# Exchange Rate Regimes and Macroeconomic Management in Asia

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## Asian Exchange Rate Regimes A Decade since the 1997–98 Crisis<sup>1</sup>

## 1. Introduction

An immediate lesson that many observers appear to have drawn from the financial crises in emerging market economies in the 1990s is that the only viable exchange rate option boils down to one between flexibility on the one hand, and "credible pegging" on the other. According to this view (which was dominant in the late 1990s and early 2000s but still has a number of followers), emerging economies have to gravitate to one of these two extremes. Any currency arrangements that lie in between these polar extremes or corners (i.e., those in the "middle") are viewed as being inherently unstable and crisis-prone.

It used to be commonly believed that this so-called "bipolar view" drew analytical support from the "Impossible Trinity" which essentially states that a country with an open capital account cannot simultaneously conduct a completely independent monetary policy and pursue a completely rigid or fixed exchange regime. However, the Impossible Trinity does not on its own imply that in an increasingly globalized world economy an intermediate regime is unviable, or that countries will be compelled to abandon the middle ground,<sup>2</sup> For instance, a country could choose to maintain an intermediate exchange rate regime while forsaking a degree of monetary policy autonomy. In other words, the analytical basis in support of the bipolar view is rather weak (particularly since some developing countries still maintain capital controls that are not entirely porous). Indeed, the only analytical support offered against intermediate regimes is their lack of verifiability or transparency; simple regimes are more verifiable by market participants than complicated ones (Frankel, Schmukler and Serven, 2000). The other commonly repeated weakness of intermediate regimes is that they are more crisis-prone (Bubula and Ötker-Robe, 2003). However, a more careful examination of the links between de facto exchange rate regimes and currency crises suggests that there is no evidence that either of the two corners is necessarily less crisis-prone than intermediate regimes in general.3

#### Exchange Rate Regimes

The remainder of this chapter in organized as follows. The next section compiles and discusses the de jure or official exchange rate regimes in various Asian economies.4 Recognizing that countries do not always follow their policy pronouncements, section 3 presents some simple de facto exchange rate regime measures for selected Asian countries. Since different measures inevitably capture different characteristics of any regime, it is critical to use a number of methodologies as an attempt to provide some robustness to the results. To preview the main conclusions from sections 2 and 3, it is evident that Asia is home to a wide array of exchange rate regimes, though there are signs of gradual movement towards somewhat greater exchange rate flexibility in many Asian countries. However, the propensity for foreign exchange intervention and exchange rate management among regional central banks remains fairly high in many instances. Section 4 discusses the analytical reasons that have motivated the move towards greater exchange rate flexibility in Asia in general, but also the reasons why many Asian economies continue to remain circumspect about adopting a flexible regime per se. Section 5 concludes the chapter.

## 2. Official Exchange Rate Regimes in Asia

Until 1998 it was fairly easy to obtain *de jure* exchange rate classifications as this data was compiled from national sources by the IMF. Specifically, between 1975 and 1998 the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions was based on self-reporting of national policies by various governments with revisions in 1977 and 1982. Since 1998 — and in response to criticisms that there can be significant divergences between *de facto* and *de jure* policies — the IMF's exchange rate classification methodology has shifted to compiling unofficial policies of countries as determined by Fund staff.<sup>5</sup> While the change in 1MF exchange rate coding is welcome for many reasons (including the fact that the new set of categories is more detailed than the older one), the IMF is no longer compiling the *de jure* regimes. The only way this can be done is by referring to the website of each central bank or other national sources individually and wading through relevant materials. The results of this detective work are summarized in Table 1.<sup>6</sup>

As is apparent, the *de jure* exchange rate regimes in Asia span a wide spectrum. A number of smaller Asian economies appear to prefer some form of single currency pegs. This is true of the Hong Kong SAR (whose currency board arrangement is pegged to the US dollar), Brunei (pegged to the Singapore dollar) and Bhutan and Nepal (pegged to the Indian rupee). In contrast, Bangladesh, Sri Lanka and the crisis-hit economies of Indonesia, Korea, the Philippines and Thailand officially operate flexible exchange rate regimes. The flexible exchange rates in the four East Asian countries are accompanied by inflation targeting frameworks (see chapter 2).

A number of other Asian countries have adopted a variety of intermediate regimes (currency baskets, crawling bands, adjustable pegs and such). For instance, 
 Table 1 De jure Exchange Rate Regimes in Asia

 (As per Country Central Bank Websites unless otherwise stated)

| Country  | Official Policy Pronouncements (direct quotes)  |
|--|---|
| Bangladesh   | The exchange rates of the taka for inter-bank and customer transactions<br>are set by the dealer banks themselves, based on demand-supply interaction.<br>The Bangladesh Bank is not present in the market on a day-to-day basis<br>and undertakes purchase or sale transactions with the dealer banks only as<br>needed to maintain orderly market conditions. |
| Bhutan   | Except for the Indian rupee to which the ngultrum is pegged at parity, and which circulates freely in Bhutan, paying or receiving payments in any other foreign currency for transactions in Bhutan is illegal.   |
|  | The Government may, by order, at any time, on the recommendation of<br>the Board, declare an external value for the ngultrum, having due regard<br>for the obligations which Bhutan has assumed in accordance with the<br>provisions of any international monetary agreement to which it is a party,<br>or to which it has adhered.                             |
| Brunei-<br>Darussalam' A currency interchangeability agreement was established between Sing<br>and Brunei Darussalam, which remains in effect till today and contin<br>play a central role in relations between the two countries. This agree<br>allows both countries to interchange their currencies at par without<br>country running the risk of currency exchange rate fluctuations which<br>further facilitates trade and commerce between the two countries<br>individual currencies are acceptable as customary tender when circu-<br>in the country in which they are not legal tender. |   |
| Cambodia N.A.  |   |
| China China announced on July 21, 2005 the adoption of a managed fle<br>exchange rate regime based on market supply and demand with refe<br>to a basket of currencies. Since then, the new exchange rate syster<br>operated stably, and the RMB exchange rate has been kept basically<br>at an adaptive and equilibrium level. The exchange rate of the RMB a<br>the US dollar has been moving both upward and downward with g<br>flexibility.   |   |
| Hong Kong<br>SAR<br>SAR<br>Since 1983 the Hong Kong dollar has been linked to the US dollar at<br>rate of HK\$7.8 to US\$ 1. The link is maintained through the operatio<br>strict and robust Currency Board system which requires both the stoc<br>the flow of the Monetary Base to be fully backed by foreign reserves<br>change in the size of the Monetary Base has to be fully matched<br>corresponding change in the foreign reserves.   |   |
| India The exchange rate policy in recent years has been guided by principles of careful monitoring and management of exchange flexibility, without a fixed target or a pre-announced targe coupled with the ability to intervene if and when necessary.  |   |

| Indonesia   | In July 2005, Bank Indonesia launched a new monetary policy framework<br>known as the Inflation Targeting Framework, which has four basic elements<br>as follows: (1) use of the BI rate as a reference rate in monetary control in<br>replacement of the base money operational target, (2) forward looking<br>monetary policymaking process, (3) more transparent communications<br>strategy, and (4) strengthening of policy coordination with the Government.<br>The rupiah exchange rate is determined wholly by market supply and<br>demand. However, Bank Indonesia is able to take some actions to keep the   |
|---|---|
| Korea   | rupiah from undergoing excessive fluctuation.<br>Inflation targeting is an operating framework of monetary policy in which<br>the central bank announces an explicit inflation target and achieves its<br>target directly. This is based on the recognition that to achieve sustainable<br>economic growth, it is important above all else that inflation expectations,<br>which have a great effect on wage and price decisions, should be stabilized.<br>In this regard, inflation targeting places great emphasis on inducing inflation<br>expectations to converge on the central bank's inflation target level by the<br>prior public announcement and successful attainment of that target level. |
|   | demand in the foreign exchange markets. However, the Bank of Korea<br>implements smoothing operations to deal with abrupt swings in the exchange<br>rate caused by temporary imbalances between supply and demand, or radical<br>changes in market sentiment.   |
| Laos The Bank of Laos announces the exchange rate derived from t<br>and officially adjusted, based on the daily average trading rate o<br>bank market to the commercial banks and the foreign exchange<br>a reference to determine their own daily trading rates. In case of<br>the Bank of Laos determines the exchange rate on its ow<br>commercial banks and foreign exchange bureaus for implementa |   |
| Malaysia  | On July 21, 2005, Malaysia shifted from a fixed exchange rate regime of USD1 = RM3.80 to a managed float against a basket of currencies. Under the managed float system, the ringgit exchange rate is largely determined by ringgit demand and supply in the foreign exchange market. The Central Bank does not actively manage or maintain the exchange rate at any particular level — economic fundamentals and market conditions are the primary determinants of the level of the ringgit exchange rate. In this regard, the Central Bank intervenes only to minimize volatility, and to ensure that the exchange rate does not become fundamentally misaligned.                                     |
| Myanmar   | N.A.  |
| Nepal   | In the review year, the exchange rate of the Nepalese rupee vis-à-vis the<br>Indian rupee remained constant, and NRB intervened 44 times in the foreign<br>exchange market. Currently, Nepal is adopting a dual exchange rate<br>arrangement. It is dual because the Nepali currency is pegged to the Indian<br>currency (IC), whereas it floats with the convertible currencies. This system<br>of exchange rate was introduced on February 12, 1993.  |

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| Pakistan <sup>2</sup> | Pakistan has adopted the floating inter-bank exchange rate as the preferred option since 2001. State Bank of Pakistan has attempted to maintain real effective exchange rate at a level that keeps the competitiveness of Pakistani exports intact. But, like other Central Banks, it does intervene from time to time to keep stability in the market and smooth excessive fluctuations. The current framework of monetary-cum-exchange rate policies and the underlying economic analysis in Pakistan can, thus, be broadly characterized as judgment — and discretion-based rather than model — or rule-based.  |
|-----------------------|--|
| Philippines           | The primary objective of Bangko Sentral ng Pilipinas' monetary policy is<br>to promote a low and stable inflation conducive to a balanced and sustainable<br>economic growth. The adoption of inflation targeting framework for<br>monetary policy in January 2002 is aimed at achieving this objective.<br>The Monetary Board determines the exchange rate policy of the country,<br>determines the rates at which the Bangko Sentral buys and sells spot<br>exchange, and establishes deviation limits from the effective exchange rate<br>or rates as it deems proper.  |
| Singapore             | Since 1981, monetary policy in Singapore has been centred on the management of the exchange rate. (1) The Singapore dollar is managed against a basket of currencies of its major trading partners and competitors. (2) The Monetary Authority of Singapore operates a managed float regime for the Singapore dollar. The trade-weighted exchange rate is allowed to fluctuate within an undisclosed policy band, rather than kept to a fixed value. (3) The exchange rate policy band is periodically reviewed to ensure that it remains consistent with the underlying fundamentals of the economy. (4) The choice of the exchange rate as the intermediate target of monetary policy implies that MAS gives up control over domestic interest rates (and money supply). |
| Sri Lanka             | The Central Bank continues to conduct its monetary policy under an independently floating exchange rate regime within a framework of targeting monetary aggregates with reserve money (i.e., high powered money) as the operating target and broad money (M2b) as the intermediate target.   |
| Taiwan                | Prior to February 1979, management of foreign exchange in Taiwan was<br>characterized by a central clearing and settlement system. Following the<br>establishment of the Taipei Foreign Exchange Market in February 1979, a<br>flexible exchange rate system was formally implemented. Since then, the<br>NT dollar exchange rate has been determined by the market. However,<br>when the market is disrupted by seasonal or irregular factors, the Bank<br>will step in.  |
| Thailand              | Since July 2, 1997, Thailand has adopted the managed-float exchange rate regime, in which the value of the baht is determined by market forces, namely demand and supply in both on-shore and off-shore foreign exchange market, to let the currency move in line with economic fundamentals. The Bank of Thailand will intervene in the market only when necessary, in order to prevent excessive volatilities and achieve economic policy targets. Under the inflation targeting framework, the Bank of Thailand implements its monetary policy by influencing short-term money market rates via the selected key policy rate, currently set at the 14-day repurchase rate.  |

| Vietnam | Vietnam has adopted a crawling peg with the US dollar for its exchange<br>rate. The State Bank of Vietnam sets the official exchange rate daily, and<br>commercial banks set their dealing rate within a trading band of plus or |
|---------|--|
|         | minus 0.25 percent. The State Bank of Vietnam tends to keep the dong depreciated against the US dollar by keeping the exchange rate on an upward trend.  |

 Based on information available from Brunei Ministry of Finance. http://www.finance. gov.bn/bcb/bcb\_index.htm.

2) Based on speech by former Pakistan central bank Governor (Husain, 2005).

Source: Compiled by author with assistance of Nicola Virgill from websites from various central banks and other official sources with minor modifications. Central Bank websites available here: http://www.bis.org/cbanks.htm.

according to the Reserve Bank of India (RBI), India "monitors and manages the exchange rates with flexibility without a fixed target or a pre-announced target or a band, coupled with the ability to intervene if and when necessary".<sup>7</sup> Vietnam officially maintains a crawling peg and band around the US dollar. Singapore officially manages its currency against a basket of currencies, with the trade-weighted exchange rate used as an intermediate target to ensure that the inflation target is attained.<sup>8</sup> While Singapore's currency basket regime follows a more strategic orientation, both China and Malaysia in July 2005 officially shifted to what may be best referred to as a more mechanical version of a currency basket regime (i.e., keeping the trade-weighted exchange rate within a certain band as a goal in and of itself). The remaining Asian economies, viz., Taiwan, Pakistan and Laos, seem to operate rather ad hoc managed floats or adjustable pegs. Overall therefore, it is readily apparent that "one-size does not necessarily fit all" when it comes to the choice of exchange rate regimes in Asia.

