

Chapter 5

Managing macroeconomic interdependence

Asia is growing together, with tighter trade, investment, and financial links both driving and reflecting this increasing macroeconomic interdependence (as detailed in chapters 3 and 4). Each economy's macroeconomic variables—such as economic growth, inflation, and exchange rates—are increasingly affected by the shocks that neighboring economies experience and the policies they adopt. This bolsters the need to improve information sharing, to strengthen mutual surveillance, and to coordinate macroeconomic policies, such as monetary, fiscal, and exchange rate policies. New regional forums for policy dialogue have already emerged. The foundations for mutual financial support are also in place—the CMI, in particular, has led to the creation of a network of bilateral swap arrangements to help cope with future financial crises. But are existing arrangements adequate? Or do the region's policy makers need to cooperate more closely to improve economic performance and enhance stability—and if so, how?

Macroeconomic interdependence is the degree to which individual economies interact with each other. This can be measured in all sorts of ways, but among the most important is the intensity with which macroeconomic variables—output and prices in particular—affect each other across national borders. Output and price correlations need not be positive, but normally, where economies share similar industries and face common shocks, they can be expected to move more closely with each other. Vertical integration through intrafirm trade and FDI also ought to increase the synchronization of output movements. Common shocks may come on the demand side, e.g., if Asian economies all produce electronics and global demand for electronics picks up, all will tend to expand. They may also occur on the supply side if the prices of crude oil and raw materials rise

substantially, Asian economies will tend to slow. Such shocks may originate outside a region, as with the two global shocks just described, or they may be specific to a region or an individual country within it. For example, a stock market collapse in one country may cause investors in neighboring economies to sell off shares, or a consumption boom in one country may suck in imports from its regional trading partners, also boosting their economies.

But the nature and degree of interdependence also hinge on the broad policy environment. For example, a price shock is more likely to spread from one economy to another if both operate with a fixed exchange rate. Likewise, a financial shock in one economy will have a greater impact on another's capital markets if both economies permit greater capital mobility between their markets. And as macroeconomic interdependence grows, policy coordination becomes increasingly beneficial. Policy makers can no longer pursue optimal policy without taking into account neighboring economies' actions.

Policies and interdependence reinforce each other in other ways. For example, a region that trades a lot with itself would gain from policies to foster integrated financial markets in which agents can better manage geographic risks. It would also gain from insulating real exchange rates (relative prices adjusted for nominal exchange rates) from erratic temporary fluctuations, making them a more efficient signal for resource allocation. Asia must now seriously consider this interplay of interdependence and collective policy response. It needs to manage its growing exposure to external shocks better—both to reduce the economic volatility and risks that they generate and to create an environment in which regional links can continue to deepen.

The rest of this chapter is organized as follows. Section 5.1 considers how economic links and macroeconomic interdependence in Asia have developed. Section 5.2 reviews recent monetary, fiscal, and exchange rate policies, and examines the stability of real exchange rates in recent years. Section 5.3 discusses Asia's challenges in maintaining growth and stability, while Section 5.4 proposes regional solutions—including policies and institutions—that would help address the challenges of an interdependent region. Section 5.5 concludes. The Appendix contains detailed explanations and documentation of the technical evidence presented in the text.

5.1. Deepening macroeconomic interdependence

There is no single, perfect measure of macroeconomic interdependence, but output and price links are among the most frequently used. This section will first look at these two measures and then discuss how global and regional shocks are transmitted through the region, another measure of interdependence. Interdependence is not a question with a yes or no answer; it is a matter of degree. Thus, interdependence can only be assessed against a yardstick. In this section, Asia's regional macroeconomic interdependence is benchmarked against the precurrency crisis period, as well as against its interdependence with other regions, in particular the EU and US. Evidence will be reviewed, recognizing that different data sets, methodologies, and sample periods have yielded radically different results, underscoring the need to be cautious and tentative in conclusions.

Output links

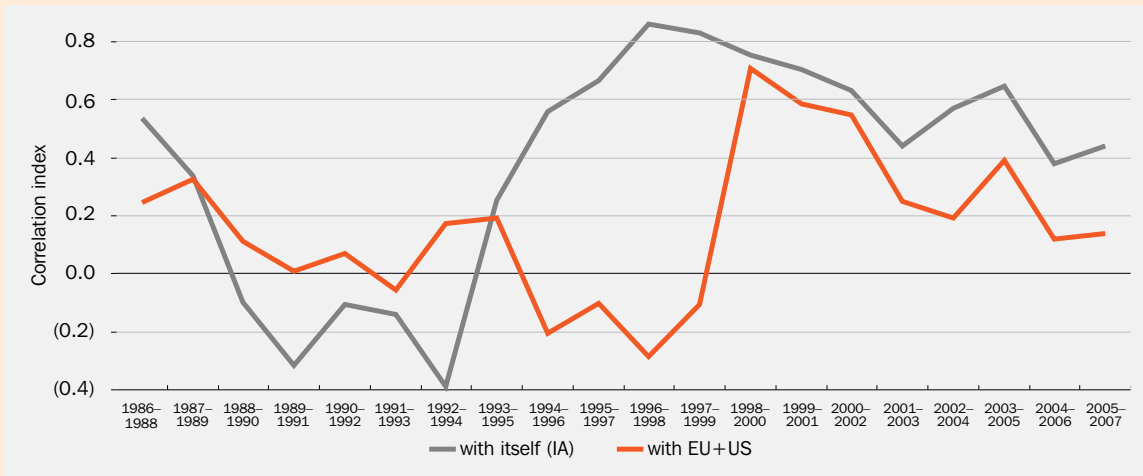
One might expect greater interdependence to lead to similar movements in real variables such as trade, output, and employment. But this is not necessarily so. If interdependence leads economies in a region to become increasingly specialized, their business cycles may become driven by different shocks and determinants and may therefore become more dissimilar (Frankel and Rose 1998). Interdependence need not imply greater co-movements in macroeconomic variables.

Yet there are at least two good reasons to believe that interdependence is creating a co-movement of macroeconomic variables in Asia. First, as Asian economies develop tighter trade, investment, and financial links, their markets are becoming increasingly important drivers of regional economic activity. Second, because most trade within Asia consists of intra-industry trade in parts and components, it propagates common, industry-specific shocks across the region.⁵⁶ Third, because Europe and the US remain the main export markets for Asia's final goods—accounting for nearly half of total exports—external demand shocks to Asian economies tend to be similar.⁵⁷ Many recent studies suggest that the synchronization of

⁵⁶ More than 70% of intra-Asian trade is said to consist of intermediate goods used in production (ADB 2007a).

⁵⁷ Rana (2007) shows that intra-industry trade is an important factor explaining the positive output correlations in Asia.

Figure 5.1. Output correlation of Integrating Asia
 Reactions by type of shock per month pre- and post-crisis



EU = European Union, IA = Integrating Asia, US = United States.

Notes:

Sample period: 1986:Q1–2007:Q3 12 quarter moving average. Other details of the correlation analysis are in Methodological Notes 5.1 in the Appendix to this chapter.

Source: Asian Development Bank staff computations. Data from Oxford Economics 2008. Forecasting and Analysis. Available: http://www.oef.com/OE_FA_IntMac.asp; and Bureau of Economic Analysis 2008. National Income Accounts. Available: <http://www.bea.gov/national/index.htm> (accessed February 2008).

Asian business cycles has greatly increased (McKinnon and Schnabl 2002, Kawai and Motonishi 2005, ADB 2007a). Some simple measures of output co-movements, based on quarterly GDP data, are presented in Figure 5.1 (technical details and more results are presented in Methodological Note 5.1 and Figure A5.1 in the appendix to this chapter).

Figure 5.1 shows that, when using 3-year moving averages, the correlation of quarterly GDPs among integrating Asian economies has greatly increased in recent years.⁵⁸ The sharp rise in the correlation in the late 1990s was largely due to the crisis, but, after a brief dip, the correlation has remained strong. The average correlation coefficient of quarterly GDP has risen from a mere 0.07 before the crisis to 0.54 after it.

Asian economies appear to be increasingly interdependent—with each other, and with the rest of the world. A closer look (as reported

⁵⁸ Integrating Asia in this exercise include Japan; the PRC; Hong Kong, China; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; and Thailand.

in Figure A5.1 in this chapter's appendix) suggests that the increase reflects stronger ties with the US, despite the fact that the share of the US market in Integrating Asia's exports declined from 35% in 1986 to 18% in 2006. The increase may also reflect the nature of much of Asia's intraregional trade, which is driven by the vertical integration of production chains, with the US remaining the main destination for final goods.

Empirical studies differ on the extent to which Asian business cycles have become more autonomous. Some find that business cycles have become more synchronized globally as a result of strengthening trade and financial links, and that cyclical swings in global economic conditions—particularly in the US economy—still exert significant influence on Asia.⁵⁹ The International Monetary Fund (IMF) notes that the nature of global interdependence differs significantly according to the type of shock (IMF 2007b). If, for instance, a US recession is caused by a global shock, the rest of the world is also likely to suffer. In other cases, economic developments in the rest of the world are becoming more independent of those in the US. The same study also finds that regional factors are increasingly important relative to global ones in determining macroeconomic outcomes.⁶⁰

Price links

Foremost among the drivers of regional integration during the last decade has been intraregional trade (Urata 2007b). Coupled with this, lower trade barriers are stitching together national markets for goods and services. This has promoted greater arbitrage in tradable goods prices; it should also have strengthened the links through which price shocks are transmitted from one economy to another.

Evidence indicates that price links in Asia are stronger than before the crisis. Looking at the correlation of quarterly detrended consumer prices of one economy with another's, adjusted for nominal exchange rate changes, the average for 12 Asian economies and for all pairs increased from 0.10 in 1988–1996 to 0.39 in 1999–2007. (Methodological Note 5.2 and Table A5.1 in the appendix to this chapter supply technical details and bilateral correlations.) Stronger price links indicates either that individual Asian economies face price shocks that are more similar than they had been previously, or that

⁵⁹ See, for a survey, ADB (2007a) and IMF (2007b).

⁶⁰ The difficulty of disentangling these conflicting influences may explain why some studies have yet to find evidence of the growing independence of Asian business cycles from the US cycle (Rana [2007]; Kawai [2007b]; and Dees and Vansteenkiste [2007]).

price shocks in one part of the region are being transmitted to others with greater force.

But this increased correlation is only indicative, because correlation can be spurious—Asian economies could be responding to similar exogenous shocks, rather than to shocks transmitted from one Asian economy to another. In practice, many factors affect consumer prices, not just external price shocks. Some of the large correlations observed for India, the country believed to be among the least integrated in the region, may well be spurious. And some of the small correlations observed for Singapore, the country believed to be among the most integrated, may appear puzzling. But the correlation of two detrended price series need not reflect the trade integration of their economies, because greater price arbitrage should result in a smaller deviation between price levels, and not necessarily lead to a higher correlation of shocks to the price level. What is remarkable, though, is the consistently large correlations observed for the PRC and Japan, the region's two largest economies. The average correlation for the post-crisis period was 0.46 for Japan (compared with -0.07 before) and 0.53 for the PRC (0.33 previously). The correlation may mean that price shocks originating in the two economies are now significantly influencing price developments in their regional trading partners. Coupled with the overall increase in consumer price correlations for the region, this is further evidence of growing macroeconomic interdependence in Asia.

Transmission of shocks

Another aspect of interdependence is how a shock is transmitted from one economy to another. This might entail a supply shock—such as a policy reform or technological improvement that boosts supply or an oil price rise or natural disaster that dents it—or a demand shock—such as an increase in government spending or a fall in investor confidence that slows domestic capital formation. Such shocks could originate either within or outside the region. Whatever the shock, the issue for Asia is how it might impact output in individual economies.

Vector autoregression (VAR) is a standard statistical procedure for investigating how shocks are transmitted from one entity to another. Using VAR, a shock that originates within the region (a regional shock), a shock that originates in the rest of the world (a global shock), or Japan (a “Japan shock”)—which is considered separately because Japan accounted for a large share (as much as 60% in 1990) of total regional output—have been considered. How

regional output responded to these shocks before and after the crisis was then analyzed.⁶¹

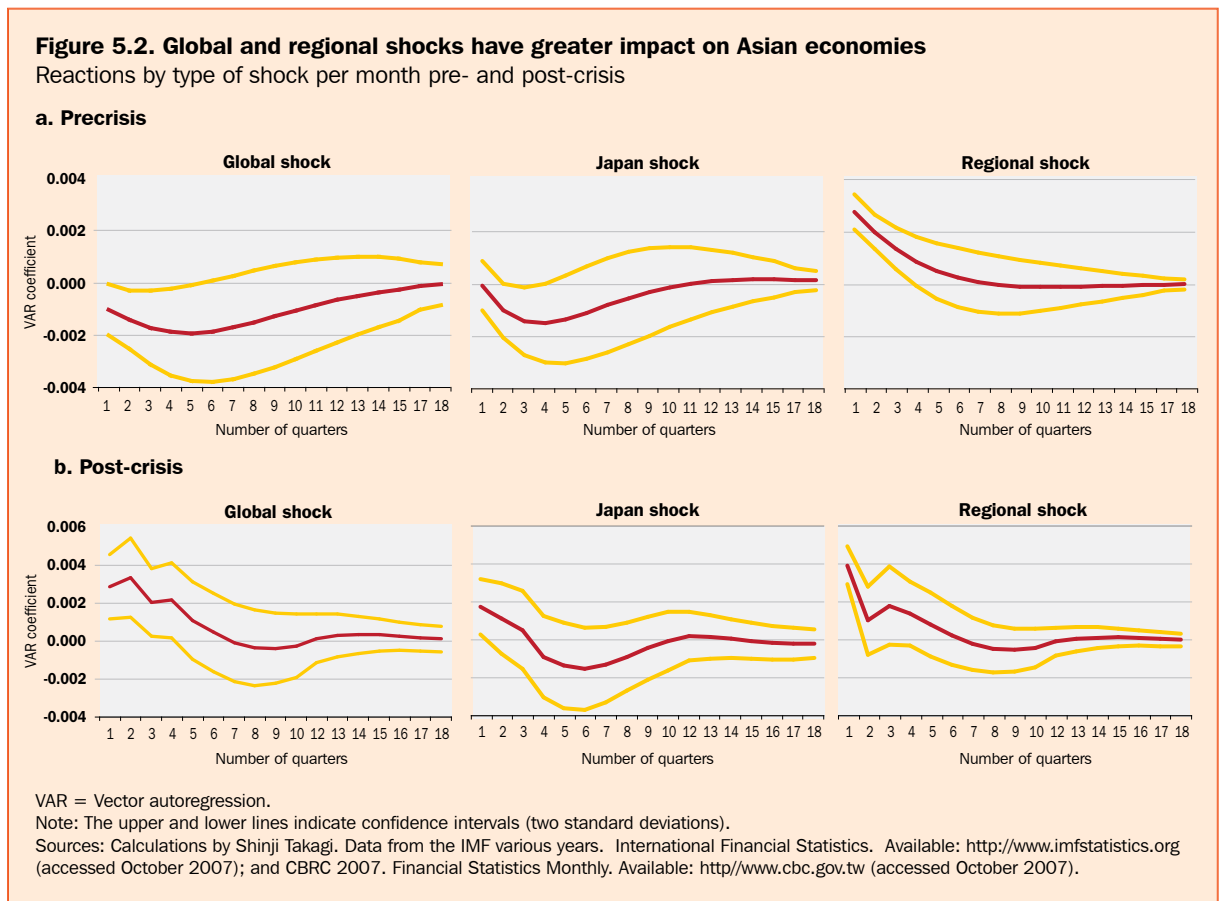
The VAR analysis indicates that before the crisis, almost 90% of the variance of Asia's GDP (outside Japan) was explained by a regional shock, but that this fell to 60% after the crisis (Methodological Note 5.3 and Figure A5.2 in the appendix to this chapter provide details). The determination of Asia's GDP became more autonomous, as the share of the long-run output variance explainable by a global shock declined (from 50% to 40%). Before the crisis, output responded significantly only to a regional shock (Figure 5.2). If anything, the response to a global or Japan shock was negative. Since the crisis, though, regional output has become significantly responsive to all shocks, and the response to a global shock, as well as a Japan shock, became positive.

