid growth, limited budget deficits, and the importance of the traded goods sector. The use of nominal targets as a precommitment mechanism to control inflation was apparently limited. In a number of economies, pegging the exchange rate was not useful in limiting inflation, and while monetary targets were adopted, their role as a precommitment device is not entirely clear. Finally, political stability may have limited inflation by making longer-term policy commitments credible.

Appendix
Exchange Rate Regimes in Pacific Basin Economies, 1980–1994

Indonesia. Since the link with the U.S. dollar was discontinued in January 1976, Bank Indonesia has set the middle rate of the rupiah in terms of the U.S. dollar, the intervention currency, by taking into account the behavior of a basket of currencies of Indonesia's main trading partners. In September 1989, the foreign exchange system was modified so that the exchange rate announced by Bank Indonesia applies only to certain transactions. For all other transactions, banks are free to set their own rates.

Korea. From January 1980 to March 1990, the won was linked to a multicurrency basket (consisting of a trade-weighted basket and a SDR basket), but other factors were also taken into account in setting the exchange rate. The Bank of Korea set a daily exchange rate of the won (Bank of Korea base rate) in terms of the U.S. dollar, the intervention currency. A market average rate system introduced on March 2, 1990, sets the won-U.S. dollar rate on the basis of the weighted average of interbank rates for won-U.S. dollar spot transactions of the previous day. During each business day, the Korean won-U.S. dollar exchange rate in the interbank market is allowed to fluctuate within fixed margins (plus or minus 1 percent in 1994) against the market average rate of the previous day. The won exchange rate against other currencies is determined by the rate at which these currencies trade against the U.S. dollar in the international market. Buying and selling rates offered to customers are set freely by foreign exchange banks.

Malaysia. The value of the ringgit is determined by supply and demand conditions in the foreign exchange market. Bank Negara Malaysia (the central bank) intervenes to maintain orderly market conditions and to avoid excessive fluctuations in the value of the ringgit against a basket of currencies weighted in terms of Malaysia's major trading partners and the currencies of settlement.

Philippines. Prior to October 1984, the central bank intervened to keep the peso exchange rate within a certain target. Since then, the value of the peso has been determined freely in the foreign exchange market. However, the central bank is a major participant in this market and intervenes when necessary to maintain orderly conditions in the exchange market and to support medium-term policy objectives.

Singapore. The Singapore dollar is permitted to float, and its exchange rate is freely determined in the foreign exchange market. However, the Monetary Authority of Singapore monitors the external value of the Singapore dollar against a trade-weighted basket of currencies. Historically, Singaporean authorities have targeted the exchange rate (through intervention) to achieve a domestic inflation goal. Rates for other currencies are available throughout the working day and are based on the currencies' exchange rates against the U.S. dollar in international markets. Banks are free to deal in all currencies, with no restrictions on amount, maturity, or type of transaction.

Taiwan. A managed float was adopted in 1979, involving a daily exchange rate ceiling set by the central bank. The ceiling was abandoned in March 1980, and reestablished in September 1982. Until 1989, the spot central rate of the U.S. dollar against the New Taiwan dollar was set daily on the basis of the weighted average of interbank transaction rates on the previous business day. Daily adjustment of the spot rate was not to exceed 2.25 percent of the central rate on the previous business day. In April 1989, the limits on daily fluctuations of the interbank rate were rescinded, and a new system of foreign exchange trading was established, based on bid-ask quotations.

Thailand. The Thai baht was de facto pegged to the U.S. dollar from 1981 until 1984, when it was devalued. The baht was subsequently pegged to a weighted basket of currencies of Thailand's major trading partners, but the exchange rate can also be influenced by other considerations. The Exchange Equalization Fund announces daily the buying and selling rates of the U.S. dollar for transactions between itself and commercial banks. It also announces daily minimum buying and maximum selling rates that commercial banks must observe when dealing with the public in various currencies. The Exchange Equalization Fund intervenes to keep the relationship of the baht to the basket of currencies within a margin and to maintain orderly conditions in the exchange market.

SOURCES: IMF, *Exchange Arrangements and Exchange Restrictions* and Working Paper version of Moreno (1994a).

Notes

Research assistance by Warren Chiang, Laura Haworth, and Thuan-Luyen Le is appreciated. The views presented in this paper are those of the authors alone and do not necessarily reflect those of the Federal Reserve Bank of San Francisco, the Board of Governors of the Federal Reserve System, or the University of California.

1. In this paper "East Asia" includes the more advanced newly industrialized economies (Korea, Hong Kong, Singapore, and Taiwan), as well as economies in Southeast Asia (Indonesia, Malaysia, the Philippines, and Thailand).

2. The Hong Kong dollar has been pegged at HK$7.80 to the U.S. dollar since 1983.

3. Analogously, much of the trend appreciation of the yen against the U.S. dollar in the past 30 years can be attributed to relatively greater productivity growth in Japan's tradable goods sector.

4. This section draws heavily on Glick and Moreno (1995).

5. Calvo, Leiderman, and Reinhart (1992) investigate capital inflows to ten Latin American countries. Calvo, Leiderman, and Reinhart (1993) compare inflows in these ten countries with those to eight Asian countries—the seven studied here, plus Sri Lanka. Schadler, Carkovic, Bennett, and Kahn (1993) analyze the capital inflow experiences of six developing countries, including one in the Pacific Basin —Thailand. Bercuson and Koenig (1993) examine capital flow episodes in Thailand, Malaysia, and Indonesia.

6. The data come from the IMF's *International Financial Statistics* or from national sources in the case of Taiwan. For further details about all data presented in this section, see Glick and Moreno (1995). Hong Kong is excluded from Figure 8.2 because of only partial availability of current account and capital account data.