## 3. De Facto Exchange Rate Regimes in Crisis-hit Asia

## 3.1 Existing Classifications

As noted, the IMF has replaced its compilation of the *de jure* exchange rate regimes with the behavioural classification of exchange rates. The new IMF coding is based on various sources, including information from IMF staff, press reports, other relevant papers, as well as the behaviour of bilateral nominal exchange rates and reserves.<sup>9</sup> Table 2a summarizes the definitions of various IMF exchange rate classifications. As is apparent, the IMF has eight exchange rate categories. Table 2b reclassifies the original IMF definitions into three broad categories, viz., "hard peg", "soft peg" and "floating regimes".<sup>10</sup> Table 3 categorizes Asian exchange rates based on the new IMF classifications as of July 2006.

| Туре  | Description  |  |
|---|--|--|
| Exchange<br>Arrangements with<br>No Separate Legal<br>Tender  | The currency of another country circulates as the sole legal tend<br>(formal dollarization), or the member belongs to a monetary<br>currency union in which the same legal tender is shared<br>members of the union. Adopting such regimes implies the comple<br>surrender of the monetary authorities' independent control ov<br>domestic monetary policy.  |  |
| Currency Board<br>Arrangements  | A monetary regime based on an explicit legislative commitment<br>to exchange domestic currency for a specified foreign currency at<br>a fixed exchange rate, combined with restrictions on the issuing<br>authority to ensure the fulfilment of its legal obligation. This<br>implies that the domestic currency will be issued only against<br>foreign exchange and that it remains fully backed by foreign assets,<br>eliminating traditional central bank functions, such as monetary<br>control and lender-of-last-resort, and leaving little scope for<br>discretionary monetary policy. Some flexibility may still be<br>afforded, depending on how strict the banking rules of the currency<br>board arrangement are. |  |
| Other<br>Conventional Fixed<br>Peg ArrangementsThe country (formally or de facto) pegs its currency at<br>to another currency or a basket of currencies, where th<br>formed from the currencies of major trading or finance<br>and weights reflect the geographical distribution of tradi-<br>or capital flows. The currency composites can also be st<br>as in the case of the SDR. There is no commitment to<br>parity irrevocably. The exchange rate may fluctuate with<br>margins of less than ±1 percent around a central r<br>maximum and minimum value of the exchange rate ray<br>within a narrow margin of 2 percent for at least three n<br>monetary authority stands ready to maintain the fixed par<br>direct intervention (i.e., via sale/purchase of foreign exchange<br>r exercise of moral suasion that constrains foreign exchange<br>or through intervention by other public institutions). Fl<br>monetary policy, though limited, is greater than in<br>exchange arrangements with no separate legal tender ar<br>boards because traditional central banking function<br>possible, and the monetary authority can adjust the l |  |  |
| Pegged Exchange<br>Rates within<br>Horizontal Bands   | The value of the currency is maintained within certain margins of<br>fluctuation of at least ±1 percent around a fixed central rate or the<br>margin between the maximum and minimum value of the exchange<br>rate exceeds 2 percent. It also includes arrangements of countries<br>in the exchange rate mechanism (ERM) of the European Monetary<br>System (EMS) that was replaced with the ERM II on January 1,<br>1999. There is a limited degree of monetary policy discretion,<br>depending on the bandwidth.   |  |

## Table 2a IMF Descriptions of Exchange Rate Regimes

| Crawling Pegs   | The currency is adjusted periodically in small amounts at a fixed<br>rate or in response to changes in selective quantitative indicators,<br>such as past inflation differentials vis-à-vis major trading partners,<br>differentials between the inflation target and expected inflation in<br>major trading partners, and so forth. The rate of crawl can be set<br>to generate inflation-adjusted changes in the exchange rate<br>(backward looking), or set at a pre-announced fixed rate and/or<br>below the projected inflation differentials (forward looking).<br>Maintaining a crawling peg imposes constraints on monetary policy<br>in a manner similar to a fixed peg system.   |
|---|--|
| Exchange Rates<br>within Crawling<br>Bands                                    | The currency is maintained within certain fluctuation margins of<br>at least $\pm 1$ percent around a central rate — or the margin between<br>the maximum and minimum value of the exchange rate exceeds 2<br>percent — and the central rate or margins are adjusted periodically<br>at a fixed rate or in response to changes in selective quantitative<br>indicators. The degree of exchange rate flexibility is a function of<br>the bandwidth. Bands are either symmetric around a crawling<br>central parity or widen gradually with an asymmetric choice of<br>the crawl of upper and lower bands (in the latter case, there may<br>be no pre-announced central rate). The commitment to maintain<br>the exchange rate within the band imposes constraints on monetary<br>policy, with the degree of policy independence being a function<br>of the bandwidth. |
| Managed Floating<br>with No<br>Predetermined<br>Path for the<br>Exchange Rate | The monetary authority attempts to influence the exchange rate<br>without having a specific exchange rate path or target. Indicators<br>for managing the rate are broadly judgmental (e.g., balance of<br>payments position, international reserves, parallel market<br>developments), and adjustments may not be automatic. Intervention<br>may be direct or indirect.  |
| Independently<br>Floating   | The exchange rate is market-determined, with any official foreign<br>exchange market intervention aimed at moderating the rate of<br>change and preventing undue fluctuations in the exchange rate,<br>rather than at establishing a level for it.   |

Source: Taken directly from IMF website on Classification of Exchange Rate Arrangements and Monetary Frameworks. http://www.imf.org/external/np/mfd/er/2006/eng/0706.htm

| Table 2b Bro | ad Categorization | is of Exchange | Rate Regimes |
|--------------|-------------------|----------------|--------------|
|--------------|-------------------|----------------|--------------|

| Hard Pegs   | Soft Pegs               | Floating Regimes   |
|---|-------------------------|--------------------|
| Exchange Arrangements with                              | Conventional fixed pegs | Independent floats |
| No Separate Legal Tender<br>(includes Dollarization and | Horizontal band         | Managed floats     |
| Currency Union)   | Crawling peg            |                    |
| Currency Board  | Crawling band           |                    |

Source: Using IMF *de facto* classifications (see Table 2a) recategorized based on Bleaney and Francisco (2005).

| Country   | As of July 2006  |
|---|--|
| Bangladesh  | Managed floating with no predetermined path.                           |
| Bhutan  | Other conventional fixed peg arrangement (against a single currency).  |
| Brunei Darussalam   | Currency board arrangement.  |
| Cambodia  | Managed floating with no predetermined path.                           |
| China   | Other conventional fixed peg arrangements.                             |
| Hong Kong SAR   | Currency board arrangement.  |
| India   | Managed floating with no predetermined path.                           |
| Indonesia   | Independently floating.  |
| Japan   | Independently floating.  |
| Korea   | Independently floating.  |
| Laos  | Managed floating with no predetermined path.                           |
| Malaysia  | Managed floating with no predetermined path.                           |
| Myanmar   | Managed floating with no predetermined path.                           |
| Nepal   | Conventional pegged arrangement (against a single currency).           |
| Pakistan  | Other conventional fixed peg arrangements (against a single currency). |
| Philippines   | Independently floating.  |
| Singapore   | Managed floating with no predetermined path.                           |
| Sri Lanka   | Managed floating with no pre-determined path.                          |
| Thailand  | Managed floating with no predetermined path.                           |
| Vietnam Other conventional fixed peg arrangements (against a single cur |  |

Table 3 De facto IMF Exchange Rate Classifications as of July 2006

Source: IMF data on Classification of Exchange Rate Arrangements and Monetary Frameworks. http://www.imf.org/external/np/mfd/er/2006/eng/0706.htm

As is apparent from a comparison of Tables 1 and 3, there is no discrepancy between the *de jure* and *de facto* regimes of Bhutan, Brunei, Hong Kong SAR and Nepal, all of which operate fixed exchange rates to a single currency. Similarly, India, Lao PDR and Singapore are categorized as managed floaters, broadly consistent with their official pronouncements. Vietnam, which used to be in this category, has more recently been classified as having a conventional fixed peg regime, in contrast to its official pronouncement of maintaining a crawling peg and band around the US dollar. Bangladesh, Sri Lanka and Thailand have been characterized as managed floaters (with no predetermined exchange rate path) despite their official declarations of being independent floaters. Pakistan is defined as operating conventional fixed peg arrangements (against a single currency) despite proclaiming to be an independent floater. Japan, Korea and the Philippines are characterized as independent floaters, consistent with their official assertions.<sup>11</sup> Contrary to the public pronouncement of the Chinese authorities that the currency is a based on a currency basket, recent empirical studies suggest the *de facto* regime appears to be a soft peg to the US dollar with the IMF classifying China under "other conventional fixed peg arrangements".<sup>12</sup> The Malaysian ringgit since its official depegging is defined as being a managed floater with no predetermined path. This is consistent with empirical analysis which suggests that the ringgit closely tracks a trade-weighted basket since its depegging in July 2005, not unlike the Singapore dollar.

In their seminal paper, Reinhart and Rogoff (2004) develop a so-called "natural classification" based on market information such as black market or parallel rates (rather than official rate), the statistical behaviour of exchange rate, reserves and interest rates as well as country chronologies using a five-year window (to prevent sporadic exchange rate changes). The authors apply the methodology to 153 countries from 1946 to 2001 and find, among other things, that nearly half of the "official pegs" are better characterized as managed or freely floating arrangements or limited flexibility.<sup>13</sup> More generally, once one uses *de facto* classifications, the bipolar view on exchange rate regimes which was based largely on *de jure* exchange rate classification is no longer obvious. This is also borne out in the case of *de facto* IMF coding for Asia. Referring to Figure 1, while there has been a discernible trend towards greater exchange rate flexibility from 1998 to 2003, there was a slight reversion to soft dollar pegs in the last two years.<sup>14</sup>

Unlike the new IMF classification, Reinhart and Rogoff are careful to distinguish between a flexible exchange rate regime and one that is freely falling rate *per se*. They define the latter as episodes in which the 12-month rate of inflation equals or exceeds 40 percent unless there is some type of pre-announced or narrow band. The authors also define the six-month period immediately after a crisis as being freely falling if there is a sudden transition from a fixed or quasi-fixed to more flexible exchange rate regime. Thus, in 1998, while the IMF codes Indonesia, Korea and Thailand as "independently floating". Reinhart-Rogoff more accurately characterize them as "freely falling".<sup>15</sup> Notwithstanding this difference, by and large, the IMF and Reinhart-Rogoff reach the same conclusion regarding the Asian currency arrangements. While the more detailed classifications of Reinhart-Rogoff make it preferable to the IMF coding, the latter is far more frequently updated than the former.<sup>16</sup> Somewhat surprisingly, both the IMF and Reinhart-Rogoff coding characterize Japan and Korea as independently floating despite the sharp reserve build-up in both countries (Willett, Kim and Nitithanprapas, 2005).



Figure 1 Trends in Exchange Rate Regimes among Asian Countries using IMF Classifications, 1998–2005

Notes: Hard peg refer to Exchange arrangements with no separate legal tender (includes dollarization, currency unions) and currency boards. Soft pegs refer to conventional fixed pegs, horizontal band, crawling peg and crawling band. Floating regimes refer to independent floats and managed floats. These definitions are based on Using IMF *de facto* classifications (see Table 2a) recategorized based on Bleaney and Francisco (2005). Data based on 19 Asian countries.

Since the exchange rate categories are from the IMF, no distinction is made between freely falling and freely floating *a la* Reinhart-Rogoff as discussed in the text.

Source: Compiled based on IMF data on Classification of Exchange Rate Arrangements and Monetary Frameworks with the assistance of Jeff Kim.

## 3.2 Some Simple De Facto Measures

Clearly there are a number of different ways of measuring *de facto* exchange rate regime — each offering different perspectives on the regime choices made by central banks but each possessing shortcomings in capturing all the essential characteristics of the regime as adopted by various countries. This section presents the results of two commonly used methods of measuring exchange rate regimes. The first is the Frankel-Wei (FW) method (Frankel and Wei, 1994). Here, we present the time-invariant results to the FW tests and we augment these results by reporting time-varying coefficients through recursive least squares. The second measure is an exchange rate flexibility index based on exchange market pressure (EMP) models.<sup>17</sup>

With regard to data, we use a time series of monthly observations from 1985: 1 to 2006:12 for most of the regressions except in the case of the euro where the sample is 1999:1 to 2004:12. This sub-period allows us to examine the particular significance of the euro as a major currency since it actually came into existence. Data is from the *IMF International Financial Statistics* (IFS). Exchange rates are taken from line RF (RH for the pound sterling) and the cross rates for the local currency against the yen, pound, deutschmark (DM), euro and Swiss franc are calculated from the quoted bilateral exchange rates. The DM/USD and euro/USD rate are taken from the *Pacific Exchange Rate Service*.<sup>18</sup> The countries examined are Bangladesh, Cambodia, mainland China, Indonesia, Korea, Laos, Malaysia, Nepal, Pakistan, the Philippines, Sri Lanka, Thailand, and Vietnam.<sup>19</sup>

## 3.3 Frankel-Wei Tests: Static Estimates

This section examines the degree of influence between the target currencies and a vector of major currencies that includes the USD, the Japanese yen, the UK pound and the euro. We do this by employing the well-known Frankel-Wei regressions as shown in Eq. 1 below:<sup>20</sup>

$$\Delta e_{it} = \alpha_0 + \alpha_1 \Delta U S_t + \alpha_2 \Delta I P_t + \alpha_3 \Delta U K_t + \alpha_1 \Delta E U_t + \alpha_5 \Delta D M_t + \mu_t \quad (1)$$

where *e* refers to the local currency *i* and we estimate the effect of the DM from 1985 to 1997 and the effect of the euro from 1999 to 2006 (ie  $\alpha_4=0$  for 1985–97 and  $\alpha_5=0$  for 1999–2006). All currencies are expressed in logs and the numeraire currency used is the Swiss franc.<sup>21</sup> This method essentially involves conducting an OLS test of the local currency on other currencies that are considered to influence the former.