Kim and Lee (2008) provide further evidence that Asia's global and regional macroeconomic interdependence may be growing using a panel VAR framework for a slightly different set of countries.⁶² Their model repeated the analysis for each of the Asian economies, with the region in each case comprising the rest of Asia. They find that, for the precrisis period of 1990–1996, a global shock had no impact on domestic output, while a regional shock had a negative effect. In the post-crisis period of 2000–2007, however, both global and regional shocks had a significantly positive impact on domestic output.

Thus several strands of evidence suggest that regional interdependence has increased in terms both of output and price correlations and of the long-run variance of output explainable by shocks originating within the region. But, somewhat surprisingly, the region's dependence on the global economy appears not to have diminished. Output correlations with the world have increased, a greater portion of the current output variance is explained by a global shock, and Asia's output has become more responsive to a global shock. In other words, through its deeper integration with international markets, Asia appears to have become more exposed to shocks within the region, while remaining sensitive to those from outside it.

⁶¹ Here, Asia includes the PRC; Hong Kong, China; India; Indonesia; Japan; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; and Thailand. The rest of the world comprises the United Kingdom; the US; and six European economies: Belgium, France, Germany, Italy, the Netherlands, and Spain. The pre-crisis period refers to Q1:1988–Q4:1996; the post-crisis period covers Q1:1999–Q4:2006.

⁶² For Asia, Kim and Lee (2008) excluded India from the sample. The rest of the world comprises the Group of 7 countries, except for Japan.



There has been a heated debate on whether Asia is decoupling from the global business cycle and the US's in particular (see ADB [2007a]). Proponents say that, with recent growth and integration, the importance of regional demand as a driver of Asia's economic growth has increased. Opponents argue that, with the commitment to openness and the importance of the EU and US markets as destinations for final goods exports, Asia's economic links with the rest of the world have intensified. The debate misses the possibility that both are true. National determinants—the third possible driver—could have diminished relative to regional and global forces in the face of greater openness.

5.2. Macroeconomic policies

The evidence of growing macroeconomic interdependence may lead to the expectation that macroeconomic policies have also converged. Is such a convergence borne out by evidence? This section will show that, except when the region's economies reacted in a broadly similar fashion to the large common shock of the currency crisis in the late 1990s, macroeconomic policies in the region have been far from convergent. Real exchange rates, though, have been relatively stable, given the—until recently—benign external environment of price and exchange rate stability. Yet, the section concludes that, if left unchanged, the divergence of policies may undermine real exchange rate stability, and hence the macroeconomic stability of an increasingly integrated region.

GDP growth

The growth performance of the region's economies reflects, in part, the wide diversity in economic conditions. Figure 5.3 shows average GDP growth rates for Integrating Asia for the two most recent 4-year periods: 2000–2003 and 2004–2007. The region's economies grew by an average of 3.5% a year in 2000–2003 and 5.5% in 2004–2007, with considerable differences across countries.⁶³ Differences in growth rates have led to big changes in some economies' shares of aggregate regional output. For instance, while Japan's share has fallen from about 60% in 2000 to 50% in 2007, the PRC's has risen from 15% to almost 25% during the same period. As developing Asian economies are generally growing faster than more advanced ones, living standards, if not growth rates, are converging.

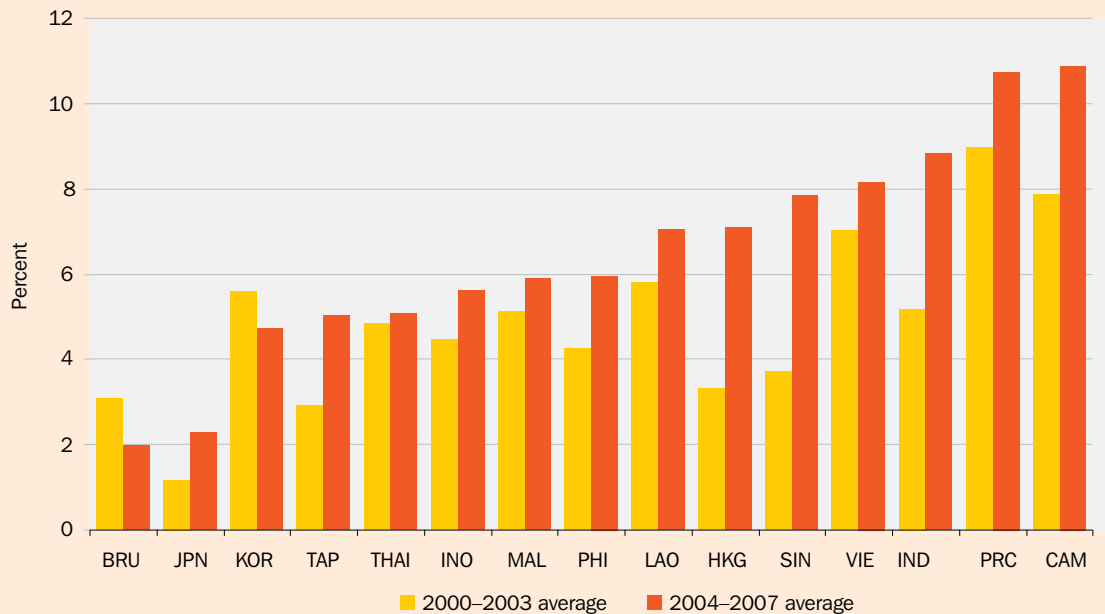
Monetary policy

Along with the lack of monetary policy coordination across the region, inflation tends to vary widely (Figure 5.4). From 2000 to 2003, inflation remained subdued throughout the region, averaging 2.7% across Integrating Asia, as most economies had excess capacity following the crisis. Monetary policy was mostly directed at supporting weak domestic demand, especially given the need for fiscal consolidation in many countries. In this respect, economies' monetary policy stance—or interest rate cycle—was reasonably synchronized.

⁶³ The inclusion of Japan, by far the largest Asian economy, with an average GDP growth rate of 1.2% in 2000–2003 and 2.3% in 2004–2007, lowers the regional average. Excluding Japan, the growth rates are 6.5% and 8.3%, respectively.

Figure 5.3. Variations in Asia's growth rates

GDP 4-year averages, 2000–2007



BRU = Brunei Darussalam; CAM = Cambodia; GDP = gross domestic product; HKG = Hong Kong, China; IND = India; INO = Indonesia; JPN = Japan; KOR = Republic of Korea; LAO = Lao People's Democratic Republic; MAL = Malaysia; PHI = Philippines; PRC = People's Republic of China; SIN = Singapore; TAP = Taipei, China; THAI = Thailand; VIE = Viet Nam.

Notes:

GDP growth rates for 2000 are based on 1993 prices; growth rates from 2001 on are based on 2000 prices.

Growth rates from 1999 to 2000 are based on 1987 prices; growth rates from 2001 on are based on 2000 prices.

For fiscal year April–March. No data available for 2006 and 2007.

Figures for 2004–2006 are not linked to the GDP figures 2003 backwards due to National Statistics Office revisions for sectoral estimates.

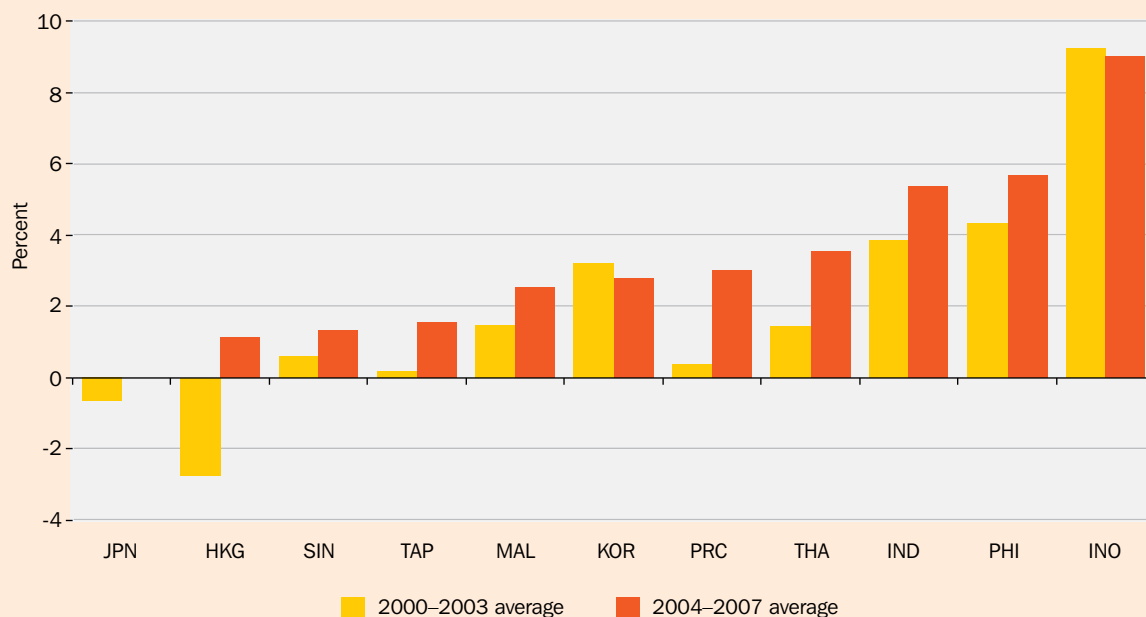
Actual 2007 figures for Japan, Republic of Korea, Indonesia, Philippines, and Singapore; ADB forecasts for the other economies.

Excludes Brunei Darussalam and Myanmar for all years as weights are unavailable.

Sources: Data from the ADB 2007a. *Key Economic Indicators*. Available: <http://www.adb.org> (accessed May 2008).

Conditions began to change in 2004, with the strengthening of economic activity and a rise in commodity prices. The monetary authorities of several economies—such as the PRC; India; Indonesia; Malaysia; Taipei, China; and Thailand—responded to inflationary pressure by tightening policy somewhat. Inflation became a concern in the PRC, India, and Indonesia. Following the US Federal Reserve's lead in mid-2004 but with some lags, a few countries, such as Indonesia and Thailand, raised interest rates substantially. Others, such as the Republic of Korea, did so more modestly, but all remained careful not to undermine weak domestic demand. Monetary policy has since

Figure 5.4. Variations in Asia's inflation
(2000–2007)

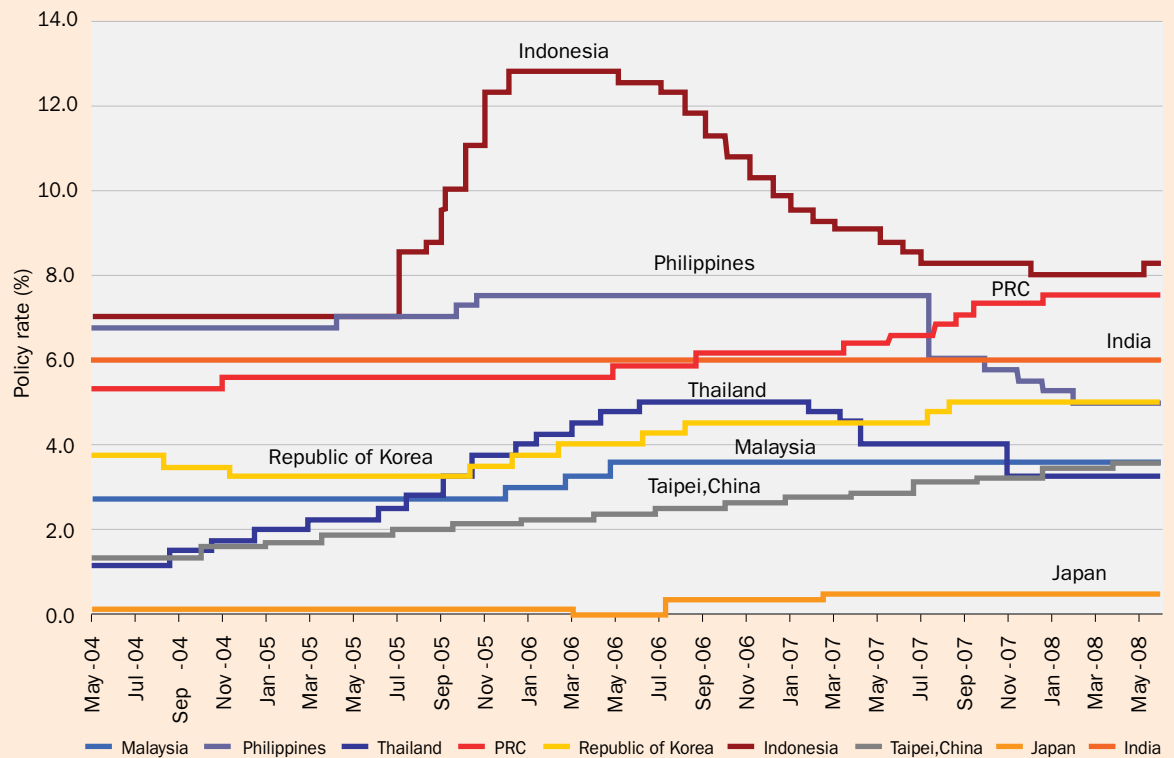


HKG = Hong Kong, China; IND = India; INO = Indonesia; JPN = Japan; KOR = Republic of Korea; MAL = Malaysia; PHI=Philippines; PRC = People's Republic of China; SIN=Singapore; TAP=Taipei,China; THA=Thailand.

Sources: Data from the ADB 2007c. *Key Indicators 2007*. Available: <http://www.adb.org> (accessed May 2008); IMF various years. *International Financial Statistics Online* and IMF 2008. *World Economic Outlook* database. Available: <http://www.imf.org>; and national sources (accessed May 2008).

diverged more, not least since the US began cutting interest rates in the second half of 2007 in response to the unfolding “credit crunch.” But while some Asian economies were cutting rates in response to falling inflation pressures and weak domestic demand, others began to tighten monetary conditions (Figure 5.5).