7. Balance of payments accounting implies that the capital account surplus (i.e. net capital inflows) equals the current account deficit (i.e. the excess of domestic expenditures over income) *plus* the increase in official reserve assets.

8. Hong Kong had very large trade balance surpluses beginning in 1989, with reserve accumulation reaching 9 percent of GDP in that year.

9. Hong Kong also experienced capital inflow surges in 1987 and 1988, as speculators anticipated appreciation against the U.S. dollar. Hong Kong authorities ended the speculation by adopting a scheme that paid negative interest rates on foreign deposits. See Moreno (1990).

10. Frankel (1994) discusses how the success of sterilization depends on the nature of the shocks inducing capital inflows. Sterilization is likely to be more effective, he argues, at least in the short run, when shocks take the form of lower foreign interest rates, as in the case of East Asia, than when they take the form of increased domestic money demand, as in the case of inflation stabilization programs in Latin America.

11. Broad money is defined as the sum of "money" (currency and demand deposits held by the private sector) and "quasi-money" (time and savings deposits), both as measured by the IMF. It is equivalent to the M2 concept of money.

12. In Hong Kong's case, the determination of the general price level and real exchange rate is complicated by changes in the demand for nontraded goods and assets such as real estate arising from political and economic factors associated with its impending reunification with China.

13. This discussion draws on World Bank (1993) and Moreno (1994b).

14. One difficulty is that the objectives of monetary policy in East Asian economies are not limited exclusively to controlling inflation (with the possible exception of Singapore). Like many other central banks (including the Federal Reserve System), East Asian central banks must reconcile a mix of policy objectives, including growth, low inflation, and balance of payments stability.

15. More generally, these observations are consistent with Cukierman et al.'s (1992) failure to find a negative association between independence and inflation for the group of developing countries. The positive association seems only to hold among the group of industrialized countries.

References

Barro, Robert, and Xavier Sala-i-Martin. 1995. *Economic Growth.* New York: McGraw Hill.

Bercuson, Kenneth, and Linda Koenig. 1993. "The Recent Surge in Capital Inflows to Asia: Cause and Macroeconomic Effects." Occasional Paper No. 15. Kuala Lumpur: South East Asian Central Banks.

Calvo, Guillermo, Leonardo Leiderman, and Carmen Reinhart. 1993. "The Capital Inflows Problem: Concepts and Issues." IMF Paper on Policy Analysis and Assessment, PPAA No. 93/10. Washington, D.C.: International Monetary Fund.

———. 1992. "Capital Inflows and Real Exchange Rate Appreciation in Latin America: The Role of External Factors." *IMF Staff Papers* 40(1): 108–51.

Cukierman, Alex, Sebastian Edwards, and Guido Tabellini. 1993. "Seigniorage and Political Instability." *American Economic Review* 82(3): 537–55.

Cukierman, Alex, Steven B. Webb, and Bilin Neyapti. 1992. "Measuring the Independence of Central Banks and Its Effects on Policy Outcomes." *World Bank Economic Review* 6(3): 353–95.

Frankel, Jeffrey. 1994. "Sterilization of Money Inflows: Difficult (Calvo) or Easy (Reisen)?" IMF Working Paper No. WP/94/159. Washington: International Monetary Fund.

Frankel, Jeffrey A., and Shang-Jin Wei. 1994. "Yen Bloc or Dollar Bloc: Exchange Rate Policies of the East Asian Economies," in Takatoshi Ito and Anne Krueger, eds., *Macroeconomic Linkage: Savings, Exchange Rates, and Capital Flows.* Pp. 295–329. Chicago: University of Chicago Press. Previously issued as Working Paper No. PB93-01, Federal Reserve Bank of San Francisco, Center for Pacific Basin Monetary and Economic Studies.

Glick, Reuven, and Ramon Moreno. 1995. "Capital Flows and Monetary Policy in East Asia," in Hong Kong Monetary Authority, ed., *Monetary and Exchange Rate Management with International Capital Mobility: Experiences of Countries and Regions Along the Pacific Rim.* Pp. 14–48. Previously issued as Working Paper No. PB94-08. Federal Reserve Bank of San Francisco, Center for Pacific Basin Monetary and Economic Studies.

Moreno, Ramon. 1994a. "Exchange Rate Policy and Insulation from External Shocks: The Cases of Korea and Taiwan, 1970–1990," in Reuven Glick and Michael Hutchison, eds., *Exchange Rate Policy and Interdependence: Perspectives from the Pacific Basin.* Pp. 138–58. New York: Cambridge University

Press. Previously issued, with additional appendices, as Working Paper No. PB93-05. Federal Reserve Bank of San Francisco, Center for Pacific Basin Monetary and Economic Studies.

———. 1994b. "Explaining Asia's Low Inflation." Federal Reserve Bank of San Francisco, *Weekly Letter,* November 4.

———. 1990. "Monetary Lessons of Hong Kong." Federal Reserve Bank of San Francisco, *Weekly Letter*, September 7.

Motley, Brian. 1997. "Growth and Inflation: A Cross-Country Study." *Economic Inquiry*, forthcoming.

Romer, David. 1993. "Openness and Inflation." *Quarterly Journal of Economics* 108(4): 869–904.

Schadler, Susan, and Maria Carkovic, Adam Bennett, and Robert Kahn. 1993. *Recent Experiences with Surges in Capital Inflows*. IMF Occasional Paper No. 108. Washington, D.C.: International Monetary Fund.

World Bank. 1993. *The East Asian Miracle.* New York: Oxford University Press.