The higher the values of  $\alpha$  coefficient corresponding to each major currency the larger is the degree of influence of that currency on the local currency. As such, a coefficient provides some information about the possible degree of fixity of the local currency to the major currency.<sup>22</sup> However, a large coefficient value does not automatically imply a pegged exchange rate: it may merely reflect naturally occurring market-driven correlations between two currencies. In this context the standard deviation of the coefficient value may provide additional useful information in the sense that a small standard deviation is more likely to imply an attempt to systematically maintain the correlation between two currencies by way of intervention (Baig, 2001).

The results of the Frankel-Wei tests are presented in Table 4. Two sets of results are presented — the first for the pre-crisis sample, 1985.1 to 1997.3 and presents the DM as one of the currencies of influence and the second is the post crisis (and indeed post-euro) sample, 1999.1 to 2006.12. It is clear from the results that the USD remains the currency with the most influence over the local currency, though in some cases, the yen, pound or DM/euro sustain some secondary influence. If one observes the relationship between the pre- and post-crisis results, it is clear that the USD has been the sole influence over the Bangladeshi taka and the Chinese yuan over both time periods under consideration. Also noteworthy is the influence of the USD. In the case of Bangladesh, China, Malaysia and Pakistan, the USD

| Dep<br>Variable    | Bangladesh -<br>Pre-crisis | Bangladesh –<br>Post-crisis | Cambodia –<br>Pre-crisis | Cambodia –<br>Post-crisis | China –<br>Pre-crisis | China –<br>Post-crisis |
|--------------------|----------------------------|-----------------------------|--------------------------|---------------------------|-----------------------|------------------------|
| Constant           | 0.002<br>(3.69)**          | 0.004<br>(2.94)**           | 0.03<br>(2.53)           | 0.001<br>(1.83)           | 0.01<br>(1.71)        | -0.0003<br>(-2.60)     |
| USD                | 1.02<br>(18.91)**          | 1.02<br>(22.41)**           | 0.54<br>(0.52)           | 0.98<br>(35.35)           | 1.09<br>(3.55)        | 0.99<br>(109.67)       |
| JPY                | 0.04<br>(1.18)             | -0.08<br>(-1.91)            | 0.23<br>(0.47)           | 0.02<br>(0.46)            | 0.07<br>(0.67)        | -0.002<br>(-0.66)      |
| DM                 | 0.04<br>(0.79)             | $\sim$                      | -0.61<br>(-0.55)         | ×                         | 0.11<br>(0.27)        |                        |
| EUR                | ~                          | -0.03<br>(-0.22)            | ~                        | -0.04<br>(-0.50)          | 8                     | 0.04<br>(1.88)         |
| Other              | -                          | -                           | ÷.                       | +                         | -                     | ÷                      |
| Adj R <sup>2</sup> | 0.96                       | 0.83                        | 0.08                     | 0.96                      | 0.43                  | 0.99                   |
| DW                 | 2.20                       | 1.67                        | 1.60                     | 1,75                      | 1.95                  | 2.03                   |
| Obs                | 145                        | 95                          | 86                       | 90                        | 145                   | 95                     |

Table 4 Frankel Wei Regression Results

| Dep<br>Variable    | Indonesia –<br>Pre-crisis | Indonesia –<br>Post-crisis | Korea –<br>Pre-crisis | Korea –<br>Post-crisis | Lao PDR –<br>Pre-crisis | Lao PDR –<br>Post-crisis |
|--------------------|---------------------------|----------------------------|-----------------------|------------------------|-------------------------|--------------------------|
| Constant           | 0.003<br>(1.94)           | 0.002<br>(0.42)            | 0.001<br>(1.24)       | -0.002<br>(-1.02)      | 0.02<br>(2.11)          | 0.01<br>(1.68)           |
| USD                | 0.88<br>(6.06)            | 0.55<br>(2.25)             | 0.93<br>(21.69)       | 0.56<br>(6.84)         | 0.94<br>(2.79)          | 0.60<br>(3.33)           |
| ЈРҮ                | 0.06<br>(1.05)            | 0.06<br>(0.28)             | 0.07<br>(3.04)        | 0,52<br>(6.27)         | -0.14<br>(-0.46)        | 0.33<br>(1.04)           |
| DM                 | -0.05<br>(-0.46)          | -                          | 0.02<br>(0.36)        |                        | -0.04<br>(-0.06)        | 1                        |
| EUR                | -                         | 1.84<br>(3.78)             |                       | 0.13<br>(0.56)         | 1                       | -0.59<br>(-1.42)         |
| Other              |                           | -                          |                       | i e                    | ÷ .                     | ÷                        |
| Adj R <sup>2</sup> | 0.70                      | 0.28                       | 0.97                  | 0.73                   | 0.02                    | 0.33                     |
| DW                 | 1.86                      | 1.96                       | 2.13                  | 1.90                   | 2.03                    | 2.09                     |
| Obs                | 145                       | 95                         | 145                   | 95                     | 146                     | 86                       |

1

Exchange Rate Regimes

| Dep<br>Variable    | Malaysia –<br>Pre-crisis | Malaysia –<br>Post-crisis | Myanmar –<br>Pre-crisis | Myanmar –<br>Post-crisis | Nepal –<br>Pre-crisis | Nepal –<br>Post-crisis |
|--------------------|--------------------------|---------------------------|-------------------------|--------------------------|-----------------------|------------------------|
| Constant           | 0.0004<br>(0.54)         | -0.001<br>(-0.99)         | 0.0002<br>(1.46)        | -0.0004<br>(-0.64)       | 0.01<br>(4.21)        | 0.0003<br>(0.41)       |
| USD                | 1.04<br>(12.38)          | 0.95<br>(31.87)           | 0.71<br>(37.05)         | 0.49<br>(24.02)          | 0.43<br>(1,37)        | 1.02<br>(21.76)        |
| ЈРҮ                | 0.08<br>(1.77)           | 0.02<br>(1.30)            | 0,19<br>(20.71)         | 0.21<br>(7.52)           | -0.06<br>(-0.82)      | 0.01<br>(0.21)         |
| DM                 | 0.21                     |                           | 0.31                    | -                        | -0.52                 | - ÷                    |
|                    | (2.06)                   |                           | (16.80)                 |                          | (-1.50)               |                        |
| EUR                | -                        | -0.04                     | -                       | 0.16                     | ~                     | 0.05                   |
|                    |                          | (-0.64)                   | 11 1                    | (0.97)                   | 1.00                  | (0.46)                 |
| Other              |                          | -                         | 0.11<br>(11.24)         |                          | 0.22<br>(2.07)        | -                      |
| Adj R <sup>2</sup> | 0.90                     | 0.95                      | 0.99                    | 0.83                     | 0.63                  | 0.91                   |
| DW                 | 1.96                     | 2.15                      | 1.51                    | 2.18                     | 2.05                  | 1.95                   |
| Obs                | 145                      | 95                        | 145                     | 94                       | 145                   | 94                     |

Table 4 (cont'd) Frankel Wei Regression Results

| Dep<br>Variable    | Pakistan –<br>Pre-crisis | Pakistan –<br>Post-crisis | Philippines –<br>Pre-crisis | Philippines –<br>Post-crisis | Sri Lanka –<br>Pre-crisis | Sri Lanka -<br>Post-crisis |
|--------------------|--------------------------|---------------------------|-----------------------------|------------------------------|---------------------------|----------------------------|
| Constant           | 0.004<br>(4.73)          | 0.002<br>(1.45)           | 0.001<br>(1.47)             | 0.002<br>(1.44)              | 0.01<br>(4.88)            | 0.004<br>(3.29)            |
| USD                | 0.95<br>(10.74)          | 0.91<br>(20.74)           | 1.16<br>(9.78)              | 0.91<br>(10.52)              | 0.88<br>(8.38)            | 1.07<br>(13.48)            |
| ЈРҮ                | -0.01<br>(-0.30)         | 0.03<br>(0.42)            | -0.06<br>(-0.98)            | 0.09<br>(1.14)               | 0.11<br>(2.05)            | 0.02<br>(0.30)             |
| DM                 | 0.05<br>(0.49)           | -                         | 0.07<br>(0.65)              |                              | -0.06<br>(-0.49)          | ~                          |
| EUR                |                          | 0.48<br>(1.76)            | -                           | 0.41<br>(1.50)               | $\sim$                    | -0.02<br>(-0.11)           |
| Other              |                          | 1                         | -                           | 9                            | -0.10<br>(-2.25)          | 1.2.                       |
| Adj R <sup>2</sup> | 0.89                     | 0.76                      | 0.87                        | 0.75                         | 0.83                      | 0.84                       |
| DW                 | 1.93                     | 1.87                      | 1.95                        | 1.93                         | 2.00                      | 2,04                       |
| Obs                | 145                      | 94                        | 145                         | 94                           | 145                       | 94                         |

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| Dep<br>Variable    | Thailand –<br>Pre-crisis | Thailand –<br>Post-crisis | Vietnam –<br>Pre-crisis <sup>d</sup> | Vietnam –<br>Post-crisis |  |
|--------------------|--------------------------|---------------------------|--------------------------------------|--------------------------|--|
| Constant           | 0.001<br>(2.21)          | 0.00<br>(0.07)            | 0.01<br>(2.37)                       | 0.002 (2.27)             |  |
| USD                | 0.81<br>(19.46)          | 0.59<br>(7.39)            | 1.55<br>(4.57)                       | 0.98<br>(29.40)          |  |
| JPY                | 0.11<br>(11.06)          | 0.15<br>(1.43)            | -0.30<br>(-1.22)                     | 0.04<br>(1.34)           |  |
| DM                 | 0.01<br>(0.22)           |                           | 0.42<br>(1.27)                       | e                        |  |
| EUR                | -                        | 0.59<br>(3.29)            |                                      | -0.22<br>(-0.66)         |  |
| Other              | 0.05<br>(2.73)           |                           | -0,21<br>(-1.74)                     | ~                        |  |
| Adj R <sup>2</sup> | 0.99                     | 0.68                      | 0.51                                 | 0.88                     |  |
| DW                 | 1.89                     | 1.82                      | 1.94                                 | 2.37                     |  |
| Obs                | 146                      | 95                        | 87                                   | 79                       |  |

Notes: (\*) represents significance at 5%. The terms in parenthesis are t statistics. The analysis involved OLS estimation of each as an Autorgressive Distributed Lag (ARDL) model. The rationale behind this is to ensure that there is no omitted variable bias due to serial correlation that often results from the exclusion of lagged dependent variables and regressors. Details of the lagged variables that were included in each specification are available upon request.

coefficient has remained quite stable between samples. There is however, a significant increase in the degree of influence of the USD post-crisis for Cambodia, Nepal and Sri Lanka and a marked decrease in the case of Indonesia, Korea, the Philippines, Thailand (all of which have adopted Inflation targeting frameworks as noted previously), as well as Vietnam and Laos.

In the post crisis sample, the euro appears to have some influence over the yuan, Indonesian rupiah, Pakistan rupee, and Thai baht.<sup>23</sup> The results for the Japanese yen are quite mixed but appears to have been moderately influential over the both periods for the Korean won. The post crisis results for the Korean won and the Thai baht merit special mention. While the USD has remained a major influence over these currencies, it seems as if the other major currencies play a significant role — partially at the expense of the USD, as mentioned above. In the case of the won and the baht, the inclusion of the other major currencies results in significant parameter values but from the adjusted  $R^2$ , the overall fit of the model is weaker.<sup>24</sup> While care must be exercised in interpreting these results, it is broadly suggestive of the possibility of a basket peg arrangement in those currencies.

### 3.4 Frankel-Wei Tests: Dynamic Estimates

While the above results offer some insight, they fail to provide any information as to whether there has been a change in the degree of influence of the USD or other major currencies over time. In view of this we expand the Frankel-Wei analysis by re-estimating Eq. 1 using recursive OLS estimates. Recursive OLS simply involves the equation being estimated repeatedly using subsets of the sample data that are increased by one observation at each iteration.25 Such recursive estimates enable us to track the evolution of the  $\alpha$  coefficients over time. It thus allows us to ascertain whether one of the major currencies is becoming more influential compared to another. As with the standard errors in the time-invariant regressions, the variation of the degree of influence is important in extracting information about the possibility of exchange rate movements being policy driven. For example, if the coefficient value for a particular currency on the local currency is high but relatively stable, this may be suggestive of sustained intervention by the central bank to manage the value of that particular currency pair. If the estimated value is high but variable, the correlation might possibly be market driven rather than conscious central bank intervention.

Results of the recursive regressions for post-crisis sample are presented in Figure 2.<sup>26</sup> The figure contains the dynamic properties of the coefficients for the USD, the Japanese yen, the pound and the euro. Generally speaking, the results are supportive of the static Frankel-Wei results. A few observations stand out.