Although monetary policy remained loose until recently, inflation generally declined across the region to an average 2.6% of in 2007. This reflected—in part—a benign environment, and was also due to an improvement in macroeconomic institutions. The Republic of Korea, the Philippines, and Thailand adopted a formal inflation-targeting framework. In other countries, such as Malaysia and Singapore, authorities acted prudently within a macroeconomic policy framework that gives paramount weight to price stability. Although both inflation and interest rates vary across the region, their variance has tended to decline over time (Figure 5.6).

Figure 5.5. Policy rates in selected integrating Asian economies


GDP = gross domestic product, PRC = People's Republic of China.

Notes:

Policy rates are as follows: Base rate (Hong Kong, China); Bank of Indonesia rate (Indonesia); reverse repo rate (India); overnight call rate (Japan); overnight call rate (Republic of Korea); overnight policy rate (Malaysia); reverse repurchase rate (Philippines); official discount rate (Taipei,China); and 1-year lending rate (PRC). Bank of Thailand switched its benchmark from 14-day to 1-day reverse repurchase rate on 17 January 2007.

Sources: Data from various sources and Bloomberg 2008. Available: <http://www.bloomberg.com/> (accessed June 2008).

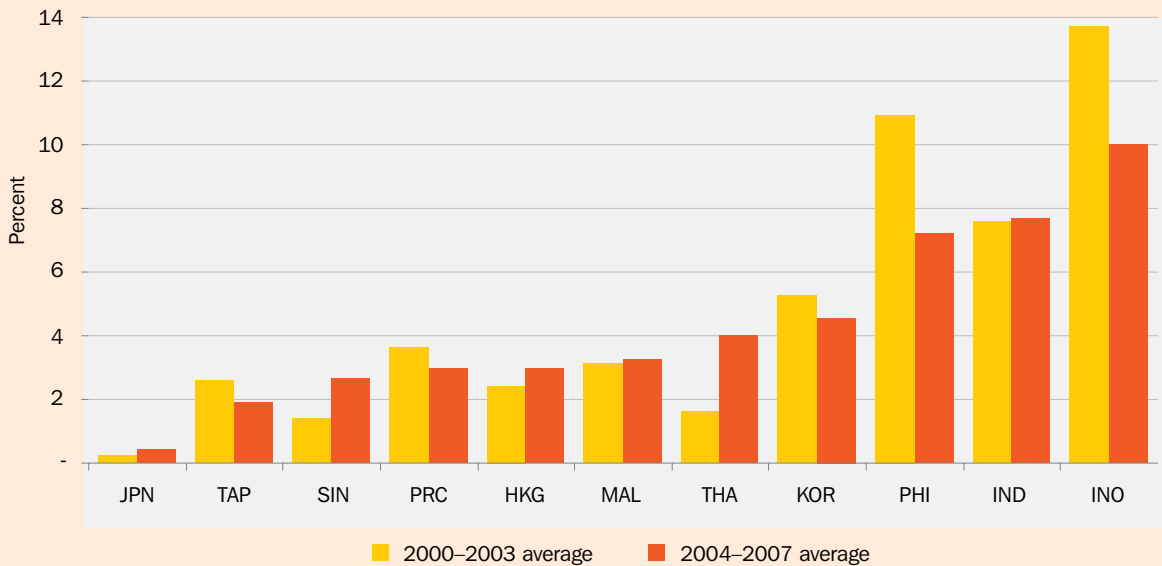
Fiscal policy

Asian economies' fiscal policy stance has also differed somewhat, albeit much less so than the stances on monetary policy. More important for the region's macroeconomic stability is governments' varying room for fiscal maneuver, because this frames how different economies can respond to future shocks that affect the region.

In the aftermath of the crisis, fiscal positions in Asia deteriorated sharply, and public debt soared. Since then, the region's authorities have made restoring fiscal discipline a priority. Even when growth weakened at the turn of the century, governments eased fiscal policy

Figure 5.6. Variations in Asia's interest rates

Three-month interest rates, 4-year averages, 2000–2007



HKG = Hong Kong, China; IND = India; INO = Indonesia; JPN = Japan; KOR = Republic of Korea; MAL = Malaysia; PHI = Philippines; PRC = People's Republic of China; SIN = Singapore; TAP = Taipei, China; THA = Thailand.

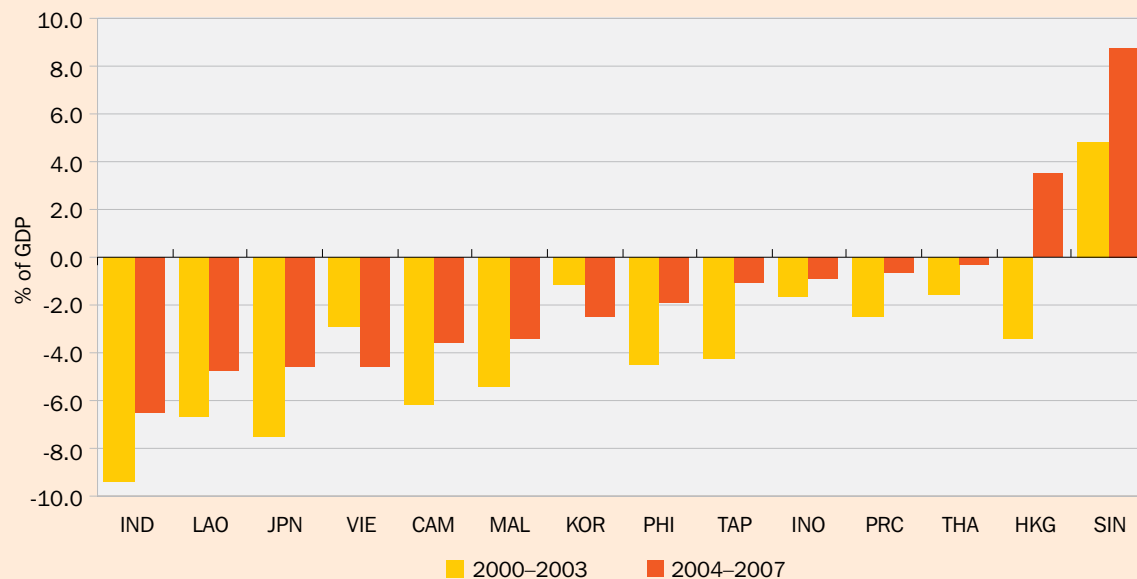
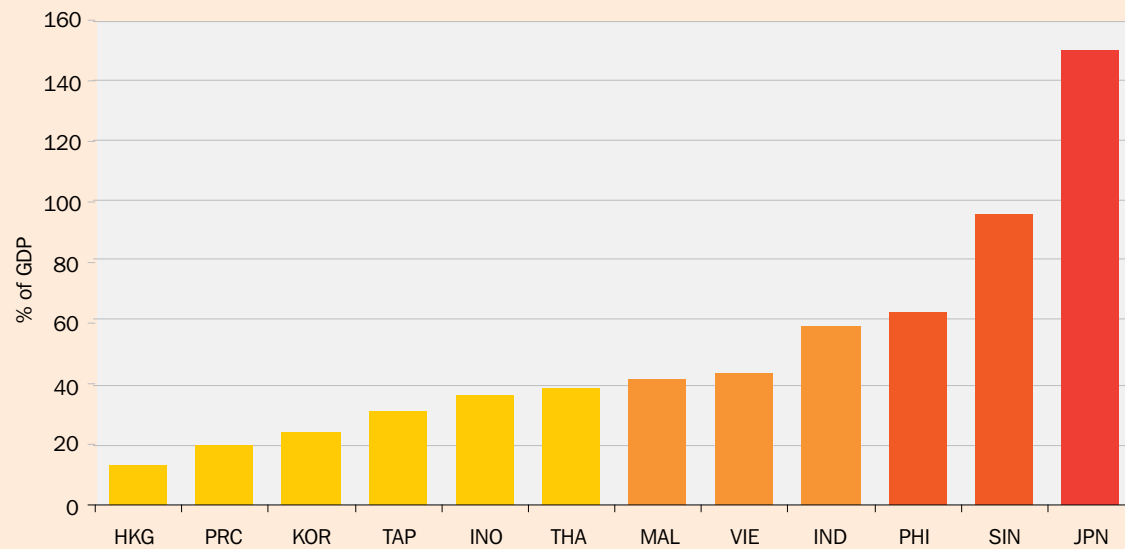
Note: 2001 and 2002 data are not available for Thailand.

Source: Bloomberg 2008. Available: <http://www.bloomberg.com/> (accessed May 2008).

only modestly. Fiscal deficits deteriorated in 2001 across Asia—except, notably, in the PRC, Malaysia, and Thailand—but quickly improved in several countries in 2002. When economic activity strengthened, almost all economies began to tighten policy, though large deficits remained in some.

For the most part, fiscal policy has remained conservative in 2000–2007. Indonesia, the Republic of Korea, Malaysia, and Thailand in particular have steadily pursued fiscal consolidation. Public debt levels in the region as a whole have fallen to their lowest since 2000. But authorities are aware that these efforts are not sufficient in view of the prospective costs of aging populations. Fiscal consolidation has been less successful in India, Japan, and the Philippines, where public debt has reached critically high levels (Figure 5.7a).

Although fiscal policy across the region is broadly neutral, actual fiscal positions vary widely (Figure 5.7b). Despite the urgent need to reduce their debts, India and Japan continue to run deficits of about 6% of GDP. Singapore, in contrast, had a surplus of as much as 12% of

Figure 5.7. Variations in Asia's fiscal indicators
a. Central government fiscal balance 4-year averages, 2000–2007

b. Gross public sector debt, 2007


Sources: Data from ADB various years. *Asian Development Outlook*. Available: <http://www.adb.org> (accessed April 2008); and IMF 2008. *World Economic Outlook*. Available: <http://www.imf.org> (accessed April).

GDP in 2007. The differences in fiscal positions and public debt levels imply that some countries have greater scope to use fiscal policy to support demand, which implies that divergent responses to adverse external shocks across countries are likely.

Exchange rate policy

Asia has a wide range of exchange rate systems. Before the crisis, most economies in the region officially operated a managed float for their currencies; in practice, they tightly controlled their movements against the US dollar. Under this de facto dollar peg, Asian currencies fluctuated sharply against the Japanese yen, the most important regional currency, whenever the yen fluctuated against the dollar. Takagi (1999) shows that the yen figured prominently in Asian economies' exchange rate policies only when the yen depreciated sharply against the US dollar, reflecting the desire of some authorities not to lose price competitiveness against Japan in third markets.

When the crisis caused the dollar pegs to collapse, affected economies temporarily adopted more flexible exchange rate regimes. But as calm returned in the second half of 1998, many began to revert to informal dollar pegs, albeit somewhat more flexible ones. Malaysia even restored a formal dollar peg in September 1998, while Hong Kong, China continued to peg its currency to the US dollar through a currency board. Officially, the PRC had a managed float; in practice, it pegged its currency to the US dollar. Japan was almost alone in having a floating currency, although in practice it too intervened to limit any appreciation against the dollar, particularly in 2003–2004.

Since the crisis, the diversity of exchange rate regimes in Asia has increased, and while most countries have adopted more flexible policies, they have done so at different times and to varying degrees. Officially, most Asian economies have maintained a managed float throughout the past 10 years. The notable exceptions are Indonesia and the Republic of Korea, both of which explicitly switched to a free float. But in practice, several managed floaters have moved toward greater flexibility. This may be due in part to the PRC's announcement on 21 July 2005 that it was revaluing the yuan by 2% against the US dollar and henceforth setting the yuan's value with reference to a basket of currencies. On the same day, Malaysian authorities also shifted to a managed float for the ringgit.

Although exchange rate regimes in Asia continue to vary, with Hong Kong, China and Viet Nam still committed to a US dollar peg, the PRC's decision may have given some countries greater scope for flexibility. Table 5.1 provides one measure of it. The figures indicate

the average monthly percentage change of each currency against the US dollar; a positive sign implies depreciation, while a negative sign signals appreciation. The figure in brackets provides a measure of the variability of monthly exchange rate changes. Overall, most Asian currencies have shown more flexibility against the US dollar in recent years than in the period before the crisis.

Table 5.1. Monthly dollar exchange rate movements

Currency	1995/96	2001/02	2003/04	2005/06
Chinese yuan	-0.07 (0.01)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)
Hong Kong dollar	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)
Indian rupee	0.56 (3.61)	0.11 (0.22)	-0.41 (1.98)	0.06 (2.49)
Indonesian rupiah	0.33 (0.13)	-0.30 (37.55)	0.16 (4.81)	-0.12 (5.20)
Japanese yen	0.63 (14.25)	0.18 (8.81)	-0.59 (6.64)	0.55 (2.76)
Korean won	0.28 (1.10)	-0.27 (5.16)	-0.57 (5.46)	-0.45 (2.35)
Malaysian ringgit	-0.05 (0.86)	0.00 (0.00)	0.00 (0.00)	-0.31 (0.64)
New Taiwan dollar	0.19 (1.65)	0.19 (1.49)	-0.36 (1.20)	0.11 (1.97)
Philippine peso	0.31 (1.07)	0.25 (3.41)	0.24 (0.93)	-0.57 (2.05)
Singapore dollar	-0.18 (0.58)	0.01 (2.40)	-0.25 (1.22)	-0.26 (1.18)
Thai baht	0.09 (0.22)	-0.01 (2.63)	-0.42 (1.81)	-0.33 (3.02)
Vietnamese dong	0.04 (0.03)	0.25 (0.08)	0.10 (0.03)	0.07 (0.02)

Notes:

Values are in averaged logarithmic difference form, multiplied by 100.

Values in parentheses are variances multiplied by 10,000 for ease of presentation.

Exchange rate values are end of period data.

Sources: Data from IMF various years. International Financial Statistics. Available: <http://www.imf.org> (accessed December 2007); and CBRC 2007. Financial Statistics Monthly.

Available: <http://www.cbc.gov.tw/EngHome/default.asp> (accessed December 2007).

At one extreme, the Hong Kong dollar has zeroes in both columns: its exchange rate against the US dollar has remained fixed throughout. The Japanese yen, on the other hand, displays both significant appreciations and depreciations, with significant variance. The PRC has shifted from a basically fixed exchange rate against the US dollar to an appreciating one since 2005, with (very limited) variability around that trend. As expected, compared to the precrisis period, as well as to the benchmark of the dollar-yen rate, the Indonesian rupiah, the Korean won, and the Thai baht have become more flexible; the Singapore dollar may also have become somewhat more flexible. The pace of yuan appreciation, which has so far been very gradual, appears to be slowly picking up, although the change is too recent to be reflected in the table.

Figure 5.8 charts how Asian currencies moved against the US dollar from January 2005 through the end of April 2008. The Philippine peso has markedly appreciated, as has the Thai baht, albeit in an increasingly volatile fashion. The Malaysian ringgit, Singapore dollar, and PRC yuan all appreciated by approximately 20% against the US dollar. Until summer 2007, the Japanese yen was—alone among major Asian currencies—depreciating against the US dollar, but since then it has picked up. By the end of April 2008, the yen was roughly back where it was in January 2005.

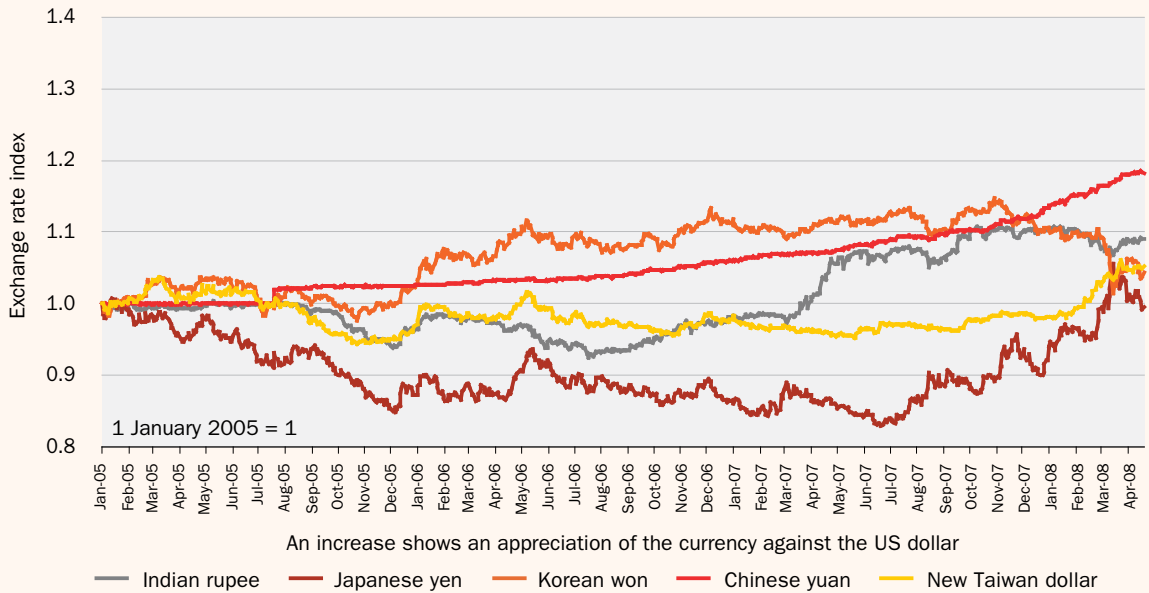
Real exchange rate stability

Real exchange rates—nominal exchange rates adjusted for differences in inflation—guide the allocation of resources across economies. Efficiency requires that they respond to changes in economic fundamentals (such as relative resource endowments, productivity growth, and technical progress), which generally change slowly over time, but that they not jump around erratically for other reasons, such as currency speculation. Given reasonable price stability, the short-run stability of nominal exchange rates is thus critical to the macroeconomic stability of an interdependent region.

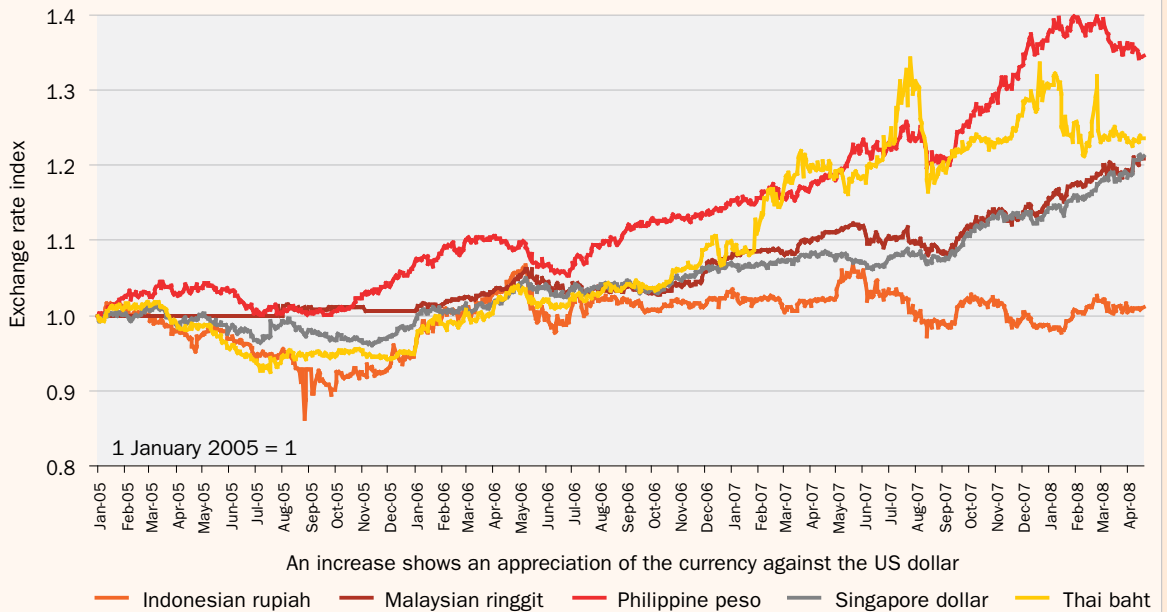
Asia has been fortunate to experience two favorable macroeconomic trends in recent years. Inflation has declined across the region, and lower average inflation in effect implies a greater convergence of inflation rates. Meanwhile, the relative weakness of the yen against the US dollar in an environment of greater exchange rate flexibility has meant that some Asian currencies have moved more closely with the yen in recent years than before. These two developments have contributed to greater real exchange rate stability

Figure 5.8. Trend of Asian currencies against the US dollar

a. Major Asian currencies



b. Major ASEAN currencies



ASEAN = Association of Southeast Asian Nations; US = United States.

Note: An increase shows an appreciation of the currency against the US dollar.

Source: Asian Development Bank staff elaborations based on Bloomberg data, 2008. Available: <http://www.bloomberg.com> (accessed April 2008).

among the region's economies, despite the lack of any formal policy coordination.

Applying the Frankel-Wei methodology to monthly exchange rate data helps to identify changes in the pattern of Asian exchange rate movements (Frankel and Shang 1994). The exchange rate of a particular currency is regressed against those of major currencies, all expressed in terms of some common currency. The estimated coefficients can then be interpreted as the major currencies' weights in determining the exchange rate of the chosen currency. For example, a large weight of the yen, when the methodology is applied to the ringgit, means that the two currencies move closely together against a common currency. Table 5.2 shows that the weight of the Japanese yen rose among the flexible currencies, from 0.06 in the precrisis period on average to 0.20 in the post-crisis period. The weight of the US dollar has significantly declined, although it continues to be larger than that of the yen. An explanation of the Frankel-Wei approach and regression estimates are included in the Methodological Note A5.4 and in Table A5.2 in the appendix to this chapter.

The recent pattern of price and nominal exchange rate changes across the region has led to a substantial fall in the variability of prices and exchange rates. For example, the variances of percentage deviations from the average of US dollar exchange rate and consumer price changes peaked at the time of the currency crisis, but diminished

Table 5.2. Weights of major currencies in Asian exchange rates

Anchor currency	January 1988–December 1996		January 2000–December 2006	
	Simple average for 11 currencies	Simple average for 7 flexible currencies	Simple average for 11 currencies	Simple average for 7 flexible currencies
US dollar	0.88	0.90	0.78	0.67
German mark/euro	0.08	0.00	0.07	0.10
Japanese yen	0.07	0.06	0.13	0.20

Notes:

11 currencies = Chinese yuan, Hong Kong dollar, Indian rupee, Indonesian rupiah, Korean won, Malaysian ringgit, Philippine peso, Singapore dollar, New Taiwan dollar, Thai baht, Vietnamese dong.

7 flexible currencies = Indian rupee, Indonesian rupiah, Korean won, Philippine peso, New Taiwan dollar, Thai baht, Vietnamese dong.

Sources: Estimates by Shinji Takagi. Data from IMF various years. International Financial Statistics. Available: <http://www.imf.statistics.org/> (accessed October 2007); and CBRC 2007. Financial Statistics Monthly. Available: <http://www.cbc.gov.tw> (accessed October 2007).

Table 5.3. Declining variance of real exchange rate movements in Asia

Variable \ Period	1989– 1991	1992– 1994	1995– 1997	1998– 2000	2001– 2003	2004– 2006
Nominal exchange rates	65.9	86.8	33.2	432.8	24.3	16.4
CPI inflation	17.0	17.7	11.0	71.8	11.3	8.8
Real exchange rates	62.0	45.4	37.2	234.0	32.1	22.8

CPI = consumer price index.

Notes:

Economies included in this analysis are the People's Republic of China; Hong Kong, China; India; Indonesia; Japan; Republic of Korea; Malaysia; Philippines; Singapore; Taipei, China; and Thailand.

Figures are the variances of annual percentage deviations from the simple average, multiplied by 10,000 for ease of presentation. Percentage deviations are approximated by first logarithmic differences.

Sources: Estimates by Shinji Takagi based on IMF various years. International Financial Statistics. Available: <http://www.imfstatistics.org/> (accessed October 2007c); and ADB 2007c. *Key Economic Indicators*. Available: <http://www.adb.org> (accessed October 2007).

sharply afterwards (Table 5.3). Real exchange rates in the region varied less in 2004–2006 than in any other comparable period over the past 17 years. This increased real exchange rate stability was not, however, the product of a deliberate policy decision. There is nothing in the policy regime to ensure that real exchange rate stability will be sustained. Indeed, this pattern may already have changed since the dollar's fall against the yen that began in the summer of 2007.

5.3. Challenges to maintaining growth and stability

Most Asian economies have performed well in recent years; some spectacularly so. With some exceptions, growth rates have been strong, inflation contained, fiscal positions sound, currencies stable. Above all, a crisis has been avoided. All of this has been achieved with scarcely any macroeconomic policy coordination within the region. Thus, the reason that Asian policy makers need to collaborate may not be immediately obvious.

Yet the stability of recent years is deceptive. It has been achieved against the backdrop of a remarkably benign global environment—one that may already have ended since the credit crunch that began in the summer of 2007. A potential US slowdown—or even a recession—requires Asia to reorient demand from exports outside the region to consumption and investment within it. But even if these adjustments are not forced by short-term macroeconomic developments, they will

be necessary in the longer run in order to resolve the major global imbalances that have emerged in recent years.

The falling US dollar is also putting a strain on the region's currency arrangements, leaving governments that have accumulated vast US dollar reserves with an unpalatable choice: either inflation or a revaluation that would erode the value of those US dollar assets. The risk of a financial crisis is real—indeed, history shows that most economies occasionally experience crises. Amid such uncertainty, and more generally because of the region's growing interdependence, Asian policy makers increasingly need to cooperate. This section examines three big challenges to the region's growth and stability; Section 5.4 will propose regional solutions.

Toward growth based on domestic demand

If Asia's economy is to “decouple” from that of the US, regional demand must fill the gap left by lower exports to the US. One way to do this is through higher levels of investment in several economies where growth has not returned to precrisis levels, most likely because of weak investment (Figure 5.9). Hong Kong, China; the Republic of Korea; Malaysia; and Singapore have seen investment decline considerably, by an average of 10% of GDP.⁶⁴ Although investment has picked up recently in Thailand, it is still low (20–30% of GDP) compared with the 40% or more recorded before the crisis. While precrisis investment levels may not have been sustainable, the size of the subsequent fall is worrying.⁶⁵

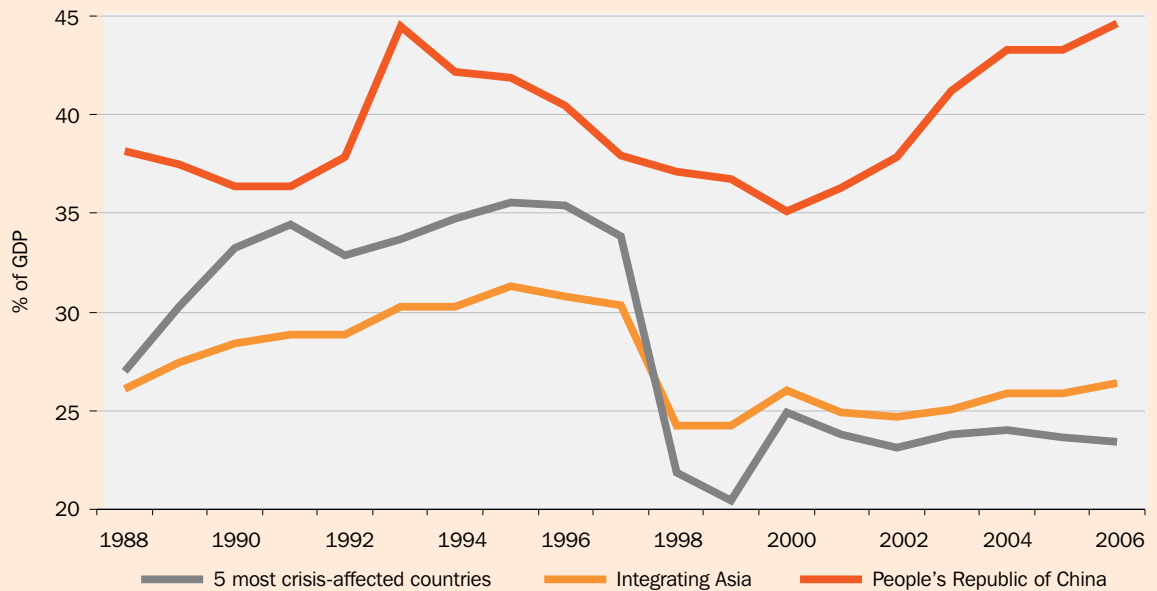
A significant part of the fall in investment rates is due to a drop in private investment. Except in the Philippines, domestic savings have remained high, real interest rates are low by historical standards, and banks' balance sheets have been greatly strengthened. A lack of credit, then, cannot wholly explain the poor investment performance. Overcapacity and implementation constraints (Indonesia), poor infrastructure (Indonesia and the Philippines), and a shortage of skilled labor (Malaysia and Thailand) may have held back private investment somewhat. In Indonesia and the Philippines, investors' perception that governance and regulatory frameworks are unfavorable may be the dominant factor. In Thailand, political uncertainty may be an additional one. This big fall in investment has serious implications for future growth.

⁶⁴ In contrast, investment has remained high in lower income countries, including the PRC, India, and Viet Nam.

⁶⁵ See Lee and McKibbin (2007) for an assessment of domestic investment decline and its consequences for global current account imbalances in the post-crisis period.

Figure 5.9. Widening gaps in gross capital formation

Selected Asian economies, percent of GDP, 1988–2006



GDP = gross domestic product.

Notes: The five most crisis-affected countries are Indonesia, the Republic of Korea, Malaysia, Philippines, and Thailand.