First, the USD generally remains the strongest influence over local currencies post-crisis, but the introduction of the euro does substitute for the influence of the USD in some cases. Cases where the USD remains strong throughout the sample include Bangladesh, China, Malaysia, Nepal, Pakistan, the Philippines, Sri Lanka and Vietnam. One should note further that the stability of the USD for Bangladesh, Cambodia, China, Malaysia and Sri Lanka might be indicative of a desire to peg to the USD.

Second, in the case of Korea, Thailand, Laos and Thailand, there is evidence of even and stable influences of multiple currencies. This is suggestive of management vis-à-vis a currency basket. (The basket hypothesis will be explored below.)

## 3.5 Exchange Rate Flexibility Index

The second measure of exchange rate behaviour adopted in this chapter is the exchange rate flexibility index. There are a variety of indices based on the idea of exchange market pressure (EMP).<sup>27</sup> The theoretical foundation for EMP stems from a basic monetary model incorporating the demand for money, its supply and relative purchasing power parity (PPP) (Tanner, 2001 and Pentecost et al., 2001). From these foundations, we can construct a measure of exchange rate flexibility such as the following:

Figure 2 Recursive Least Squares Estimates, 1995–2006



Bangladesh, Post-Crisis





China, Post-Crisis

![](_page_21_Figure_1.jpeg)

Indonesia, Post-Crisis 4 3 ÷ 2 1 0 -1 -2 -3 2000 2001 2002 2003 2004 2005 2006

-JPY = - - EUR

-USD

![](_page_21_Figure_3.jpeg)

India, Post-Crisis

![](_page_22_Figure_1.jpeg)

![](_page_22_Figure_2.jpeg)

Myanmar, Post-Crisis

![](_page_22_Figure_4.jpeg)

![](_page_23_Figure_1.jpeg)

![](_page_23_Figure_2.jpeg)

Pakistan, Post-Crisis

![](_page_23_Figure_4.jpeg)

Philippines, Post-Crisis

![](_page_23_Figure_6.jpeg)

![](_page_24_Figure_1.jpeg)

Sri Lanka, Post-Crisis

#### Index = $\Delta e / (\Delta e + \Delta f)$

where  $\Delta e$  is as calculated in the previous section and  $\Delta f$  is change in net foreign assets (IFS line 11 – line 16c) scaled by lagged money base (line 14).<sup>28</sup> We take the 12 monthly mean of  $\Delta e$  and  $\Delta f$  to form non-overlapping annual mean absolute deviations of each series. The index is deliberately constructed in this manner such that it returns a value between zero and one.<sup>29</sup> This offers a scaling device for the relative exchange rate volatility; the closer the index is to one ( $\Delta f \rightarrow 0$ ), the more flexible the exchange rate regime and the closer to zero ( $\Delta e \rightarrow 0$ ), the more fixed the regime.<sup>30</sup>

Figure 3 reports the results of the exchange rate flexibility index for the identical selection of countries as the Frankel-Wei tests for the same period, 1985 to 2006. The index is calculated for the local currency versus the USD, the yen and the euro. The index for the nominal effective exchange rate (NEER) is also reported.

Two observations warrant highlighting. First, it is clear that for most of the countries examined, the index containing the USD is lower than the other currency pairs and the NEER. This is suggestive that the local currency is more likely to be pegged to the USD that the others. This is most easily seen in the case of China — where the index value for the USD is very near zero for the sample of data collected, and for Malaysia — where the index value is zero for the post-crisis period until mid July 2005.

The second observation relates to the transition of exchange rate flexibility over time. We would expect that the crisis-affected economies of Korea, Indonesia, Thailand and the Philippines would show an increase in flexibility after the crisis following the formal adoption of inflation targeting regimes. Somewhat surprisingly this is not universally the case. We observe an increase in flexibility for Indonesia and Thailand and the degree of flexibility has not altered materially for the Philippines. However it would appear that the index value has diminished since the crisis for Korea (aside from a brief jump in flexibility in the immediate aftermath of the crisis). This is indicative of a possible reversion to a USD (and yen) peg for Korea, though it might also reflect greater use of interest rates as a stabilization instrument.<sup>31</sup>

Interestingly, if one observes the more recent index values for the crisisaffected countries (Thailand being the exception), there appears to be a trend towards a basket peg as the index values are very low for all currency pairs and they are all very close together. However, even if one concludes that the respective monetary authorities have consciously tried to stabilize the effective exchange rates, does this indicate a movement towards managing the currencies against a basket (i.e., trade-weighted exchange rate management), or is it a consequence of an open economy, inflation targeting framework in which effective exchange rate fluctuations are taken into account in some manner (given their impact on trade, growth and inflation, among other things)?<sup>32</sup> In an early review of the experiences

(2)

![](_page_26_Figure_1.jpeg)

![](_page_26_Figure_2.jpeg)

![](_page_27_Figure_1.jpeg)

![](_page_27_Figure_2.jpeg)

![](_page_27_Figure_3.jpeg)

![](_page_27_Figure_4.jpeg)

26

![](_page_28_Figure_1.jpeg)

![](_page_28_Figure_2.jpeg)

![](_page_28_Figure_3.jpeg)

![](_page_28_Figure_4.jpeg)

![](_page_29_Figure_1.jpeg)

of selected emerging economies, which included the four Asian economies noted above, Ho and McCauley (2003) note:

While inflation targeting may be a framework that is typically free from formal exchange rate commitments, it is nonetheless not free from exchange rate considerations... (W)e find that, in practice, policymakers in inflation targeting countries do react to the exchange rate above and beyond its impact on inflation... Notwithstanding the explicit concern and active response in some countries to exchange rate movements, there is as yet no clear evidence that any of them has acted in contradiction to the announced inflation target. Nonetheless, the line between responding to the exchange rate within the bounds of inflation targeting, and managing the exchange rate as a goal *per se*, can be quite thin at times. The onus is on the policymaker to explain to the public the difference, if any, between the two types of actions and the rationale for the policy decisions actually taken. Effective communication of policy intentions with respect to the role of the exchange rate will be crucial for the credibility of the policy regimes (pp. 35–6).<sup>23</sup>

## 4. Fixed versus Flexible: Revisiting the Debate in Asia

The previous section suggests that there appears to be a general trend towards somewhat greater exchange rate flexibility in Asia, though not complete flexibility. Unease clearly persists about allowing a completely free float. This is further apparent from the massive stockpiling of reserves in many Asian economies (China and Japan most notably, but also Korea, Taiwan, India, Hong Kong SAR and Singapore, all of which hold well over US\$150 billion of reserves each), on the one hand, and a rather remarkably stable set of real exchange rates (REERs) in selected East Asian economies (China, Japan, NIEs and ASEAN), on the other. Taken together, this suggests persistent foreign exchange intervention by the regional central banks, i.e., many of the external adjustments are taking place via quantities (reserves) rather than prices (nominal exchange rates).<sup>34</sup> We do not broach the

much-debated issue of the reasons behind the reserve build-up (i.e., insurance versus export-stimulus), except to note the following — quite reasonable observation — by the World Bank:

Intervention was initially motivated by a desire to build up a buffer stock after the Asian crisis had depleted levels of reserves... (H)owever (r)apid reserve accumulation continued through late 2004, as countries sought to limit the impact of heavy capital inflows on external competitiveness, at a time when domestic demand generally remained subdued.<sup>35</sup>

This section discusses some of the analytical reasons that have motivated the move towards greater exchange rate flexibility in Asia in general, but also the reasons why many Asian economies continue to remain circumspect about adopting a flexible regime *per se*.

## 4.1 Reasons to Favour Flexibility

A priori, there are a number of reasons that underlie a preference for a greater degree of exchange rate flexibility.

First, the more flexible the exchange rate regime, the keener the incentives for agents to undertake appropriate foreign exchange (forex) risk management techniques in response to the higher element of exchange rate risk, while simultaneously reducing the extent of moral hazard which could lead to "excessive" unhedged external borrowing (referred to as a "fixed exchange rate bubble"). The introduction of these transaction costs and exchange rate risks may also help moderate the extent of capital inflows, consequently dampening the intensity of boom and bust cycles (this is essentially a moral hazard argument).

Second, small and open economies are far more susceptible to large external shocks, such as changes in foreign interest rates, terms of trade, regional contagion effects and the like. Received theory tells us that a greater degree of exchange rate flexibility is called for in the presence of external or domestic real shocks. By acting as a safety valve, flexible exchange regimes could provide a less costly adjustment mechanism by which relative prices can be altered in response to such shocks as opposed to fixed rate regimes. The latter relies on gradual reductions in relative costs through deflation and productivity increases vis-à-vis trade partners to restore internal balance. This can prove to be prolonged and costly, as made apparent by both Argentina and Hong Kong SAR in the late 1990s.

Third, many Asian economies have diversified trade structures, being dependent on the US, Japan and intra-Asian trade (Table 5). The Optimum Currency Area (OCA) criteria suggest that such economies are good candidates to maintain more flexible regimes.<sup>36</sup> Thus, in the case of East Asia, institutionalization of the precrisis dollar pegs (via a Currency Board Arrangement or dollarization) would not have helped domestic economic performance in 1996–97 (just prior to the crisis) to

| Country       | United<br>States | Japan | European<br>Union | Non-US<br>Western<br>Hemisphere | Rest of<br>non-Japan<br>East Asia | Rest of<br>the world |
|---------------|------------------|-------|-------------------|---------------------------------|-----------------------------------|----------------------|
| China         |                  | 100   |                   |                                 |                                   |                      |
| Exports       | 22.8             | 12.4  | 18.1              | 4.6                             | 30.1                              | 12.1                 |
| Imports       | 7.7              | 16.1  | 12.4              | 4.8                             | 39.4                              | 19.5                 |
| Total         | 15.2             | 14.3  | 15.3              | 4.7                             | 34.8                              | 15.8                 |
| Hong Kong SAR |                  | 1.1   |                   |                                 | 1000                              | 1.000                |
| Exports       | 17.0             | 5.3   | 14.0              | 2.7                             | 55.3                              | 5.8                  |
| Imports       | 5.3              | 12.1  | 8.0               | 2.0                             | 67.6                              | 4.9                  |
| Total         | 11.1             | 8.7   | 11.0              | 2,3                             | 61.5                              | 5.3                  |
| India         |                  |       |                   |                                 |                                   |                      |
| Exports       | 18.4             | 3.5   | 22.6              | 3.4                             | 22.9                              | 29.3                 |
| Imports       | 7.0              | 3.5   | 23.1              | 5.2                             | 24.2                              | 37.0                 |
| Total         | 12.7             | 3.5   | 22.9              | 4.3                             | 23.5                              | 33.1                 |
| Indonesia     |                  | 1000  |                   |                                 |                                   |                      |
| Exports       | 13.5             | 21.8  | 14.3              | 2,1                             | 35,6                              | 12.7                 |
| Imports       | 5.7              | 19.3  | 12.1              | 2.5                             | 43.3                              | 17.1                 |
| Total         | 9,6              | 20.5  | 13,2              | 2.3                             | 39.4                              | 14,9                 |
| Japan         | 12.4             |       |                   | 0.3                             |                                   | 1.00                 |
| Exports       | 22.7             | n.a.  | 15.8              | 5.4                             | 47.6                              | 8.5                  |
| Imports       | 14.0             | п.а.  | 12.7              | 4.6                             | 44.6                              | 24.1                 |
| Total         | 18.4             | n.a.  | 14.3              | 5.0                             | 46.1                              | 16.3                 |
| Korea         | 1.1              | 1.5   |                   | 100                             | 1.26.2                            | 100                  |
| Exports       | 17.8             | 8.3   | 13.8              | 6.3                             | 41.4                              | 12.5                 |
| Imports       | 12.7             | 21.6  | 10.8              | 3.4                             | 28.8                              | 22.7                 |
| Total         | 15.3             | 14.9  | 12.3.             | 4.8                             | .55.1                             | 17.6                 |
| Malaysia      |                  |       |                   |                                 |                                   | 1 633                |
| Exports       | 18.8             | 10.1  | 12.6              | 1.8                             | 44.6                              | 12.2                 |
| Imports       | 14.0             | 10.4  | 12.1              | 1.6                             | 47.4                              | 8.1                  |
| Total         | 10.7             | 15,1  | 14.5              | 1.7                             | 40.0                              | 10.2                 |
| Philippines   | 17.0             | 100   | 1.1.1             |                                 | 100                               |                      |
| Exports       | 17.5             | 15.8  | 15.5              | 1,9                             | 46.6                              | 2.8                  |
| Total         | 16.0             | 18.2  | 12.1              | 1.8                             | 44.1                              | 6.8                  |
| m             | 1017             | 10.2  | 10.1              | 1.0                             | 3110                              | 9.57                 |
| Singapore     | 12.0             | 63    | 110               | 21                              | 61.0                              | 12.1                 |
| Exports       | 13.0             | 0.4   | 14.5              | 14                              | 45.2                              | 12.1                 |
| Total         | 12.9             | 9.1   | 13.5              | 1.7                             | 48.5                              | 13.8                 |
| Taiwan        |                  |       |                   |                                 |                                   |                      |
| Exports       | 180              | 9.2   | 11.2              | 0.0                             | 18.2                              |                      |
| Imports       | 13.2             | 25.6  | 90                | n.a.                            | 30.1                              | n.a.                 |
| Total         | 15.6             | 17.0  | 10.6              | n.a.                            | 39.2                              | n.a.                 |
| Thailand      |                  |       |                   |                                 |                                   |                      |
| Exports       | 15.9             | 13.9  | 14.7              | 2.6                             | 38.8                              | 14.1                 |
| Imports       | 7.6              | 23.6  | 9.9               | 2.3                             | 34.4                              | 22.2                 |
| Total         | 11.8             | 18.7  | 12.3              | 2.5                             | 36.6                              | 18.2                 |

Table 5 Direction of Trade of Selected Asian Economies, 2004 (Percent share)

Note: Non-Japan East Asia is the aggregate in the IMF *DOTS* database for "Developing Asia". Source: Williamson (2005)

the extent that the problem was, at least partly, one of loss of competitiveness due to fluctuations in the US dollar and yen cross-rate.<sup>37</sup>

Fourth, an important argument often put forward in favour of a rigid peg regime is that it may operate as a nominal anchor for monetary policy and be a way of introducing some degree of financial discipline domestically and breaking existing inflationary inertia. At a superficial level this seems apparent from Figure 4 which reveals that hard pegs have consistently had lower inflation than soft pegs or floaters in the 1980s and 1990s (with the exception of 1994-95), though the differential has come down sharply since the late 1990s. More formal studies appear to confirm this point.<sup>36</sup> This would seem to offer a strong case for more exchange rate fixity (and therefore less flexibility). However, most of these studies do not account for the possibility of endogeneity in the choice of exchange rate regimes. Specifically, we cannot be sure as to whether a fixed exchange rate actually leads to lower inflation or whether countries which experience low inflation rates choose to adopt such a regime. In fact, once one uses the Reinhart-Rogoff natural classification - which, as noted, separates freely floating rates from freely falling ones — the average inflation rates across freely floating countries fall. sharply and are comparable with managed floats and regimes with little or no flexibility (see Table 6). Both theory and lessons of experience with nominal anchors have shown that pegging loses credibility over time and induces booms followed by inevitable busts and crises episodes.39

![](_page_32_Figure_3.jpeg)

Figure 4 Inflation Rates across various Exchange Rate Regimes, 1980–2005 (Percent)

Notes: Inflation based on CPI and exchange rate definitions based on Tables 2a, b. Since the exchange rate categories are from the IMF, no distinction is made between freely falling and freely floating *a la* Reinhart-Rogoff as discussed in the text.