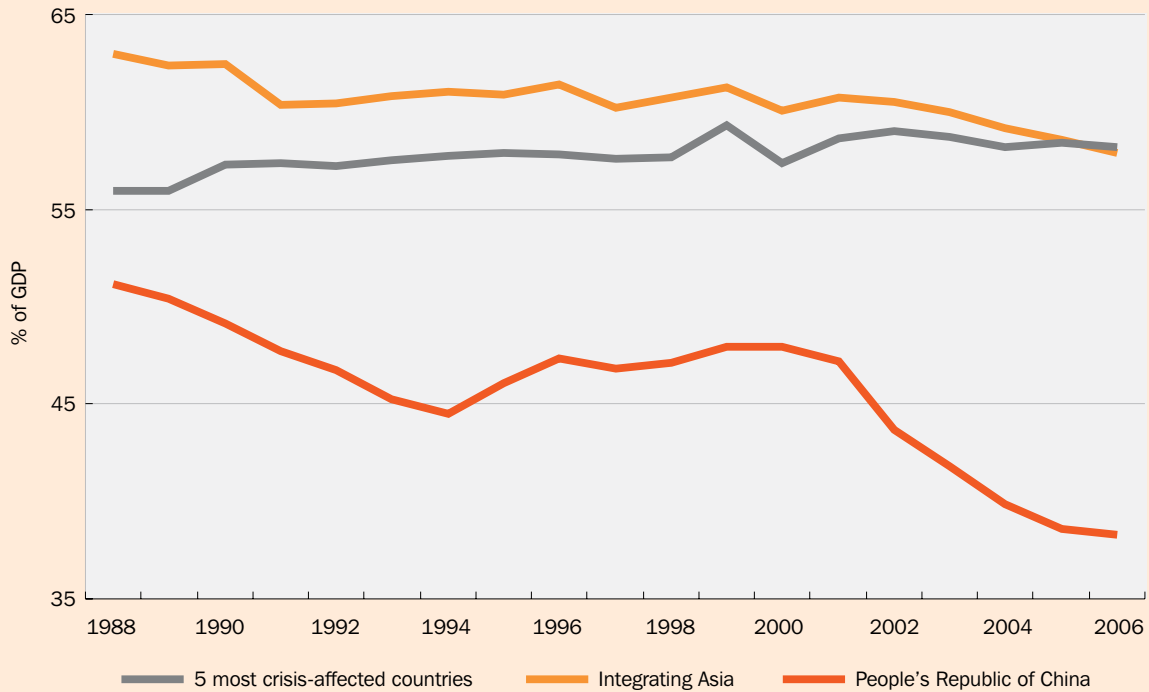
Sources: Data from World Bank 2008. World Development Indicators. Available: <http://www.worldbank.org> (accessed April 2008).

In the PRC, the share of personal consumption has been extremely low in recent years (Figure 5.10).⁶⁶ It has slumped from an already low 48% of GDP in 2000 to a mere 38% in 2006. A number of reasons have been suggested, including the rapid growth in per capita incomes (given some ratchet effect) and the need for precautionary savings to make up for an insufficient social safety net. With overcapacity in some sectors and the potential for declining asset quality, some rebalancing of domestic demand from investment toward private consumption is needed to make economic growth more sustainable. The PRC authorities have already stated that they are pursuing such a policy. There is considerable scope for increasing public spending on pensions, education, welfare, and health care, which amount to a mere 3% of GDP (Lardy 2007). More balanced tax and dividend policies could enable the government to tap a larger share of the

⁶⁶ In contrast, India has historically maintained a high consumption-to-GDP ratio, although the ratio has been on a declining trend; indeed, it is one of the few Asian countries where economic growth has been largely driven by domestic demand.

Figure 5.10. Widening gaps in consumption

Selected Asian economies, percent of GDP, 1988–2006



GDP = gross domestic product.

Notes: The five most crisis-affected countries are Indonesia, Republic of Korea, Malaysia, Philippines, and Thailand.

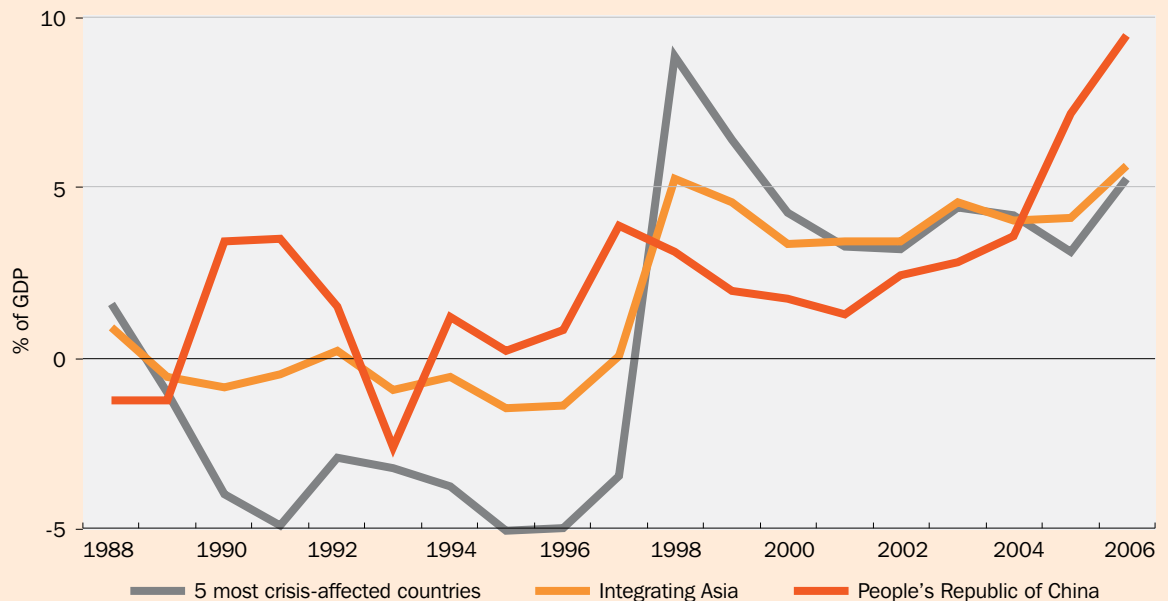
Sources: Data from World Bank. 2008. World Development Indicators. Available: <http://www.worldbank.org> (accessed April 2008).

exceptional profits of the commercial sector (both private and state-owned). These resources, in turn, could be used to address the high cost of education and health care and the inadequacy of the social safety net and pension systems.

Asia's rapid growth and increased interdependence are opening new opportunities for the region to focus its economic growth on its own markets. Yet high savings and weaker domestic demand have led to large and persistent current account surpluses in several key Asian economies (Figure 5.11). In Indonesia; the Republic of Korea; Malaysia; the Philippines; Taipei,China; and Thailand, the average current account balance swung from a deficit of 2–4% of GDP in 1994–1996 to a surplus of 4–6% in 2003–2006. Japan has a hefty surplus of 5% of GDP, too. The PRC and Hong Kong, China now have surpluses of around 10% of GDP, while Singapore's approaches 30%.

Figure 5.11. Rising current account surpluses

Selected Asian economies, percent of GDP 1988–2006.



GDP = gross domestic product.

Notes: The five most crisis-affected countries are Indonesia, Republic of Korea, Malaysia, Philippines, and Thailand.

Sources: Data from World Bank. 2008. World Development Indicators. Available: <http://www.worldbank.org> (accessed April 2008).

Asia has thus played a big part in the global imbalances of recent years. Six Asian economies—the PRC; Japan; Singapore; Hong Kong, China; Malaysia; and Taipei, China—had current account surpluses that equaled some 60% of the US current account deficit of \$810 billion in 2006. Such imbalances are not sustainable. For one thing, they have created substantial political frictions and an upsurge in protectionist pressures. Since Asia's rapid growth depends on global supply chains for final goods that are principally sold in the US and Europe, it has a big stake in limiting protectionism. More fundamentally, if the size of global imbalances is at least in part a result of Asia's export-led growth strategy, Asia's weight in the world economy will eventually be such—indeed, already arguably is such—that it cannot depend on demand outside the region to propel its growth. A region that already accounts for 22% of the world economy and which is likely to make up a quarter of it in 2020 cannot rely on the other three quarters as much as it does now.

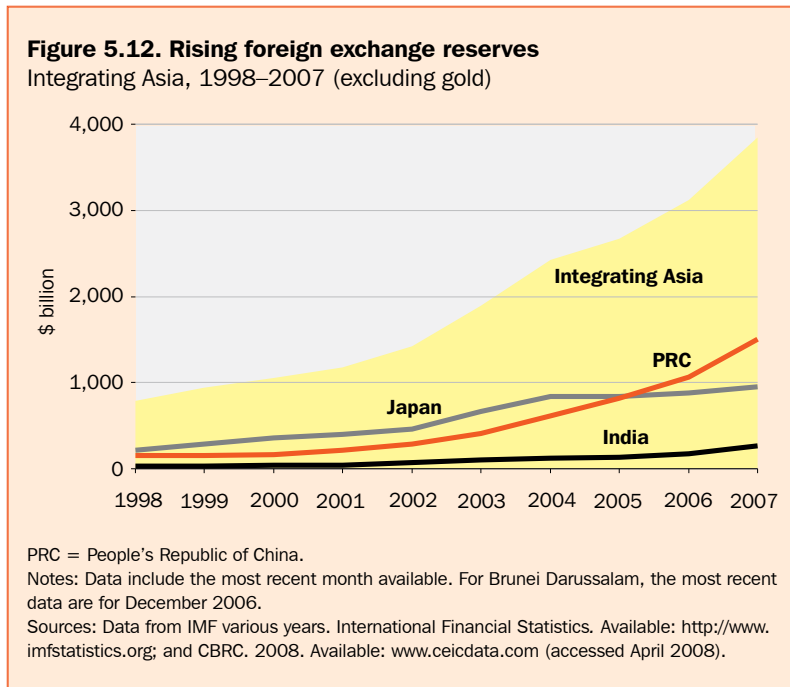
It is therefore in Asia's interest to shift the primary engine of growth from demand outside the region to demand within it—and policies to encourage further economic regional integration are thus crucial. Policies to promote domestic investment and consumption are part of this. Asia has vast savings; it is a large net exporter of capital. By building a stronger and more efficient capital market, some of the capital exported to the US and elsewhere could be redirected to Asia's own large investment needs in physical and social infrastructure.

Will real exchange rate stability continue?

The expected unwinding of the global imbalances will likely require substantial adjustments in real exchange rates in coming years. To safeguard regional integration, Asia's policy makers will have to manage the potential disruption that comes from large exchange rate realignments. Asia's economies have recorded steady growth in recent years in a rather benign environment supported by nominal exchange rate and price stability, but both of these are already at risk.

Currency stability may be disturbed if the yen continues to strengthen rapidly against the US dollar, as it has done since summer 2007. While some appreciation of the yen may be desirable in the medium term in order to help unwind the global imbalances, a US dollar collapse would disrupt the region's stability. Asian policy makers would have to choose between allowing their currencies to fall against the yen in line with the US dollar and revaluing or increasing the flexibility of their exchange rate regimes so as to permit an appreciation against the US dollar.

The latter would reduce currency instability within Asia and help reorient economies away from exports to the US, but to ensure that this does not result in lower growth, regional demand must take up the slack. Appreciation against the US dollar would inevitably erode the value of the region's vast dollar reserves and other dollar investments. These have swollen in recent years in line with expanding current account surpluses that have far exceeded net capital outflows. This reflects monetary authorities' determination to insure themselves against the possibility of a currency crisis as well as their desire to maintain export competitiveness by moderating the pace of nominal appreciation through large currency intervention. The combined reserves of Integrating Asian economies have risen from \$788 billion at the end of 1998 to close to \$4 trillion at the end of 2007, with the PRC's soaring from \$150 billion to almost \$1.5 trillion, nearly two fifths of the current total (Figure 5.12). These reserves, which have



not been fully sterilized, are already creating inflationary pressure in some economies, notably the PRC. A decision not to allow currencies to appreciate at a measured pace risks a far worse outcome, if it leads to a collapse of the dollar that has a greater impact on the value of reserves.

Disturbances to real exchange rates could also come from other sources, not least because of the region's divergent macroeconomic prospects and the conflicting demands on macroeconomic policies in the region. While it is important to allow real exchange rates to adjust to changes in fundamentals, mitigating large, abrupt changes in real exchange rates will be equally important for an interdependent region.

The desire to manage more efficiently the huge reserves accumulated in recent years has led several Asian governments to set up, or consider setting up, sovereign wealth funds. Box 5.1 discusses the implications of sovereign wealth funds for the Asian and world economies.

Box. 5.1 Global and regional implications of Asia's new sovereign wealth funds

Many of the sovereign wealth funds (SWFs) that have recently been set up in Asia are modeled on successful precedents such as Singapore's Temasek Holdings and the Government of Singapore Investment Corporation. Examples of new Asian sovereign funds include the China Investment Corporation, established in September 2007, and the Korea Investment Corporation in July 2005.

SWFs provide an institutional model for active reserve management. Unlike central banks or national treasuries, their primary goal can be defined to maximize investment returns. If managed on an independent, transparent, and commercial basis, SWFs could make a deep, steady pool of savings available for investments in the region and worldwide.

Reallocating a share of foreign exchange reserves to a SWF could yield a substantial fiscal dividend. Park (2008), based on the methodology of Summers (2007), estimates that the People's Republic of China's 2006 fiscal dividend could be as large as \$43 billion, or 1.63% of gross domestic product. This is not one-off income, but a recurrent stream of investment income. The fiscal dividend could help governments tackle their huge long-term development challenges. Yet such gains are neither automatic nor guaranteed. Creating another Temasek or Government of Singapore

Investment Corporation requires time and effort to build up the institutional capacity needed for successful high-risk, high-return investment strategies. Prudence suggests that the new Asian funds should start with less risky asset classes and build up their investment-management capacity before contemplating riskier asset classes and investment strategies.

SWFs' investment activities affect the interests of both investing and host countries. As such, a global dialogue in which both are fully and fairly represented would be mutually beneficial. This is being coordinated via the International Monetary Fund (IMF), which is finalizing a set of best practices for SWFs focused on the identification of investment objectives and risk management practices. The IMF is also involved in policy and institutional discussions as well as on operational issues, such as the publication of data on the sources and uses of SWFs. A draft of new guidelines for SWFs is expected to be endorsed during the IMF Annual Meetings in October 2008.

Asian governments should discuss the role of SWFs within the region. The controversy over Temasek's purchase of Thailand's Shin Corporation is a useful reminder of the potential benefits of regional dialogue. This could help to defuse the threat of financial protectionism and promote financial openness, which ultimately benefits all Asian economies.

5.4. Regional cooperation: why and how

Asia's continued growth and stability rest, first and foremost, on each of the region's economies pursuing sound policies for their own sake—which is precisely how many have grown so fast in recent decades. But while compromising national welfare simply for the sake of a common regional policy would be foolish, cooperation is often more beneficial than going it alone. As trade and financial links within the region grow, each economy's fate increasingly depends on what happens to their neighbors. A shock—including a policy decision—that originates in one Asian country can quickly and forcefully affect others. To the extent that Asia's integration is a vital factor in luring fragmented production to the region, currency dislocations could prove highly disruptive. Insofar as Asia's economies are increasingly synchronized, they may sometimes gain from formulating a common response. In principle, there could also be gains to formulating different responses to common shocks insofar as different countries are affected differently by the same shock.

Broadly, three types of regional macroeconomic policy cooperation are conceivable: information sharing, regime setting, and policy coordination.⁶⁷ The most rudimentary, information sharing, involves a mechanism for dialogue (and possibly surveillance) that seeks to improve each government's understanding of the economic performance, macroeconomic and structural issues, policy objectives, and policy choices faced by its peers. This can enhance the region's economic welfare by enabling each country's policy makers to use more accurate information in their own decisions.

Regime setting involves agreeing on common rules of the game, within which individual countries can pursue independent policies that suit their own economic interests. This type of policy cooperation includes regional agreements on payments settlement, financing arrangements, rules for exchange rate management, and frameworks for action in a crisis.

Policy coordination can take various forms, of varying intensities. A weaker form might involve acting in concert to avoid unexpected spillovers. This was attempted through the Group of 7 (G-7) in the

⁶⁷ Much of the argument in this section comes from Kawai and Takagi (2005). See also Kenen (1994) and Hamada and Kawai (1997).

1970s and 1980s, when the task of fiscal expansion or currency appreciation was assigned to a group of countries. In its most ambitious form, the economies' policy makers would act as if the region were a single economy in order to maximize a weighted sum of their economic welfare. The successful launch of a common currency in Europe, the euro, is a good example of this, although arguably it goes even further, because some national sovereignty is surrendered to a supranational agency.

Macroeconomic policy cooperation in Asia is mostly at the first stage of information sharing. But while the bilateral swap agreements to provide additional short-term liquidity in a crisis represent a fledgling attempt at regime setting, any deeper form of cooperation, let alone coordinated joint policy action, appear unrealistic for the foreseeable future. Policy outcomes differ widely, and policy stances are likely to evolve differently, while authorities' values and objectives also vary.

Yet Asia cannot rely entirely on a global framework to help address the challenges associated with increasing regional spillovers. Some formal policy dialogue and cooperative framework is needed, if only to mitigate the political tensions that may arise from increasing macroeconomic interdependence—and, because institution building takes time, it must begin now. So the main task for the region is to strengthen existing mechanisms of information sharing, policy dialogue, and mutual surveillance, and to identify areas in which agreeing on common policy regimes could yield mutual gains.

One important area for policy dialogue and cooperation is the stabilization of real exchange rates, which are the key channel through which macroeconomic disturbances are transmitted from one economy to another. Although the expected divergence of growth rates in Asian economies will require substantial and ongoing adjustments in real exchange rates, cooperation to avoid abrupt changes is vital for macroeconomic stability.

Cooperation is also needed to build a regional architecture to secure financial stability. The crisis highlighted that the global framework for managing and resolving financial crises provided too little help, too late. It also showed that contagion has a geographic dimension, because neighboring economies tend to share similar characteristics, are more closely connected with each other than with other economies, and are perceived as similar by outside investors. There is thus a case for establishing a regional crisis management

mechanism, to complement, not substitute for, the global framework centered on the IMF.

A regional framework would also be a useful forum to discuss global and regional issues. With nearly 200 sovereign states in the world, it is virtually impossible to discuss the details of any issue in a global setting, let alone to agree on solutions. Economies that are closely interdependent share many common features and can discuss them more readily. They can also arrive at common positions in global negotiations that maximize their leverage, and, to the extent that their position is constructive, improve the state of the world. Asia must remain open and become more engaged in discussions of global issues. A regional framework would provide a means of more effectively projecting common concerns globally.

Consultation and mutual surveillance

Asia's policy makers already have many forums for dialogue (Table 5.4), but most are not as effective as they could be. While face-to-face contact is desirable, dialogue ought to be more formally structured with a view to producing better tangible policy outcomes through closer monitoring of economic conditions and peer pressure.

As discussed in Chapter 4, Section 4.4, perhaps one of the most developed channels so far is the ASEAN surveillance process, established in 1998. It seeks to strengthen policy dialogue and policy making capacity in the monetary, fiscal, and financial fields. It involves ASEAN finance ministers meeting twice a year and the ASEAN Surveillance Coordinating Unit preparing a report that analyzes the latest economic and financial conditions in the region and elsewhere. This is considered and finalized by ASEAN finance and central bank deputies before being discussed by ASEAN finance ministers during their peer review session.

The ASEAN+3 economic review and policy dialogue process also includes the PRC, Japan, and the Republic of Korea. Following the meeting of heads of state or government in December 1997, ASEAN+3 finance ministers met for the first time in April 1999. Since the ERPDP was formally established in May 2000, ministers have met annually to exchange information and discuss policy issues. The process aims to strengthen policy dialogue and coordination, as well as collaboration on financial, monetary, and fiscal issues of common interest. Steps have been taken to cooperate in monitoring short-term capital flows

Table 5.4. Emerging structures of the regional policy dialogue
Regional and transregional forums in Integrating Asia

Economy	Finance ministers and/or central banks					Central banks			Total
	ASEAN	ASEAN+3	EAS	APEC	ASEM	SEANZA ^a	SEACEN ^a	EMEAP	
Brunei Darussalam	✓	✓	✓	✓	✓		✓		6
Cambodia	✓	✓	✓		✓		✓		5
China, People's Rep. of		✓	✓	✓	✓	✓		✓	6
Hong Kong, China				✓				✓	2
India			✓		✓	✓			3
Indonesia	✓	✓	✓	✓	✓	✓	✓	✓	8
Japan		✓	✓	✓	✓	✓		✓	6
Korea, Republic of		✓	✓	✓	✓	✓	✓	✓	7
Lao PDR	✓	✓	✓		✓				4
Malaysia	✓	✓	✓	✓	✓	✓	✓	✓	8
Myanmar	✓	✓	✓		✓		✓		5
Philippines	✓	✓	✓	✓	✓	✓	✓	✓	8
Singapore	✓	✓	✓	✓	✓	✓	✓	✓	8
Taipei, China				✓		✓	✓		3
Thailand	✓	✓	✓	✓	✓	✓	✓	✓	8
Viet Nam	✓	✓	✓	✓	✓		✓		6
Integrating Asia	10	13	14	12	14	20	11	9	
Others			2	9	29	10	5	2	
Total	10	13	16	21	43	20	16	11	

ASEAN = Association of Southeast Asian Nations; EAS = East Asia Summit (ASEAN plus Australia and New Zealand); APEC = Asia-Pacific Economic Cooperation (includes Australia, Canada, Chile, Mexico, New Zealand, Papua New Guinea, Peru, Russian Federation, and United States); ASEM = Asia-Europe Meeting (includes Mongolia, Pakistan, and the 27 European Union member countries); Lao PDR = Lao People's Democratic Republic; SEANZA = Southeast Asia, New Zealand, and Australia (includes Australia; Bangladesh; Iran; Macao, China; Mongolia; Nepal; New Zealand; Pakistan; Papua New Guinea, and Sri Lanka); SEACEN = South East Asian Central Banks (includes Fiji Islands, Nepal, Mongolia, Papua New Guinea, and Sri Lanka); and EMEAP = Executives' Meetings of East Asia-Pacific Central Banks.

^a SEANZA and SEACEN are primarily training institutions.

Source: Asian Development Bank staff elaboration from Kawai 2007c.

and in developing a regional early warning system to assess financial vulnerabilities.⁶⁸

Among the groups for the region's central bankers, EMEAP has the broadest geographical coverage.⁶⁹ EMEAP was organized in 1991 with the leadership of the Bank of Japan and the Reserve Bank of Australia, and promotes enhanced regional surveillance, the exchange of information and views, and financial market development. EMEAP's activities include annual meetings of central bank governors; twice-yearly meetings of deputy governors; and three working groups on bank supervision, financial markets, and payments and settlement systems.

The effectiveness of these and other processes has been limited by their multiplicity, the lack—except in the case of the ASEAN surveillance process—of a permanent secretariat to provide consistency and logistics to the process, and a lack of agreement on analytical tools for monitoring economic developments.⁷⁰ All these weaknesses need to be addressed.

First, a formal, central structure to coordinate macroeconomic policy and surveillance initiatives in the region should be established. Existing mechanisms should be subsumed within a single overarching framework, so that they could be coordinated to work toward achieving common regional objectives. The logical step would be to formalize the ASEAN+3 finance ministers' process, and establish an "Asian Secretariat for Economic Cooperation" with qualified, permanent regional staff. This institution would most logically operate under the oversight of ASEAN+3 finance ministers and in coordination with the region's central banks, but the functions it administers could have varying memberships, including economies that are not beyond ASEAN+3 members.⁷¹ The secretariat could provide logistical support as well as substantive inputs based on surveillance of economic developments. Responsibility for organizational matters in ASEAN+3

⁶⁸ From 1997 to 2002, Asia had another region-wide dialogue and surveillance mechanism, under the so-called Manila Framework Group. This mechanism provided a forum for surveillance and dialogue among participating finance ministries and central banks, with support from the IMF, World Bank, ADB, and the Bank for International Settlements. The Manila Framework Group involved deputy finance ministers and deputy central bank governors.

⁶⁹ The other important regional central bank forums are known as South East Asia, New Zealand, and Australia (SEANZA) and South East Asian Central Banks (SEACEN), discussed in Chapter 4, Sector 4.4. In addition, the central banks of ASEAN members have met for policy dialogue as the ASEAN Central Bank Forum since late 1997.

⁷⁰ In 2006, the ASEAN+3 set up a group of experts and an economic technical working group to find ways to strengthen regional surveillance and to develop an early warning system.

⁷¹ Membership could eventually be expanded to include other economies, such as Australia; Hong Kong, China; India; Mongolia; New Zealand; and Taipei, China.

(and EMEAP) is currently rotated among the participants. The choice of topics therefore tends to reflect the preferences of the particular country holding the chair, and the process lacks the consistency, continuity, and institutional memory needed to be effective.

Second, to make the new Asian Secretariat for Economic Cooperation effective in its surveillance role, member governments should develop and agree on the analytical tools to monitor economic developments. These should comprise a set of appropriate objective indicators as well as standards of good conduct. Developing an objective indicator of exchange rate alignment among the region's currencies is vital. Following the precedent of the European Monetary Cooperation Fund first and the European Monetary System (EMS) later, a basket of regional currencies could be developed for the purpose of improving regional surveillance (see further discussion under exchange rate cooperation, to follow). With the agreed analytical tools, a dialogue and consultation mechanism could develop into a mutual surveillance mechanism.

Regional financing facility

The most compelling way to progress to the regime setting phase is to push forward with efforts to create a regional financing facility. Pooling the region's enormous foreign exchange reserves and agreeing to rules under which they could be used would create a regional institution for crisis management and related purposes. This could be done by multilateralizing the bilateral swap arrangements under the CMI.

The CMI (agreed to in May 2000) was designed to strengthen the longstanding ASEAN swap arrangement (ASA)⁷² and introduce bilateral swap arrangements (BSAs) for the ASEAN+3 members. In November 2000, the ASA was enlarged to \$1 billion and included as part of the CMI. The total bilateral swap size reached \$84 billion, with 16 bilateral swap arrangements as of January 2008 (Table 5.5), and the ASA has been expanded to \$2 billion.

Signatories also agreed on the basic framework of bilateral support. For example, countries can borrow international liquidity

⁷² The ASEAN swap arrangement (ASA) was established in August 1977, when the original five ASEAN members created a \$100 million facility, which was doubled in 1978, to provide immediate, short-term financing to any member facing a temporary liquidity shortage. The ASA was activated by Indonesia in 1979, Malaysia in 1980, Thailand in 1980, and the Philippines in 1981 (Henning 2002). In March 2000, ASEAN finance ministers, recognizing the need to enhance the facility to respond more effectively to future crises, agreed to expand the ASA to all new ASEAN members.

Table 5.5. Swap arrangements under the Chiang Mai Initiative

\$ billions as of January 2008

From \ To	PRC	Japan	Rep. of Korea	Indonesia	Malaysia	Philippines	Singapore	Thailand	Total
PRC		3.0	4.0	4.0	1.5	2.0		2.0	16.5
Japan	3.0		13.0	6.0	1.0	6.0	3.0	6.0	38.0
Korea, Rep. of	4.0	8.0		2.0	1.5	2.0		1.0	18.0
Indonesia			2.0					18.5	2.0
Malaysia			1.5						1.5
Philippines		0.5	1.5						2.0
Singapore		1.0							1.0
Thailand		3.0	1.0						4.0
Subtotal	7.0	15.5	23.0	12.0	4.0	10.0	3.0	9.0	84.0
ASEAN Swap Arrangements									2.0
Total	7.0	15.5	23.0	12.0	4.0	10.0	3.0	9.0	86.0

ASEAN = Association of Southeast Asian Nations, PRC = People's Republic of China.

Source: Asian Development Bank staff elaborations based on data from Japan's Ministry of Finance website. Available: <http://www.mof.go.jp/english/index.htm> (accessed May 2008).

collateralized by domestic currencies with government guarantees, rather than offering US Treasury bonds as collateral. BSAs are for a period of 90 days, renewable up to seven times, at an interest rate equivalent to the London interbank offered rate (LIBOR) plus 150 basis points for the first drawing and first renewal. Thereafter, the premium goes up by 50 basis points every two renewals, up to a maximum of 300 basis points. Members requesting liquidity support could immediately obtain short-term financial assistance for the first 10% of the BSA facility, but could draw on the remaining 90% only under an IMF adjustment program.

The CMI has been repeatedly strengthened since its launch. Major recent developments include

- the integration and enhancement of the economic review and policy dialogue into the CMI framework (May 2005);
- an increase in the ceiling for CMI swap activation without an IMF program in place, from 10% of the total to 20% (May 2005);
- the adoption of a collective decision-making procedure for CMI activation, as a step toward multilateralizing the CMI (May 2006);

- an agreement in principle on a self-managed reserve pooling arrangement governed by a single contractual agreement as the appropriate form of CMI multilateralization (May 2007); and
- the total size of the pooled resources to be at least \$80 billion, 20% from ASEAN and 80% from the “+3” countries (May 2008).

ASEAN+3 finance ministers and central bank deputies are studying key elements of CMI multilateralization, including surveillance, reserve eligibility, borrowing quota, and the activation mechanism.

While the CMI's efficacy in a crisis is unproven, many Asian economies continue to accumulate massive external reserves. Multilateralizing the CMI would enable them to pool their reserves, cutting down on this costly and wasteful duplication. Making the activation of a substantial part of swaps conditional on IMF programs was essential in the early stages of the CMI, but, as the facility becomes larger, multilateral, and more fully institutionalized, the direct link with IMF financing could be phased out. This would make the facility more effective, because it would enable a more rapid commitment of funds in times of crisis, and would give the region a greater incentive to monitor and influence national policies.

The multilateralized CMI should be supported by a permanent secretariat created for surveillance. This should be a guardian of the pooled resources and, in a crisis, should negotiate a program of economic policies with a country seeking financial support. The multilateralized CMI's administrative expenses could be financed by the interest earned on the pooled reserves and from lending operations, if any. The CMI could thus complement the IMF's surveillance and crisis management efforts in Asia.

Exchange rate cooperation

Exchange rate cooperation could begin with a regime setting exercise in which the region's economies agree on broad rules for conducting policy, including intervention and reserve management. This may naturally evolve into a deeper form of cooperation. The region will increasingly benefit from concerted action to deal with spillovers from exchange rate movements.