Source: Compiled based on IMF data on Classification of Exchange Rate Arrangements and Monetary Frameworks and IMF, international Financial Statistics with the assistance of Jeff Kim.

|                |              | Natural classification |                        |                     |                    |                   |               |               |
|----------------|--------------|------------------------|------------------------|---------------------|--------------------|-------------------|---------------|---------------|
|                |              | Peg                    | Limited<br>Flexibility | Managed<br>Floating | Freely<br>Floating | Freely<br>Falling | Unknown       | Total         |
|                | Pegged       | 17.9                   | 9.6                    | 14.2                | 24.5               | 391.7             | 12.4          | 33.9          |
|                |              | (6.8)                  | (7.9)                  | (10.4)              | (23.2)             | (39.9)            | (6.5)         | (7.9)         |
| IMF de jure    | Intermediate | 11.2                   | 13.0                   | 16.7                | 9.2                | 147.6             | 25.7          | 36.0          |
| classification |              | (3.5)                  | (9.1)                  | (15.1)              | (3.8)              | (66,1)            | (15.9)        | (10.8)        |
|                | Floating     | 20.3                   | 10.1                   | 11.3                | 8.1                | 408.9             | 445.6         | 138.5         |
|                |              | (11.5)                 | (7.5)                  | (8.4)               | (4.5)              | (68.6)            | (22.2)        | (10.8)        |
|                | Total        | 17.1<br>(6.5)          | 11.1<br>(8.3)          | 14.2<br>(8.3)       | 9.9<br>(4.8)       | 305.3<br>(57.0)   | 55.5<br>(7.6) | 49.7<br>(8.7) |

Table 6 Average Annual Inflation across Exchange Rate Regimes, 1970-1999 (percent)

Notes: Figures in parentheses are medians. The IMF de jure classification (second column) is broadly similar to the categories used in Table 2b with one exception. "Pegged" includes "conventional fixed pegs".

Source: Husain et al. (2005).

Fifth, pegging the exchange rate also constrains monetary independence. To be sure, it is often noted that some recent empirical evidence casts doubt on the extent to which floating regimes in emerging economies provide insulation from foreign interest rate shocks (for instance, see Frankel, Schmukler and Serven, 2004 and Hausmann, Panizza and Stein, 2001).

However, using *de facto* exchange rates for 100 developing and industrial countries between 1973 and 2000 Shambaugh (2004) finds that the interest rates of the countries that operated pegged regimes followed the base country far more closely than non-pegs. In a closely related paper, Di Giovanni and Shambaugh (2005) finds that small countries with fixed exchange rates are most directly affected by interest rate changes in large countries. All this suggests that the loss of monetary-policy autonomy can have significant costs.<sup>40</sup> In relation to this, while Figure 5 (which is based on the IMF *de facto* regime classification) does not appear to reveal any discernible difference in growth rates among pegs and floats, once the freely falling exchange rate regimes are separated from the flexible ones, the average growth of countries with flexible exchange rates quadruples and is comparable with managed floats and pegged regimes, while also being less volatile (Tables 7 and 8).

Sixth, there is a widespread belief that a pegged regime induces increased policy discipline, as fiscal profligacy will lead to reserve depletion or burgeoning debt and an eventual currency collapse. However, the effects of unsound macropolicies become evident immediately under flexible rates through currency and

![](_page_34_Figure_1.jpeg)

Figure 5 Growth Rates across various Exchange Rate Regimes, 1980-2005 (Percent)

Notes: Growth rate based on real GDP growth and exchange rate definitions based on Tables 2a, b.

Since the exchange rate categories are from the IMF, no distinction is made between "freely falling" and "freely floating" *a la* Reinhart-Rogoff as discussed in the text.

Source: Compiled based on IMF data on Classification of Exchange Rate Arrangements and Monetary Frameworks and IMF, World Economic Outlook with the assistance of Jeff Kim.

|                                      | -            | Natural classification |                        |                     |                    |                   |                |              |
|--------------------------------------|--------------|------------------------|------------------------|---------------------|--------------------|-------------------|----------------|--------------|
|                                      |              | Peg                    | Limited<br>Flexibility | Managed<br>Floating | Freely<br>Floating | Freely<br>Falling | Unknown        | Total        |
|                                      | Pegged       | 2.0<br>(2.0)           | 2.6<br>(2.6)           | 1.6<br>(1.6)        | -3.2<br>(0.5)      | -1,1<br>-(0,7)    | 1.0<br>(0.6)   | 1.6<br>(1.6) |
| IMF <i>de jure</i><br>classification | Intermediate | 2.8<br>(2.4)           | 2.6<br>(2.9)           | 1.9<br>(2.1)        | 2.7<br>(2.2)       | 0.0<br>(0.4)      | 2.7<br>(2.7)   | 2.1<br>(2.3) |
|                                      | Floating     | 3.6<br>(2.9)           | 1.7<br>(1.8)           | 1.6<br>(2.2)        | 2.2<br>(2.3)       | -3.1<br>(-1.2)    | -1.6<br>(-0.3) | 0.6<br>(1.7) |
| -                                    | Total        | 2.1<br>(2.2)           | 2.4<br>(2.6)           | 1.7<br>(2.0)        | 1.8<br>(2.0)       | -1.3<br>(-0.6)    | 0.8<br>(0.6)   | 1.5<br>(1.8) |

 
 Table 7 Average Annual Real Per Capita GDP Growth across Exchange Rate Regimes, 1970–1999 (percent)

Notes: Figures in parentheses are medians. The IMF *de jure* classification (second column) is broadly similar to the categories used in Table 2b with one exception. "Pegged" includes "conventional fixed pegs".

Source: Husain et al. (2005).

|                |   | Natural classification |                        |                     |                    |                   |         |       |
|----------------|---|------------------------|------------------------|---------------------|--------------------|-------------------|---------|-------|
|                |   | Pcg                    | Lîmited<br>Flexibility | Managed<br>Floating | Freely<br>Floating | Freely<br>Falling | Unknown | Total |
|                | Pegged                                  | 4.0                    | 3.8                    | 3.6                 | 5.7                | 4.3               | 4.3     | 4.0   |
|                | 1.000                                   | (2.7)                  | (2.3)                  | (2.6)               | (3.3)              | (3.4)             | (2.9)   | (2.7) |
| IMF de jure    | Intermediate                            | 1.6                    | 2.0                    | 2.6                 | 3.3                | 3.8               | 6.1     | 2.6   |
| classification | 1 C C C C C C C C C C C C C C C C C C C | (1.2)                  | (1.6)                  | (1.8)               | (1.7)              | (3.4)             | (2.5)   | (1.8) |
|                | Floating                                | 3.1                    | 2.4                    | 4.1                 | 1.9                | 6.4               | 4.9     | 3.8   |
|                | 1.162                                   | (1.8)                  | (1.5)                  | (1.9)               | (1.1)              | (4.6)             | (2.9)   | (1.9) |
|                | Total                                   | 3.7                    | 2.8                    | 3.5                 | 2.7                | 4.7               | 4.5     | 3.7   |
|                | , Coll,                                 | (2.4)                  | (1.8)                  | (2.3)               | (1.3)              | (3.7)             | (2.9)   | (2.4) |

 
 Table 8 Average Annual Growth Volatility Across Exchange Rate Regimes, 1970–1999 (percent)

Notes: Figures in parentheses are medians. The IMF de jure classification (second column) is broadly similar to the categories used in Table 2b with one exception. "Pegged" includes "conventional fixed pegs".

Source: Husain et al. (2005).

price-level movements (i.e., depreciation-inflation spiral). In view of this, one could plausibly argue that flexible rates ought to instill greater fiscal restraint (relative to a fixed regime) as the costs of macroeconomic policy transgressions have to be paid upfront. In other words, the key distinction between fixed and floating rates may be the inter-temporal distribution of costs and benefits.<sup>41</sup>

## 4.2 Reasons for a "Fear of Floating"

Despite the foregoing virtues of greater exchange rate flexibility, significant apprehensions remain about permitting genuine exchange rate flexibility and, as noted, many Asian countries continue to manage their currencies quite heavily. Why?

Countries with flexible regimes have experienced "excessive" volatility over the last few decades.<sup>42</sup> It is admittedly difficult to define what exactly is meant by the term "excessive". However, a reading of the relevant empirical literature reveals that evidence of excessive exchange rate variability comes in a number of forms (see Bird and Rajan, 2001a,b and references cited within). For instance, a number of surveys of foreign exchange (forex) market participants clearly indicate that short-term/high-frequency exchange rate movements are caused by "speculative" or "trend-following" elements rather than underlying macroeconomic fundamentals. The problem of destabilizing speculation appears to be particularly problematic in developing countries with thin markets (Indonesia's post-crisis experience being a good case in point).

Of course, even if it were accepted that flexible exchange rates often appear to exhibit greater volatility than would be warranted by underlying fundamentals, why might such excessive volatility be of concern? A comprehensive survey of the literature on the impact of exchange rate volatility on trade flows concludes that recent empirical studies have had "greater success in deriving a statistically significant [negative] relationship between volatility and trade".<sup>43</sup> Another set of empirics by Andrew Rose, based on gravity models using both cross-sectional and time-series data suggests institutionally fixed exchange regimes (i.e., common currency, currency boards or dollarization) stimulate trade, which in turn boosts income.<sup>44</sup> As is common knowledge, proponents of the European Monetary Union (EMU) have used such an argument extensively in support of a single regional currency.<sup>45</sup>

While many industrial countries have operated fairly flexible exchange rates quite effectively, they have well-developed and diversified financial systems that are able to minimize real sector disruptions due to transitory exchange rate variations (abstracting from the resource-allocation costs of misalignments noted previously). Most importantly, industrial countries are able to borrow overseas in their domestic currencies. Many emerging economies are unable to do so, leading to an accumulation of foreign currency debt liabilities that are primarily dollar-denominated and unhedged (i.e., "liability dollarization")<sup>46</sup> In these countries, sharp depreciations in their currencies alter the domestic currency value of their external debt and therefore the net worth of the economies, with calamitous real sector effects (so-called "balance sheet" effects). This in turn may be an explanation for the continued priority given to a high degree of exchange rate stability in emerging economies. In other words, many emerging economies continue to be plagued by an acute "fear of floating".<sup>47</sup>

The inability to borrow overseas in one's own currency is related to the seeming lack of hedging in a number of emerging economies. Even if there is an ability to hedge, the transaction costs can be too high to make it an attractive option, especially over short horizons. In view of this, it may be reasonable to expect some smaller domestic firms in emerging economies to be affected by exchange rate volatility.<sup>48</sup> However, it is often argued that multinational firms can self-insure themselves from exchange rate fluctuations by having diversified production facilities in different countries and by being able to source from a number of different countries. While there is not much empirical literature of recent vintage on this issue, some existing studies appear to suggest that exchange rate variability has an adverse impact on FDI (which may or may not always be multinational firms) in the case of East Asia. Far more work needs to be done in this area before definitive policy conclusions can be drawn.<sup>40</sup>

#### Exchange Rate Regimes

Another reason cited for the "fear of floating" is that small and open economies are relatively more susceptible to exchange rate pass-through effects in domestic prices. Nonetheless, empirical evidence suggests that exchange rate pass-through has declined across all countries, including those in Asia.50 In fact, exchange rate pass-through may be endogenous to the degree of flexibility of the exchange rate regime itself. This appears to be the experience of New Zealand which has operated one of the most flexible exchange rate regimes in the world. Needless to say that low exchange rate pass-through implies that small and open economies may be less concerned about the potential inflationary consequences of exchange rate fluctuations, suggesting there is less reason to fear floating. In addition, there is also some evidence that emerging economies "learn to float" in the sense that as they adopt more flexible exchange rates regimes, and that they tend to adopt stronger monetary and financial frameworks (Hakura, 2005). China appears to be a good example of a country engaging in this "learning to float" behaviour as the Chinese authorities are gradually allowing for greater volatility of the currency as they also put in place the necessary infrastructure and institutions to ensure that the foreign exchange market functions well (i.e., is liquid) and that agents are able to hedge themselves against volatility (Eichengreen, 2006).

### 4.3 Fixed versus Floating?

The foregoing discussion makes apparent that theory is of rather limited guidance as to the choice of exchange rate. Consistent with this, as we have shown, Asia is home to a wide array of exchange rate regimes, though there are signs of gradual movement towards somewhat greater exchange rate flexibility in many countries in the region post crisis. In an important paper that uses the Reinhart-Rogoff Natural classification, Husain-Mody-Rogoff (2005) (HMR) conclude that for developing countries with limited access to international capital flows, pegged exchange rate regimes appear to be relatively more durable and are associated with higher growth. The Asian countries in this category in the HMR database are Bangladesh, Myanmar, Nepal, Sri Lanka and Vietnam. As these countries become more financially developed and have greater access to international capital markets, there may be benefits - in terms of both higher growth and lower inflation - from permitting increased exchange rate flexibility. The Asian economies considered high income in the HMR database are Japan, Hong Kong SAR and Singapore. Interestingly, for emerging markets — i.e., those with access to international capital flows — there is not much difference (in terms of growth or inflation effects) from either a pegged or flexible exchange rate regime, though the former is somewhat less durable and exposes the country to higher risk. The Asian countries in this category are those included in the Morgan Stanley Capital International (MSCI) index, viz., China, India, Indonesia, Korea, Malaysia, Pakistan, the Philippines and Thailand.<sup>51</sup>

## 5. Conclusion

This chapter has examined the *de jure* and *de facto* exchange rate regimes in Asia and has discussed the costs and benefits related to fixed versus relatively more flexible regimes. It has also highlighted some questions of potentially important policy implications for Asia that need further research. At a broader level, it is always useful to keep in mind that the choice of exchange rate regime cannot be done in isolation. It must be seen as part of a coherent macroeconomic and development strategy. No exchange rate regime will deliver stability if governance is poor, institutions are weak, and domestic macroeconomic policy is unsound.<sup>52</sup> Paraphrasing Max Corden (2003), one should not be "too sensational" about the choice of exchange rate regime.

Many observers have pointed out that the export-oriented nature of the Asian economies — especially those in East Asia — has given rise to a collective action problem (the so-called "prisoner's dilemma") whereby the fear of losing competitiveness leads each of them to heavily manage their respective currencies, particularly in view of the limited flexibility of the Chinese currency. This in turn could lead to internal imbalances (liquidity buildup for instance), while also contributing in part to the global macroeconomic imbalances. This prisoner's dilemma with regard to exchange rate policies in Asia in turn implies that there may be potential benefits from pursuing a more coordinated approach to dealing with monetary and exchange rate policies in the region.<sup>53</sup>

## Notes

- 1 This chapter is an updated and revised version of a paper initially presented by the authors at the Claremont-Bologna-SCAPE International Economic Policy Forum, July 30-1 2007, Singapore.
- 2 For the most recent and clearest statements on this, see Frankel (1999) and Willett (2002).
- 3 For instance, see Angkinand, Chiu and Willett (2005). However, the authors find that adjustable parities (including conventional adjustable pegs and horizontal bands) appear to be the most crisis prone of all.
- 4 The focus of this chapter is on Asia defined to include North, South and Southeast Asian economies. We do not consider West Asia, the Pacific island economies or Australia and New Zealand.
- 5 The data has since been applied retroactively to 1990.
- 6 The descriptions in Table 1 are mostly direct quotes from the official sources and not paraphrased by the authors.
- 7 See chapter 4 of this volume for an analysis of India's exchange rate regime.
- 8 See chapter 5 of this volume for an analysis of Singapore's exchange rate regime.
- 9 Bubula and Ötker-Robe (2002) appears to be the intellectual basis for the IMF *de facto* regimes.
- 10 See Rajan (2006) for IMF specifications of Asian exchange rate regimes from 1998 to 2004. Taiwan is not included in Table 3 as it is not a member of the IMF.
- 11 We were not able to obtain official pronouncements of Cambodia's, Myanmar's and Timor Leste's exchange rates. However, according to the IMF *de facto* classification, Cambodia and Myanmar both operate a managed float with no predetermined path while Timor Lester has adopted the US dollar as its legal tender.
- 12 See Shah, Zeileis and Patnaik (2006) and Ogawa and Sakane (2006) for empirical validation. Also see Eichengreen (2006) who provides a broader discussion of issues surrounding the Chinese currency and its exchange rate regime.
- 13 There are two other notable *de facto* exchange rate classifications. One is by Levy-Yeyati Sturzenegger (2003, 2005) who use rather broad exchange rate categories, viz., fixed, floating and intermediate using cluster analysis. The second is by Shambaugh

(2004) who closely follows Reinhart-Rogoff, except that the former uses a one-year window while the latter uses a five-year window. Also see discussion in Genberg and Swoboda (2005).

- 14 Needless to say, this statement should be interpreted with some caution in view of the small sample size (19 economies).
- 15 One needs to refer to the earlier NBER working paper version by the authors (2002) for country-specific exchange rate arrangements.
- 16 However, neither classification is able to capture the most recent changes in exchange rate regimes in China and Malaysia. Hakura (2005) briefly compares the IMF *de facto* classification with the Reinhart-Rogoff one.
- 17 There are clearly some weaknesses with the EMP models (which is why we do not use them in isolation). For a critical analysis of the EMP models, see Willett, Kim and Nitithanprapas (2005) who have developed a methodology for classifying exchange rate regimes based on the degree of foreign exchange intervention.
- 18 http://fx.sauder.ubc.ca. The reason for this is that the Service contains a sample for the euro/USD from 1993. The data are no different from that available from the IFS.
- 19 Compared to the list of countries in Table 1 we have left out Hong Kong, Bhutan and Brunei, both of which maintain currency board arrangements vis-à-vis the US dollar and the Singapore dollar, respectively. We also excluded Myanmar which effectively operates a dual currency regime. We also excluded India and Singapore as these two exchange rate regimes are the specific focus of chapters 4 and 5, respectively.
- 20 Such regressions have recently been used in several subsequent studies such as Kawai (2002), McKinnon (2001) and Cavoli and Rajan (2006), to name a few.
- 21 In constructing the Frankel-Wei equation, we acknowledge the effect cross rates may have in influencing the currency pair we wish to examine. By estimating the equation in first differences and adding a constant we are assuming that the effect of the cross rates are fixed over the estimation period.
- 22 The term "degree of influence" is used for these tests as an alternative more general — interpretation to the coefficients being seen as "weights" in the currency basket. The basket weights story can only be valid under this method if the right-hand-side (RHS) variables are uncorrelated. Unfortunately, this cannot be assured here.
- 23 As noted in chapters 4 and 5 of this volume, the same is true of India and Singapore.
- 24 This statement is supported by the observation of both Akaike information criteria (AIC) and Schwarz criteria. In fact, this phenomenon occurred for almost all currencies tested.
- 25 We estimated the initial regression using the same number of observations as there are coefficients to be estimated in the α vector for each country. (Thus, the first few values are volatile and ignored given the low degrees of freedom we removed the first 18 months for the pre-crisis period and the first 12 from the post-crisis period). We obtained largely similar results using a Kalman Filter test. Results are broadly unchanged and therefore not reported here.
- 26 There are a number of rationale for presenting the post-crisis results. First, the pre-crisis period is characterized by a domination of the USD as the currency of influence. Second, due to the change from DM to euro and also to the fact that the crisis period is removed (owing to high parameter volatility), the time path of the recursive estimates is broken. Pre crisis (1985–97) recursive estimates are available from the authors on request.

- 27 For instance, see the seminal contribution from Girton and Roper (1977). Also see Li, Rajan and Willett (2006) and Guimãeres and Karagdag (2004).
- 28 Reserve differences (from trend) are scaled by lagged domestic monetary base in order to compare the magnitude of the reserve change in relation to the stock of money base in the system. The result is an index that is more easily interpretable than if absolute values are taken.
- 29 Note that  $1 \Delta e / (\Delta e + \Delta f) = \Delta f / (\Delta e + \Delta f)$  which is defined as a measure of exchange rate intervention. An index such as Index 2 can also be constructed using standard deviations, e.g.  $\sigma_{\Delta e} / \sigma_{\Delta e} + \sigma_{df}$  Baig (2001) and Calvo and Reinhart (2002) use variances. The index values using standard deviations are broadly similar to those for index 2 and are not reported here but are available on request. The nominal interest rate is often included in EMP measures but is excluded here due to the unavailability of market interest rates for all countries. It should be noted that part of the exchange rate change (and, indeed, interest rates) could be valuation effects rather than adjustment because of foreign exchange intervention. The interest rate was added to the denominator to selection of countries as a robustness exercise and the results were very similar. See Frankel and Wei (2007) and Cavoli and Rajan (2006) for more on this.
- 30 In a recent paper, Frankel and Wei (2007) combine the regression or "weight-inference" methodology used in section 3.4 with the foreign exchange intervention index or "flexibility-inference" methodology used in section 3.5.
- 31 Recall that the exchange rate flexibility index we are using does not include interest rates. See Cavoli and Rajan (2006) for an alternative where interest rates are included.
- 32 This issue is explored analytically in chapter 2 of this volume. Also see Edwards (2006), Eichengreen (2002) and Ho and McCauley (2003). Eichengreen (2004) examines the issue with specific reference to Korea.
- 33 Effective communication is especially critical going forward if there is a reemergence of inflation globally and possible adverse supply shocks.
- 34 The implicit assumption is one of rigid prices.
- 35 See World Bank (2005, p. 29). Reserve accretions also have implications for macroeconomic management. See Ouyang, Rajan and Willett (2007a, b) for an attempt to measure the extent of sterilization in selected East Asian economies and China and Ouyang and Rajan (2008) for the case of sterilization in India. Also see Mohanty and Turner (2005). Also see chapters 6 and 7 of this volume.
- 36 The basic notion of the Optimum Currency Area (OCA) theory is that while there are microeconomic benefits from forming a common currency area (in terms of reducing transactions costs, such as costs arising from currency conversions and pricing, eliminating bilateral currency risks, etc), there are macroeconomic costs of forsaking monetary policy autonomy. In a nutshell, the OCA criteria refer to conditions under which these costs are minimized. See Willett (2003) for a comprehensive set of criteria.
- 37 For instance, see Bird and Rajan (2002). Consistent with this, a study of exports by about 100 emerging economies to the US, Japan and Europe over the period 1983–92 concludes that the more flexible the exchange rate regime the better the export performance (Nilsson and Nilsson, 2000). Three caveats are in order, however. One, the authors use data based on official IMF classification of exchange rate arrangements, i.e., they use the *de jure* rather than *de facto* exchange rate regime. Two, countries pegging to a composite group of currencies do not appear to have experienced weaker

economic performance than ones with independently floating regimes. Three, Reinhart and Rogoff (2004) also find that countries with freely floating regimes have lower trade-to-GDP ratios than all other categories.

- 38 For instance, an IMF study of 123 emerging economies covering the period 1975–96 found the median inflation rate of "peggers" to be consistently lower and less volatile than those with more flexible arrangements, though the inflation rate differential between the two sets of countries has decreased through the 1990s (see IMF, 1997).
- 39 See Willett (1998) for a detailed exploration of the nominal anchor debate. Bleaney and Francisco (2005) find that even after controlling for endogeneity and using both *de jure* and *de facto* regimes, there is still some evidence that hard pegs are associated with lower inflation rates than soft pegs (classification based on Table 2b).
- 40 There may even be a degree of endogeneity in the sense that as countries "learn to float", they gain a greater degree of monetary policy autonomy (see Hakura, 2005). Of course, if unrestrained monetary policy has been a facet of a country's past, imposing exchange rate fixity may be an advantage as it constrains the active use of monetary policy.
- 41 This point has been articulated and elaborated upon by Tornell and Velasco (2000). Gavin and Perotti (1997) have provided some empirical validity of this argument. After controlling for a host of other factors, they find that Latin American fiscal policies were more prudent under flexible rates than under floating ones.
- 42 Of course, almost no country has maintained a completely free (or pure) float, the authorities intervening intermittently to smoothen market fluctuations. However, even in the case of New Zealand, the Reserve Bank of New Zealand announced plans to "broaden its foreign exchange intervention capacity" by holding additional foreign exchange reserves (see Orr, 2004).
- 43 See McKenzie (1999). Calvo and Reinhart (2000) review a more limited set of such studies and draw a similar conclusion. This being said, the IMF recently undertook a comprehensive analysis of exchange rate volatility and trade. It has examined exchange rate variability over the past 30 years for all countries and reached the following conclusion:

(T)he current study does not find a robustly negative effect. To be more precise, the study reports some evidence that is consistent with a negative effect of volatility on trade. However, such a relationship is not robust to certain reasonable perturbation of the specification... Changes in the volatility of the exchange rate may reflect changes in the volatility of the underlying shocks and/or changes in the policy regime. For example, trade liberalization undertaken together with a move to greater exchange rate flexibility could well be associated with increased trade flows as well as increased exchange rate volatility. This possibility is a reason for the ambiguity of the theoretical results as well as the difficulty in finding consistent and robust empirical results regarding the impact of volatility on trade. An additional implication is that the empirical results do not provide clear policy guidance...There do not appear to be strong grounds to take measures to reduce exchange rate movements from the perspective of promoting trade flow (see Clark, Tamirisa and Wei with Sadikov and Li, 2004, pp. 55–6).