Because exchange rates are one of the key links among interdependent economies, one country's exchange rate decisions can harm another. For example, if the Japanese yen began to appreciate substantially against the US dollar and the Republic of Korea sought to prevent the won's value from rising against the US

dollar, this would harm Japan's international price competitiveness in the short term but fuel inflation in the Republic of Korea over the medium term. It would be preferable if the Republic of Korea allowed the won to appreciate too—and this would be less costly in the short term if other countries that compete with the Republic of Korea in the US and other third markets allowed their currencies to appreciate concurrently.

Another case involves joint action to deal with the macroeconomic consequences of large capital inflows. Without collective action, a country that receives capital flows might be reluctant to allow its currency to appreciate for fear that it might lose price competitiveness against its neighbors. In a bid to forestall this, Thailand in December 2006 responded to a surge of capital inflows by imposing capital controls, damaging regional financial integration. Other economies, though, have recently allowed their currencies to appreciate unilaterally.

Countries could instead choose to jointly revalue their currencies.⁷³ But if—as is often the case—some economies receive greater capital inflows than others and are affected differently by them, exchange rates within the region would still need to adjust.

Even so, regional collective action could expand the menu of options available to countries in dealing with large capital inflows and upward currency pressure. Because international investors from both within and outside East Asia are channeling liquidity to its emerging economies and thereby placing upward pressure on the value of many regional currencies, this is an option worth pursuing.

For collective currency appreciation to be a viable option, there must be a mechanism of close policy dialogue and cooperation designed to ensure intraregional exchange rate stability. The current policy dialogue processes among the region's finance ministers (such as ASEAN+3) and central bank governors (such as EMEAP) need to be significantly enhanced to foster such policy coordination. Such an arrangement could ultimately lead to the formation of an East Asian monetary zone, along the lines seen in Europe after the collapse of the Bretton Woods system in the early 1970s.

Because growth within the region varies widely, arrangements must be flexible enough to allow real exchange rates to adjust. But, in the cases described above, concerted action is needed. More

⁷³ Kawai (2008b) estimates that a 20% collective appreciation of all East Asian currencies would entail an appreciation of only 9% in effective terms even if all the countries outside the region maintained the nominal value of their currencies against the US dollar.

broadly, cooperation to maintain reasonable exchange rate stability will become increasingly important for the macroeconomic stability of the region. Such stability would bolster intraregional trade and help reorient demand toward consumption within the region. Whatever form such cooperation takes, it requires analytical tools to monitor exchange rate developments in the region, and a strengthening of existing policy-dialogue and surveillance mechanisms, including agreement on the scope and conditions for collective action.

To give some sense of the form such exchange rate cooperation might take, some economists have suggested, following the proposal by Williamson (1999) of a “basket, band, and crawl” regime,⁷⁴ that East Asian economies stabilize their exchange rates against a common basket of currencies. Opinion differs as to the composition of such a basket, especially whether the US dollar and euro should be included. The benefit of including major global currencies is that, by pegging to such a basket, East Asian economies could stabilize not only their exchange rates against each other but also their effective exchange rates (see Williamson [2005] and Kawai [2008a]). Alternative ideas for stabilizing both bilateral and effective exchange rates within the region include, for example, a dollar peg advocated by McKinnon and Schnabl (2003).

A basket consisting only of the region’s currencies—alternatively called an “Asian currency unit,” “regional currency unit,” “Asian monetary unit,” or “regional monetary unit” by different groups—has its own merits. As with the EMS’s European Currency Unit, a similarly constructed regional basket could serve as a stabilizing device as well as an indicator of the degree of joint movement of East Asian currencies—for example, in the context of the eventual unwinding of global payments imbalances or surges of capital inflows to East Asia—as well as of the degree of divergence of each component currency from the regional average. When the PRC moves to a more flexible exchange rate regime, the basket could provide more meaningful information and allow the regional surveillance process to become more intensive (Kawai 2008a).

Some people see a greater role for such a regional currency unit. For example, Eichengreen (2006) argues that, if the basket is used as a parallel currency and its use is promoted, it could become a catalyst for monetary integration in the region—this would be a way of allowing economics, rather than politics, to drive the decision to

⁷⁴ This refers to a basket peg, with a band of fluctuation, whose central rate can be adjusted at a predetermined pace.

move to a common currency (see also Chai and Yoon [2007]) for a similar idea). Technical difficulties remain regarding how to design such a basket and how to make it effective (Adams and Chow [2007]), and not every government currently appears to support the idea of a regional currency basket. The topic, however, is already on the agenda of ASEAN+3, and discussion is ongoing among technical experts. In the spirit of Asian pragmatism, the process could begin with the elements that are most acceptable and feasible under the circumstances.

Exchange rate cooperation does not have to involve every economy from the outset. It may be more compelling for the advanced ASEAN members—Indonesia, Malaysia, the Philippines, Singapore, and Thailand, whose business cycles are highly synchronized (in terms of industrial production, the average correlation was nearly 70% in 1999–2006). To jump-start the process, this subgroup of ASEAN countries could initiate exchange rate cooperation. They could then be joined by other countries as they find greater benefits from such joint action.⁷⁵

5.5. Macroeconomic challenges ahead

Asia's impressive macroeconomic performance in recent years has occurred in a relatively benign environment characterized by nominal exchange rate and price stability within the region. This period would now appear to be over. With divergent prospects and conflicting demands on policy, significant exchange rate realignments are possible. With the accumulation of large international reserves, inflationary pressure is already mounting in some countries. How to manage these real exchange rate shocks has implications for the macroeconomic stability of an increasingly interdependent region.

The engine of growth urgently needs to shift from demand outside the region to demand at home and within the region. Asia's increasing economic weight in the world places a natural limit to the strategy of relying on external demand to propel its growth. Asia has plenty of room to increase investment and consumption, not only to grow, but also to improve its infrastructure and quality of life.

⁷⁵ Based on a weighted average of various measures (such as purchasing power parity (PPP), interest rate parity, trade intensity, and interest rate correlations), cluster analysis by Takagi and Hirose (2004) also shows that Malaysia, the Philippines, Thailand, and (in some specifications) Singapore form a highly integrated group of countries.

Asia cannot rely on a global framework to mitigate the tensions that may arise from policy spillovers. Asia will need to develop its own institutions to deal with the consequences of increased interdependence. Institution building for regional policy cooperation could begin with a framework of information sharing, which could then evolve into a deeper form. The second step is to establish a regional financing facility by multilateralizing the CMI. The third step is to develop a framework of exchange rate cooperation. All of this could be done step by step, starting with a subset of ASEAN countries, which could then be expanded to others as they see benefits from greater policy cooperation.

ASEAN has articulated a vision for 2020 involving the creation of an ASEAN economic community. Its road map for integration envisages that the aim will be achieved through capital market development and liberalization, financial services liberalization, and currency cooperation. While ASEAN countries (or a subset of members at similar stages of development) may lead the way, the rest of the region could eventually join the process to maximize the benefits from regional cooperation.

A deeper form of macroeconomic cooperation, including monetary policy coordination and a cooperative exchange rate arrangement, could come later. Although economic conditions are still divergent, business cycles in the region are becoming more synchronized, minimizing the costs to individual economies of a coordinated monetary policy. Moreover, the benefits of coordination will rise as exchange rate volatility becomes increasingly incompatible with an integrated region. Although few people see that a cooperative EMS-type of exchange rate arrangement is feasible over the next two decades, appreciation of the benefits of such an arrangement—and even a common currency—could increase over time, as the economies of the region continue to integrate and become more interdependent. This would require years of working together, institution building, common values, and shared policy objectives.

The steps outlined in this chapter do not necessitate setting an ultimate endpoint for cooperation, but will rather provide experience and insight into the feasibility of further monetary integration. For now, the priorities are to strengthen regional macroeconomic monitoring; better coordinate macroeconomic and exchange rate policies; pool reserves; start to develop effective regional economic institutions by multilateralizing the CMI; and develop institutional capacity to support macroeconomic cooperation, notably through the proposed establishment of an ASEAN Secretariat.

Chapter 5: appendix

Methodological note 5.1.

Correlation of quarterly gross domestic product

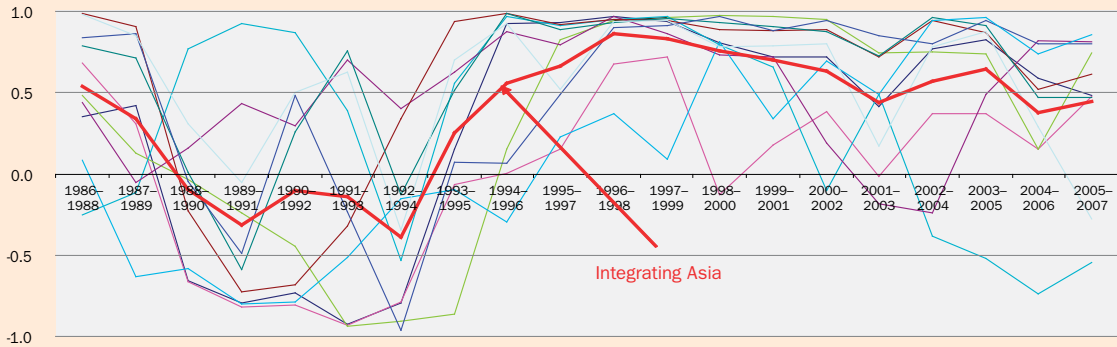
The analysis of output correlations uses quarterly gross domestic product (GDP) data for the following sets of countries: (1) for Integrating Asia—the People’s Republic of China (PRC); Hong Kong, China; Indonesia; Japan; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei,China; and Thailand; and (2) for the rest of the world—the United States (US) and the eurozone of the European Union (EU). The sample period covers Q1:1986–Q3:2007. Data come from Oxford Economics (2008); for the US, data are from the Bureau of Economic Analysis (2008). For 2007 only, national sources are used.

Correlations are computed bilaterally for Integrating Asia as well as between it and the rest of the world. As indicated in figures A5.1–3, different combinations of regional and nonregional entities are attempted. Correlations are based on year-on-year growth of quarterly GDP at current prices; where aggregation is necessary, GDPs in US dollars are used as the weights. To eliminate the cyclical components of GDP, the fixed length Baxter-King filter is used (12 quarters, low: 6.0; high: 32.0). The so-called band-pass filter is designed to eliminate long-term trends (of more than 32 quarters) and high frequency fluctuations (of less than six quarters) while retaining only the cyclical components of a series.

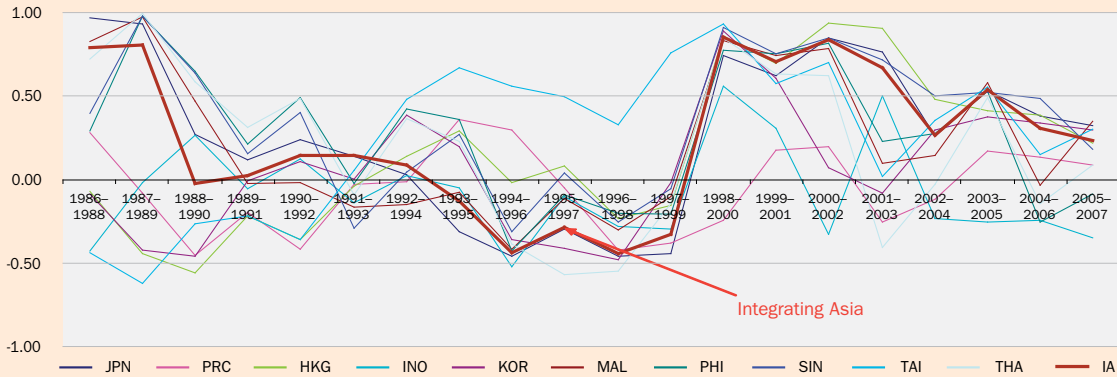
Correlations reported in Figure A5.1 (as well as in Figure 5.1) are all 12-quarter moving averages.

Figure A5.1. Correlation of quarterly GDP of Integrating Asia

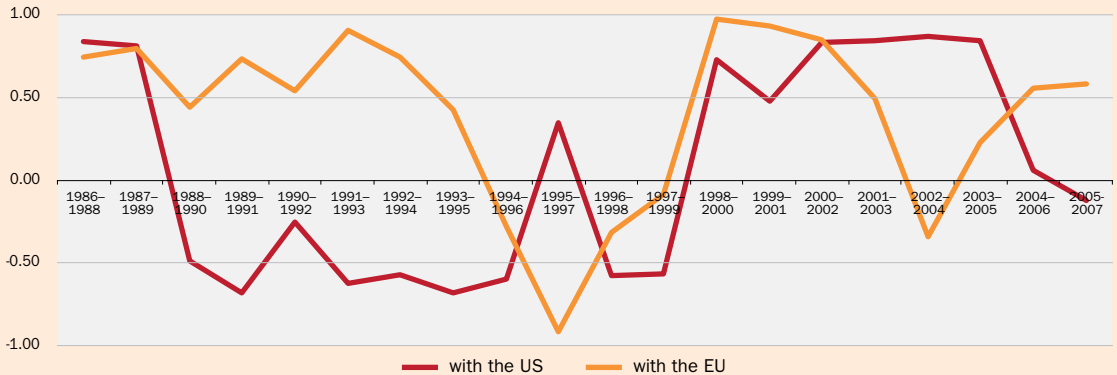
A. Quarterly GDP correlations within Integrating Asia



B. Quarterly GDP correlations of Integrating Asia with (US+EU)



C. Quarterly GDP correlations for Integrating Asia with US and EU



EU = European Union, US = United States.

Notes: Integrating Asia = Japan; People's Republic of China; Hong Kong, China; Indonesia; Republic of Korea; Malaysia; Philippines; Singapore; Taipei, China; Thailand.

Sources: Data from Oxford Economics 2008. Forecasting and Analysis. Available: http://www.oef.com/OE_FA_Int_Mac.asp (accessed February 2008); Bureau of Economic Analysis. 2008. National Income Accounts. Available: <http://www.bea.gov/national/index.htm> (accessed February 2008).

Methodological note 5.2.

Correlation of quarterly exchange-rate-adjusted consumer prices

Data for the tables on the exchange-rate-adjusted consumer prices come from the International Financial Statistics (IMF various years); for Taipei,China only, the data are from (CBRC 2007). Consumer price indexes are seasonally adjusted and detrended by the Hodrick-Prescott filter.