- 44 For instance, see Frankel and Rose (2002), Glick and Rose (2002) and Rose (2000).
- 45 Conversely, as regional countries become increasingly integrated through trade and investment, arbitrary shifts in comparative advantage and demand due to alterations in exchange rates may provoke political backlash and disrupt real intra-regional linkages.

In addition, a regional currency eliminates transaction and information costs (i.e., enhances transparency) and reduces the likelihood that producers can arbitrarily price discriminate across countries in the region. This problem becomes especially acute when regional countries have agreed on a trade pact — why bother negotiating detailed tariff and rules-of-origin requirements when sudden currency depreciation by a member alters relative prices and competitiveness, offsetting the effects of the regional trade rules that were agreed upon (Bird and Rajan, 2006)?

- 46 This is commonly referred to as the "original sin" hypothesis, a term attributed to Hausmann and Panizza (2003). The concept is also analyzed in detail in Eichengreen and Hausmann (eds.) (2004). Given their large reserve holdings (primarily in US dollars), the Asian and oil-producing economies — at least the central banks — are faced with the opposite concern now, i.e., domestic currency appreciations could lead to capital losses due to asset dollarization.
- 47 This term was originally coined by Calvo and Reinhart (2002).
- 48 See Slavov (2003) for a discussion on why firms in developing economies may not hedge with particular reference to East Asia.
- 49 For instance, Bénassy-Quéré, Fontagné and Lahrèche-Révil (2001) show that exchange rate volatility could have a detrimental impact on FDI, comparable to the distortions created by currency misalignments. Also see Kiyota and Urata (2004) who find that the volatility of the host country's currency (developing East Asia) and yen bilateral rates have an adverse impact on FDI and go on to suggest a "flexible but stable exchange rate system is needed to successfully attract FDI" (p. 1531).
- 50 See Edwards (2006) for a recent confirmation of the finding of declining pass-through in general. See Ghosh and Rajan (2007) for a literature review of some recent studies of exchange rate pass-through in Asia.
- 51 There is clearly room to debate the logic of country categorizations. For instance, it could quite reasonably be argued that Sri Lanka ought to be classified as an "emerging economy" (particularly when compared with Pakistan, for instance).
- 52 Domaç and Martinez Peria (2003) argue that, after controlling for various fundamentals and problems of endogeneity, a fixed exchange rate regime may lower the probability of a banking crisis in developing countries. This may arise from the disciplining effects. of a pegged regime, though once a crisis occurs a flexible rate regime appears to be less costly (in terms of forgone output growth). On the other hand, Husain, Mody and Rogoff (2005) find that the incidence of "twin crises" (i.e. banking-cum-currency crises) in emerging economics is greatest under pegged exchange rate regimes and that it declines as the exchange rate becomes more flexible.
- 53 Park (2006) elaborates on the prisoner's dilemma in East Asia and the central role played by China:

There is little disagreement that an across-the-board appreciation of East Asian currencies constitutes an important component of the resolution of global imbalances. However, as noted earlier, if China insists on maintaining its limited flexibility, other East Asian countries are not likely to let their currencies strengthen vis-à-vis the Renminbi as China has emerged as their export competitor in regional as well as global markets... What is significant about China's move to an intermediate regime is that it will broaden the scope of coordination of exchange rate policy among some of the... East Asia economies and revive the discussion of establishing a new modality of cooperation for monetary integration in the region (pp. 15–16).

- 1 This chapter is a slightly revised version of a paper published by the authors in *Briefing* Notes in Economics No. 74, 2007, September-October. Reprinted with permission.
- 2 As Fischer (2001) notes:

proponents of what is now known as the bipolar view...probably have exaggerated their point for dramatic effect. The right statement is that *for countries open to international capital flows*: (i) pegs are not sustainable unless they are very hard indeed; but (ii) that a wide variety of flexible rate arrangements are possible; and (iii) that it is to be expected that policy in most countries will not be indifferent to exchange rate movements. To put the point graphically, if exchange rate arrangements lie along a line connecting free floating on the left with currency boards, dollarization or currency union on the right, the intent was not to remove everything but the corners, but rather to pronounce as unsustainable a segment of that line representing a variety of soft pegging exchange rate arrangements. This formulation accommodates all three of the above positions. For countries open to capital flows, it leaves open a wide range of arrangements running from free floating to a variety of crawling bands with wide ranges, and then very hard pegs sustained by a highly credible policy commitment, notably currency boards and the abandonment of a national currency.

- 3 See chapter 5 for an analysis and discussion of Singapore's BBC regime.
- 4 The topic of currency basket arrangements for Asia has been extensively dealt with elsewhere. For instance, see Bird and Rajan (2002) and Rajan (2002, 2004).
- 5 For a discussion of inflation targeting during IMF structural adjustment programs, see Blejer et al. (2001).
- 6 Malaysia shifted to a rigid US dollar peg in September 1998 but moved to a rather nontransparent managed float in July 2005.
- 7 The revised Bank of Korea Act was passed in December 1997 (and revised in April 1998), the new bank of Indonesia Act was passed in May 1999 and the Bank of Thailand Act was passed in May 2000 (Table 1). For a more involved discussion of inflation targeting frameworks and experiences in Asia, see Ho and McCauley (2003).
- 8 Closely related to the distinction between MPRs and IT is the need to distinguish between two types of policy rules, viz. an instrument rule and a target rule (Svensson, 1997, 2000). The former is a rule for the monetary policy instrument that is imposed into a model but has no explicit reference to a policy target or objective. The latter is one that is derived as an endogenous optimal function from a model that has been solved explicitly for a particular target or a monetary authority welfare function. A target rule focuses policymaker's attention on the stated target and is very model-dependent. The instrument rule need not be directly related to a specific objective and offers the flexibility to be applied across models (Batini and Haldane 1998). There are many examples of instrument rules the most widely cited being the Taylor Rule (Taylor, 2000, 2001).
- 9 This said, there is evidence of declining exchange rate pass-through in both industrial and emerging economies. See Ghosh and Rajan (2007) for a discussion of the some of the reasons behind this.
- 10 The model is an open economy IS-LM type setup similar to Ball (1999, 2001) and a simplification of the model in Svensson (2000).

- 11 We abstract from the possibility of contractionary devaluation. See Cavoli and Rajan (2006b), Bird and Rajan (2004) and Rajan (2007).
- 12 It is widely held in the inflation targeting literature that the target will be met in two periods. However, in open economies, the inclusion of the exchange rate in the model eqs. (2)-(4) will result in the target being potentially met in one period. This accounts for the specification of the loss function specified in (1).
- 13 See chapter 3 for empirical estimation of MPRs for Asia.
- 14 For the purposes of this chapter, eq. (11) reflects the view that, in an open economy, traded goods inflation will be reflected to some extent by movements in the real exchange rate. It is this aspect that we wish to incorporate into the analysis of CPI inflation targeting as its inclusion offers the exchange rate a greater role in the conduct of optimal policy than in a domestic inflation targeting system.
- 15 For a more detailed discussion of general issues on core inflation in the context of the Philippines and other Asian countries, see Bangko Sentral ng Pilipinas (2005). "Frequently Asked Questions on Core Inflation", www.bsp.gov.ph/downloads/2005/faq/inflation.pdf.
- 16 While core inflation has the advantage of stripping out components that may cause idiosyncratic price changes arising from supply shocks, a problem with targeting core inflation is that it is much harder to communicate the logic of this target to the general public. The public is generally not aware of the meaning of core inflation, and if there is a wide gap between core and headline inflation, the central bank's anti-inflationary credibility might be affected.
- 17 For instance, for a fast growing open economy, the productivity growth in the tradables sector generally outpaces the nontradables sector, (so-called "Balassa-Samuelson effect"), thus suggesting an appreciation of the country's equilibrium real exchange rate. For discussions of the concept of equilibrium real exchange rates, see the collection of papers in Hinkle and Montiel (1999).
- 18 For elaborated discussions of the role of exchange rates in inflation targeting arrangements, see Eichengreen (2001), Sgherri (2005), and Taylor (2001). For a more formal analysis of the role of exchange rates in central bank's objective function, see Hammermann (2003). These issues are also explored in Cavoli and Rajan (2006b).
- 19 One might call this the "Australian view" of inflation targeting. See Debelle (2001).
- 20 Similarly, many central banks in Asia and elsewhere also keep an eye on the so-called "Monetary Conditions Index" or MCI which is a weighted average of interest rate and exchange rate and this is not controversial. If they attempt to explicitly target the MCI it would be much more controversial. For discussion of the MCI in the context of Hong Kong, see Hong Kong Monetary Authority (HKMA) (2000).
- 21 Also see Bean (2003). That said, not everyone is convinced by such concerns and offer the counterargument that monetary policy needs to be cautious but not "paralyzed". For instance, Cecchetti, Genberg and Wadhwani (2002) have opined: (W)e are not persuaded that one should ignore asset price misalignments simply because they are difficult to measure. The standard response to noisy data is to use econometric methods to extract the signal. This is common practice in the use of statistics in a policymaking environment. If central bankers threw out all data that was poorly measured, there would be very little information left on which to base their decisions (p. 19).
- 22 Also see Bernanke and Gertler (2001).

- 23 See chapter 3 for an estimation of the importance of exchange rates in Asian monetary policy rules (MPRs).
- 24 See chapter 8. Also see Ouyang, Rajan and Willett (2007).

- 1 For instance, see Ades, Buscaglia and Masih (2002), and most recently, Siklos (2006) and Leu and Sheen (2006). A recent Asian application can be found in Mohanty and Klau (2004).
- 2 The exchange rate is expressed as the domestic price of foreign currency.
- 3 Estimates with the 1st difference of the nominal (bilateral and effective) exchange rate as a regressor were also generated but have not been included in the Tables. These results were quite strong for Korea — in terms of the sign of the coefficient and its statistical significance — but were inconclusive for the other countries.
- 4 Note that the NEER is expressed as the price of the domestic currency. As such, the sign for these results will be the opposite to those for the exchange rate per USD.
- 5 In Table 2 to 7, we estimate a range of model specifications of which p=q=n=0 is only one. However, the actual vs predicted results were quite robust to these alternative specifications.

## Chapter 4

- This chapter draws in part on a paper published by the authors in *India Macroeconomic* Annual 2007. SAGE Publication pp. 125–140, 2008.
- We say "generally believed" as the Reserve Bank of India (RBI) has, since 1993. officially stated that the focus of its exchange rate policy is to "manage volatility". Of course, this could mean many things. As noted by Agrawal (2004) "(t)hough the RBI does not target a specific value for the rupee, the market tries to gauge underlying policy through movement in the Real Effective Exchange Rate (REER) index. The market believes that the RBI monitors the REER carefully (1993–94 base year, 5-country series) and tries to maintain the nominal rupee in a +/-4% band (i.e. 96 to 104) over a longer period of time", Joshi and Sanyal (2004) also argue that India has been pursuing REER targeting with respect to five target currencies, viz. US, Japan, UK, Germany and France at the 1993–94 level. See chapter 5 in this volume for a discussion of Singapore's exchange rate policy.
- 3 Data using euros are for the period 1999:1 to 2004:12.
- 4 www.rbi.org.in
- 5 Given the possibility of multicollinearity between the euro and pound sterling we consider a specification with the euro and pound included simultaneously, as well as the case without the sterling. As can be seen from Table I, results are largely unchanged.
- 6 This leaves us with the next question as to exactly what type of USD pegger India is. We return to this issue in Section 5.
- 7 The other variables in eq. (2) are, respectively, change in domestic credit, change in foreign prices, change in foreign output and change in the domestic interest rate.

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- 8 See Willett et al. (2005) for a discussion of problems with trends in reserves data and various ways of dealing with it.
- 9 It is well known that the ADF test has low power in predicting the difference between unit root and near unit root processes. As such the KPSS test for stationarity is included for robustness. Lag length for ADF and KPSS tests are selected by Schwartz criteria.
- 10 See chapter 1 for details.
- 11 In a paper using the technique, Guimarães and Karacadag (2004) adopt an asymmetric component threshold GARCH (ACT-GARCH) model that tests volatility at different time horizons. This is made possible because of the availability of daily intervention data for Mexico and Turkey.
- 12 Using slightly different exchange rate flexibility indices than those used in this chapter, Willett et al. (2005) arrive at a similar conclusion on the Indian rupee and even go on to use it as a benchmark for pegged regimes. Also see Patnaik (2004) who concludes that India has been operating a soft US dollar peg and goes on to detail India's experience with managing such an arrangement, focussing on capital flows and reserve build-up. Ouyang and Rajan (2008) estimate that India has been sterilizing about 80–90 percent of the reserve accretion between 2000 and 2004.