Table A5.1. Correlation of quarterly exchange rate-adjusted consumer prices

a. Precrisis 1988–1995

Economy	PRC	HKG	IND	INO	JPN	KOR	MAL	PHI	SIN	TAP	THA
HKG	0.19										
India	0.64	0.48									
Indonesia	0.13	-0.64	0.11								
Japan	0.36	-0.67	0.09	0.73							
Korea, Rep. of	0.75	0.01	0.66	0.32	0.54						
Malaysia	0.3	0.15	0.66	0.19	0.11	0.26					
Philippines	-0.27	0.69	-0.11	-0.64	-0.76	-0.46	-0.26				
Singapore	0.19	0.26	0.16	-0.15	0.02	0.4	-0.05	0.03			
Taipei,China	-0.06	0.53	0.15	-0.59	-0.51	-0.01	-0.1	0.4	0.11		
Thailand	0.57	0.18	0.26	0.18	0.22	0.34	-0.11	0.22	-0.07	-0.05	
Viet Nam	0.79	0.51	0.31	-0.35	-0.88	-0.44	-0.64	0.53	-0.63	0.27	0.86

b. Post-crisis 1999–2007

Economy	PRC	HKG	IND	INO	JPN	KOR	MAL	PHI	SIN	TAP	THA
HKG	0.75										
India	0.52	0.63									
Indonesia	0.71	0.59	0.76								
Japan	0.63	0.62	0.65	0.45							
Korea, Rep. of	0.23	0.17	-0.31	-0.2	0.01						
Malaysia	0.68	0.68	0.78	0.81	0.63	-0.43					
Philippines	0.61	0.79	0.19	0.16	0.39	0.34	0.3				
Singapore	-0.09	0.12	-0.33	-0.34	-0.01	0.14	-0.14	0.45			
Taipei,China	0.37	0.45	0.1	0.1	0.28	-0.11	0.42	0.53	0.46		
Thailand	0.69	0.82	0.67	0.66	0.64	-0.17	0.86	0.57	0.18	0.66	
Viet Nam	0.72	0.8	0.54	0.58	0.74	0.17	0.59	0.47	-0.14	0.49	0.72

HKG = Hong Kong, China; PRC = People's Republic of China.

Note: Data include first quarter of 1999 to fourth quarter of 2007, except for Viet Nam, which ends on the second quarter of 2006.

Sources: Data from IMF various years. International Financial Statistics. Available: <http://www.imfstatistics.org> (accessed 2008); and CBRC 2008. Financial Statistics Monthly. Available: <http://www.cbc.gov.tw> (accessed April 2008).

Methodological note 5.3.

Vector autoregression analysis

To examine the nature of macroeconomic interdependence in Asia, a vector autoregression (VAR) model has been estimated for an Asian economy, consisting of three equations representing global, Japanese, and regional outputs. Consider the following moving average representation:

$$\begin{aligned} (1) \quad X_t &= \sum \phi_{1j} u_{t-j} + \sum \phi_{2j} v_{t-j} + \sum \phi_{3j} w_{t-j} \\ (2) \quad Y_t &= \sum \lambda_{1j} u_{t-j} + \sum \lambda_{2j} v_{t-j} + \sum \lambda_{3j} w_{t-j} \\ (3) \quad Z_t &= \sum \eta_{1j} u_{t-j} + \sum \eta_{2j} v_{t-j} + \sum \eta_{3j} w_{t-j} \end{aligned}$$

where X_t is real gross domestic product (GDP) in the United States (US) and Europe (henceforth referred to as “global”); Y_t , real GDP in Japan; and Z_t , real GDP in the rest of Asia (referred to as “regional”), all expressed as indexes in order to remove the influence of nominal exchange rate changes; and u is a shock to global GDP (a global shock), v is a shock to Japanese GDP (a Japan shock), and w is a shock to regional GDP (a regional shock). Knowing how regional GDP (Z) responds to the past global and Japan shocks is particularly interesting, before and after the currency crisis of 1997/98.

The extremely simplified setup of equations (1–3) is dictated by the small number of observations, especially when the data are divided into the pre- and post-crisis periods. Even with this setup, data limitations have restricted the coverage of countries and the choice of sample period. The estimation of a VAR system is often sensitive to the choice of particular strategy (e.g., detrending method, order of inversion, and lag length). For this exercise, the popular Hodrick-Prescott filter is used to detrend the data. In addition, it is assumed that global GDP affects both Japanese and regional GDPs, Japanese GDP affects only regional GDP, and regional GDP affects neither. The Akaike information criterion is used to determine lag length.

Sample

The sample countries include (1) for Asia—the PRC; Hong Kong, China; India; Indonesia; Japan; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; and Thailand; and (2) for the rest of the world—Belgium, France, Germany, Italy, the Netherlands, Spain, the US, and the United Kingdom. Global and regional GDPs are the weighted averages of the individual country GDPs in each region,

with 2000 US dollar GDPs used as the weights. The precrisis period refers to Q1:1988–Q4:1996; the post-crisis period covers Q1:1999–Q4:2006. The underlying data are from Oxford Economics, Quarterly Model, February 2007, as supplied to the Asian Development Bank’s Economics and Research Department.

Analysis of shocks

VAR is a standard statistical procedure to investigate how shocks are transmitted from one entity to another. Using this statistical procedure, a shock that originates within the region (a regional shock) and a shock that originates in the rest of the world (a global shock) are considered, and two measures of the responsiveness of regional output to these shocks are computed. The first measure is how much of the total variance of regional output is explained by the variance of respective shocks. The second measure is the response of regional output to a 1 standard deviation shock to global and regional output. In order to quantify the evidence of growing macroeconomic interdependence, these measures are compared before and after the crisis.

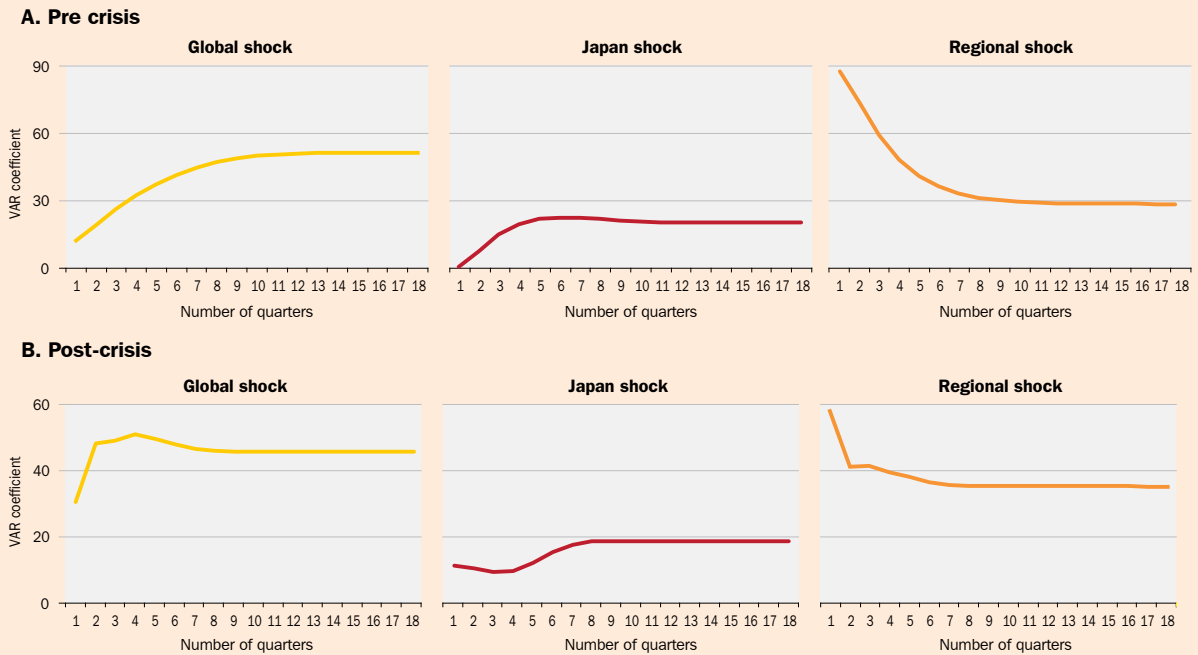
Results

Two sets of charts (Figure A5.2 and Figure 5.2, in the main text) describe the results of estimating a VAR model that consists of global GDP, Japanese GDP, and regional GDP. After estimating several alternative VAR specifications, the best results were obtained when Japanese GDP (which accounted for about 60% of the region’s GDP in 2000) was separated from regional GDP.⁷⁶ The results became less robust when PRC output was also separated out of regional output. With the PRC separated, the impact of a Chinese shock on regional output became larger after the crisis, but the impact is much smaller than the impact of a regional, Japan, or global shock. This may reflect the possibility that, though the impact of PRC growth on the rest of the region has risen, part of PRC demand is a conduit for global demand (as parts and components are supplied to the PRC for final exports to the rest of the world) and the PRC competes with neighboring economies in the medium- to low-tech industries (Haltmaier et al. 2007).

Figure A5.2 indicates the variance of regional GDP that can be explained by a global shock, a Japan shock, and a regional shock. Before the crisis, almost 90% of the variance of Asia’s GDP (outside

⁷⁶ Japan’s share subsequently declined to less than 50%.

Figure A5.2. Variance decomposition of Asian GDP (in percent of total)



VAR = Vector autoregression.
 Sources: Calculated by Shinji Takagi. Data from IMF various years. International Financial Statistics. Available: <http://www.imfstatistics.org> (accessed October 2007); and CBRC. 2007. Financial Statistics Monthly. Available: www.cbc.gov.tw (accessed October 2007).

Japan) was explained by a regional shock, with only 10% explained by a global shock, although the regional shock's impact began to decline over time to 30%, while the global impact increased to 50%. The percentage of the variance explainable by a Japan shock was nil in the current period, though it rose to 20% over time. Following the crisis, the percentage of the variance explainable by a regional shock fell to 60% (while those attributable to global and Japan shocks rose to 30% and 10%, respectively, from 10% and 0%), though the long-run decline is smaller (to 40%).

The other set of charts (Figure 5.2, main text) shows the responses of Asia's GDP to a 1 standard deviation shock to global, Japan, and regional GDP. Before the crisis, regional GDP responded significantly only to a regional shock (in each graph, the red dotted lines indicate a confidence interval). If anything, the response to a global or Japan shock was negative. Following the crisis, however, regional output became significantly responsive to all shocks, and the response to a global shock as well as a Japan shock became positive. Coupled with the results of the foregoing variance decomposition, the overall VAR results seem to indicate evidence of greater macroeconomic interdependence for the 11 Asian economies, both with Japan and with the rest of the world during the post-crisis period.

Methodological note 5.4. Frankel-Wei weights for individual currencies

The Frankel-Wei methodology (Frankel and Shang 1994) is applied to estimate the following regression equation:

$$\Delta \log e_t^0 = \alpha_0 + \alpha_1 \Delta \log e_t^1 + \alpha_2 \Delta \log e_t^2 + \alpha_3 \Delta \log e_t^3 + \varepsilon_t$$

where e^0 is the exchange rate of an Asian (home) currency, e^1 the exchange rate of the United States (US) dollar, e^2 the exchange rate of the euro (or previously the Deutsche mark), and e^3 the exchange rate of the Japanese yen, all against the United Kingdom (UK) pound (chosen as the numeraire because it is the only widely traded third currency that is presumably not highly correlated with the euro or the Deutsche mark); α_0 , α_1 , α_2 , and α_3 are coefficients to be estimated; Δ is a random error; Δ is a first difference operator; and t is a time subscript. The underlying data are from IMF (2007b); and for Taipei, China only, CRBC (2007).

Table A5.2. Frankel-Wei regression estimates for selected Asian currencies

Currency	January 1988-December 1996			January 2000-December 2006		
	US dollar (α_1)	Deutsche mark (α_2)	Japanese yen (α_3)	US dollar (α_1)	Euro (α_2)	Japanese yen (α_3)
Chinese renminbi	1.05*** (0.00)	-0.04 (0.88)	0.04 (0.85)	1.01*** (0.00)	0.02 (0.27)	-0.01 (0.60)
Hong Kong dollar	1.00*** (0.00)	0.01 (-0.14)	-0.01 (0.23)	0.99*** (0.00)	0.01 (0.24)	-0.00 (0.87)
Indian rupee	0.96*** (0.00)	0.08 (-0.6)	0.12 (0.30)	0.85*** (0.00)	-0.01 (0.81)	0.10** (0.03)
Indonesian rupiah	0.97*** (0.00)	0.01 (-0.3)	0.01 (0.18)	0.70** (0.02)	0.28 (0.36)	0.25 (0.30)
Korean won	0.96*** (0.00)	-0.03 (-0.48)	0.09*** (0.01)	0.51*** (0.00)	-0.15 (0.18)	0.45*** (0.00)
Malaysian ringgit	0.84*** (0.00)	0.09 (0.16)	0.07 (0.13)	1.01*** (0.00)	0.01 (0.29)	-0.00 (0.70)
Philippine peso	1.04*** (0.00)	-0.19* (-0.1)	-0.06 (0.47)	0.86*** (0.00)	0.19* (0.09)	0.04 (0.65)
Singapore dollar	0.71*** (0.00)	0.10*** (0.01)	0.13*** (0.00)	0.63*** (0.00)	0.16*** (0.01)	0.22*** (0.00)
New Taiwan dollar	0.87*** (0.00)	0.00 (0.96)	0.10* (0.07)	0.74*** (0.00)	0.05 (0.44)	0.15*** (0.00)
Thai baht	0.82*** (0.00)	0.05*** (0.00)	0.11*** (0.00)	0.62*** (0.00)	0.18* (0.09)	0.19** (0.02)
Vietnamese dong	0.46 (0.56)	0.78 (0.52)	0.22 (0.80)	1.00*** (0.00)	0.00 (0.99)	0.01 (0.48)

Estimates' significance level:

*** significant at $\alpha=0.01$; ** significant at $\alpha=0.05$; and * significant at $\alpha=0.10$

Notes: Values refer to coefficients of the regression estimates; those in parentheses are the p-values.

Sources: Frankel and Shang 1994. Data from IMF various years. International Financial Statistics. Available: <http://www.imfststatistics.org> (accessed March); and CBRC 2008. Financial Statistics Monthly. Available: <http://www.cbc.gov.tw> (accessed March).

The estimated coefficients (based on monthly data), along with their p-values, for 11 Asian currencies for 1988–1996 and 2000–2006 are in Table A5.2.

Although the US dollar remains the most important currency, its weight declines for most currencies. The vector autoregression (VAR) analysis of Chow (2006) confirms the smaller impact of the US dollar on the exchange rates of major regional currencies, including the Indonesian rupiah, the Korean won, the Philippine peso, and the Thai baht, during the post-crisis period. In contrast, the weight of the Japanese yen becomes significant in the post-crisis period for the Indian rupee, the Korean won, the Singapore dollar, the Thai baht, and the New Taiwan dollar; it increases by five times for the Korean won and almost doubles for the Singapore dollar and the Thai baht. These results are corroborated by Ogawa and Yoshimi (2007) who, on the basis of daily data, came to a similar conclusion, especially for the Thai baht and the Singapore dollar.¹

¹ Ogawa and Yoshimi (2007) further show that the weight of the yen was statistically significant for the Malaysian ringgit (0.11) and for the Myanmar kyat (0.07) during the year 2006. The yen's weight for the Korean won, however, becomes numerically quite small in daily data, suggesting that the exchange rate is managed with reference to the US dollar, the intervention currency, on a daily basis. Fukuda (2002), also based on daily data, shows that the weight of the yen was very high for the Malaysian ringgit (0.90), the Thai baht (0.75), and the Singapore dollar (0.65) during the immediate post-crisis period prior to the pegging of the ringgit to the US dollar, indicating the incentives of these countries to maintain exchange rate stability against each other's currency.