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- 2 See chapter 1 and 4 and references cited within.
- 3 Two qualifications should be noted. First, data using euros are for the period 1999:1 to 2004:12. Second, for comparison we include an Annex computing the Frankel-Wei regression in Section 2 using daily data.
- 4 The MAS reviews both the band and parity from time-to-time and makes alterations according to changing market circumstances if necessary.
- 5 The SGD was on a gradual upward crawl (appreciation) until 1997–98. This upward crawl was a deliberate policy by the MAS to keep inflation under check. This so-called strong Singapore dollar policy was also a tool used to promote structural adjustment (to higher value-added, less price-sensitive activities). However, this policy was on an extended hiatus since the East Asian crisis until April 2004 in view of the sharp slowdown in the country's average economic growth post-crisis and the deflationary global environment.
- 6 The theoretical motivation for Eq. 10 is based on Ball (1999).
- 7 The rule is estimated in the form presented in Eq. 10 and not as in Clarida et al. (1998) or Parrado (2004) and others because we feel it more accurately reflects the actual derivation of a MPR under optimal policy. In these derivations, the MPR reacts to the state variables of an appropriately specified macro model. The absence of so-called forward-looking variables in our estimation equation does not imply that policy is not forward-looking the forward-looking behaviour would be captured in a central bank. loss function that would be minimized to derive optimal policy. Rather, the rule simply describes how the instrument of policy reacts to variables whose value is known at time *t* such that the loss function is minimized. However, for completeness, we estimate

some MPRs with leading values for inflation below — the results are contained in Table 4).

- 8 It is usual in the empirical literature of MPRs to use an estimator that imposes exogeneity (such as GMM). The interest rate rules of Clarida et al. (1998), Ades et al. (2002) and by Mohanty and Klau (2004) are estimated using GMM, as are the exchange rate rules estimated by Parrado (2004). We have accounted for possible endogeneity by employing TSLS due to concerns over the small sample properties of GMM. The instruments used were contemporaneous and lagged (one period) values of the other regressors, lagged (one period) inflation and contemporaneous, and lagged (one period) values of the difference in the money base. Cointegration analysis involving NEER, CPI and output levels, and subsequent robustness testing reveal insufficient evidence of cointegrating relationships that would form part of the NEER equation, eq. (10). These tests are available upon request from the authors.
- 9 Note that it is not entirely correct to refer to the coefficients of the rule as being directly attributable to the sole reactions of the central banks as is sometimes done in the literature.
- 10 The recursive OLS estimates are taken from the baseline model. As with the recursive OLS results for the Frankel-Wei regressions, the first few observations are removed as they do not exhibit sufficient degrees of freedom to be meaningful.
- 11 The instruments used here are the same as those used for the baseline model in Table 3.
- 12 The MPR would actually be as follows:  $\Delta e_t = \gamma_0 + \gamma_1 E_t \pi_{t+k} + \gamma_2 y_t + \gamma_3 \Delta e_{t-1} + \xi_t$  where  $E_t \pi_{t+k} = \pi_{t+k} + \xi_{t+k}$ . As such,  $\xi_t = \varepsilon_t + \gamma_1 \omega_{t+k}$ .
- 13 Note that Reinhart and Rogoff (2004) characterize Singapore as a *de facto* moving band around the US dollar between June 1973 and November 1998 and a managed floater between December 1998 and December 2001.
- 14 During downturns, the Singapore policy makers make extensive use of incomes policies (i.e. reducing wages and other costs) to depreciate the REER (Rajan, 2004).
- 15 For instance, the MAS explicitly states that "the exchange rate policy band is periodically reviewed to ensure that it remains consistent with the underlying fundamentals of the economy" (Khor et al., 2004, p. 3).

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- 2 As a robustness test, we also employed the Phillips-Perron and KPSS test for unit roots and stationarity, respectively. We found that the results were mostly consistent with the ADF tests. The exceptions were the KPSS results with trend included for Korea, Malaysia and the Philippines. In each case, stationarity is rejected at 5% due to a significant trend component.
- 3 The foregoing papers originally employed the model to investigate the level of capital mobility in developing countries.
- 4 We ignore the money multiplier, implicitly assuming it is a constant and normalized to one. See Kwack (2003) for a discussion of sterilization in the context of a varying multiplier.

- 5 Hutchison (2003) notes that capital mobility (more strictly interpreted) is a stronger factor in determining the effectiveness of sterilization than imperfect asset substitution. For imperfect asset substitution to have any meaningful effect the relative asset quantities being moved must be enormous.
- 6 One possible institutional barrier causing the sluggishness in developing countries could be the role played by banks. We touch on this theme in section 5.
- 7 For the calculation of the sterilization coefficients in section 4, the sample is curtailed at 1997:3 to avoid the rapid depletion of reserves at the onset of the East Asian crisis.
- 8 Sterilization coefficients are presented in section 4 below.
- 9 This issue arises from the literature on sterilization, see Kwack (2003) and Glick and Hutchison (2000).
- 10 The Granger Tests are based on a reduced form of eq. (11b) and is given by:  $A_i Y_i = A_i^{-1} B_{ii} + A_i^{-1} B I(L) Y_{rel} + A_i^{-1} C X_i + A_i^{-1} \xi_i$
- 11 A potential problem arises as theory would dictate that both the contemporaneous coefficients,  $a_{12}$  and  $a_{23}$ , be present in the estimating the model. The problem is addressed by estimating the model for both Choleski orderings. The ordering presented here is (UID,  $\Delta f$ ), which is equivalent to restricting  $a_{12} = 0$ . As it happens, the results are quite robust to the alternative ordering. This is suggestive of two things. One, the contemporaneous coefficients are not statistically significant. Two, the residuals to the reduced form model are not likely to be highly correlated (Enders, 1995).
- 12 Estimation of Eq. 12a and 12b is consistent with most studies attempting to empirically investigate sterilization. For instance, Glick and Hutchison (1994) and Kwack (1994) have estimated various versions of Eq. (12) for Japan and Korea respectively. Also see Fane (2000) for a list of sterilization coefficients for a selection of emerging market economies.

- This chapter draws on and develops upon background work done by the second author for chapter 4 in Kharas and Gill (eds.) (2006).
- 2 We say "largely" because while the regional economies have generally remained open to international capital flows, there are two notable exceptions. One, Malaysia imposed capital controls in September 1998 but has since removed them. Two, some East Asian economies have tightened regulations with regard to the offshore trading of currencies (EMEAP, 2002).
- 3 Indonesia, Malaysia, Philippines and Thailand.
- 4 Also see IMF (2005a, chapter 2, 2005b, IMF, 2006, chapter 3) and Chinn and Ito (2005) who argue "there is no evidence of excess domestic saving in the Asian emerging economies rather they seem to have suffered from depressed investment..." In view of this, the so-called "savings glut" thesis in Asia and rest of the world which argues that "excess savings" in the rest of the world has allowed the US to finance its large current account deficits at relatively low real interest (*a la* Bernanke, 2005) cannot be generalized across the entire East Asian region. Also see Eichengreen (2005) who reviews the debates relating to global imbalances. The bulk of the current account adjustment has been by the private sector; see World Bank (2005b) for a discussion of the public sector saving-investment balance since the crisis.

- 5 However, to the extent that one argues that there were signs of "over investment" in the region pre-crisis (especially in construction and real estate), it is debatable whether investment ratios will ever reach pre-crisis levels. See Eichengreen (2005) and IMF (2006, chapter 5) for more detailed discussions.
- 6 In addition, the rising oil bill may work to reduce the current account surpluses in the oil importing East Asian region (IMF, 2006 and ADB, 2005a,b).
- 7 Indeed, there are valid concerns of overinvestment and overheating in the case of China (Prasad, 2005 and Xie, 2006).
- 8 See Woo (2005) and Chamon and Prasad (2006) for in-depth discussions of the determinants of China's savings and steps to raise domestic demand in the country. See Prasad (2005) and Prasad and Rajan (2006) for a broader discussion of China's reforms and way forward to ensure more balanced growth.
- 9 As the IMF (2005a) has noted, some of the important steps that Japan needs to take includes improving labour market flexibility, encouraging FDI and increasing product market flexibility.
- 10 See Cavoli and Rajan (2006a) for an analysis and discussion of the extent of exchange rate flexibility in Asia post-crisis.
- 11 See Aizenman and Siregar (2006) for more detailed descriptive data of reserve stockpiling in East Asia.
- 12 Outside East Asia, but still in Asia, India has also seen a sharp increase in reserves (see chapter 4 of this volume).
- 13 There has been a growing body of literature exploring various aspects of the precautionary motive for reserve hoarding. See Aizenman et al. (2007), García and Soto (2004), Jeanne and Ranciere (2006), Kim et al. (2004) and Li and Rajan (2006).
- 14 In addition, part of the change in reserves in US dollar terms arises from "revaluation gains" due to the depreciation of the US dollar against the major currencies in which reserves might be held, especially the Euro.
- 15 While Aizenman and Lee (2005) argue against the mercantilist rationale for reserve accumulation in East Asia (also see Aizenman and Siregar, 2006), the World Bank (2005b) has observed:

Intervention was initially motivated by a desire to build up a buffer stock after the Asian crisis had depleted levels of reserves.... (H)owever (r)apid reserve accumulation.. continued through late 2004, as countries sought to limit the impact of heavy capital inflows on external competitiveness, at a time when domestic demand generally remained subdued (p.29).

Similarly, the IMF (2004) has noted:

(M)onetary authorities seem to have been driven by a desire to prevent nominal exchange rate appreciation in the pursuit of export-led growth policies — especially in Asia and after the increase in inflows in 2003-04 (p.148).

- 16 A significant part of the balance of payments surplus is, of course, driven by China. See Ouyang et al. (2006) and Prasad and Wei (2006) for details on the dynamics of the capital and current account balances in China.
- 17 The World Bank capital flows data is on net medium and long-term resource transfers and therefore does not include very short-term capital flows. The World Bank data also excludes capital flows to Asian NIEs along with Japan. Accordingly, Table 1 summarizes balance of payments data from the IMF for all emerging economies and emerging Asia

(which is dominated by the developing East Asian region but also includes some systemically important non East Asian countries like India).

- 18 Two caveats should be noted. One, Indonesia was the only exception, FDI having collapsed due to ongoing socio-political uncertainties (World Bank, 1999 and Rajan and Siregar, 2002). Two, the implicit assumption is that there is little or no relationship hetween the various types of capital flows. Rajan (2005a) discusses the nexus between FDI and other forms of capital flows and stresses the need to be circumspect in concluding unambiguously that FDI is a stable source of financing. In view of the complex linkages between the various capital flows, Chuhan et al. (1996) and Claessens et al. (1995) argue that it may be misleading to look at capital flows individually, with the latter maintaining that it is only meaningful to examine aggregate financial accounts. Also see Sarno and Taylor (1997).
- 19 See Aizenman and Siregar (2006) for more detailed descriptive data on capital flows into the region.
- 20 The IMF (2004, chapter 4) discusses the post-crisis external debt adjustment in East Asia and other crisis-hit emerging economies.
- 21 See "Capital Flows to Emerging Market Economies," International Institute of Finance (IIF), various issues. See www.iif.com.
- 22 See Kim et al. (2004) for an analytical discussion of the crisis-inducing nature of shortterm debt (as well as portfolio equity flows) and references cited within.
- 23 Studies have, however, not been able to ascertain as to whether FDI into China has been diverted from China into ASEAN and if anything, suggest the reverse, i.e. complementarity between China and ASEAN as host destinations for FDI, partly due to China's increasing role in regional production networks (see *fn 25*) (for instance, see Chantasaswat et al., 2004, Eichengreen et al., 2004, Zhou and Lall, 2005, Mecereau, 2005 and Weiss, 2005). Also see Aizenman and Siregar (2006) who discuss this issue and also develop a gravity model for FDI flows to East Asia.
- 24 As is well known, a portion of China's FDI inflows is associated with round tripping as domestic capital from China capital leaves the country and then returns to benefit from tax incentives and other subsidies as well as to escape foreign exchange controls. The scale of round tripping of the total FDI inflows into China varies — one quarter (World Bank, 2002) to one half (Xiao, 2004). Also see Hattari and Rajan (2008).
- 25 Part of the intraregional FDI flows has been driven by and reflects greater degree of intraregional "production sharing", defined as the decoupling of previously integrated goods into its sub-component parts, components and accessories (PCAs) which in turn are distributed across countries on the basis of comparative advantage (Lemoine and Unal-Kesenci, 2002 and Ng and Yeats, 1999). This cross-border multi-staged production process in turn has been facilitated immensely by major improvements in transportation, coordination and communication technologies and the expansion of the global operations of transnationals corporations (TNCs) and consequent FDI. The significance of TNCs in regional and global production networks is apparent from the fact that there is a strong overlap in the concentration of developing countries' participation in global networks, on the one hand, and recipients of FDI, on the other (China, Singapore, Malaysia and Thailand) (World Bank, 2003, 2004).
- 26 Rajan (2005b) summarizes the various reasons for increased FDI from China.

- 27 While it is sometimes noted that the bulk of the purchases of US government securities have been done by the private sector (including pension funds), it is important to keep in mind that the data may substantially understate the actual magnitude of foreign central bank purchases (i.e. so-called "policy buying"). This is so as some of the central banks have regularly invested through third parties (private brokers) or may have bought US fixed income assets in the foreign secondary market.
- 28 From the US perspective, part of the purchases has also been by oil producing countries recycling petrodollars (Nsouli, 2006).
- 29 As noted, reserves have also been channelled into Japanese government debt and European sovereign debt.
- 30 McCauley and Fung (2003) elaborate on the US dollar portfolio choice of reserve managers:

The evolution of reserve managers' choice of instrument over the last 40 years broadly shows three successive trends. First, they began to diversify their short-term holdings away from Treasury bills in the mid-1970s. Then they extended maturities during the 1980s and into the 1990s. Most recently, they have diversified their longer-term holdings away from Treasury notes. The first and third of these trends involved an acceptance of greater credit risk, while the second involved an acceptance of greater market risk. In all cases, the evolution of benchmarks has tended to remove the risk-taking from the immediate reserve managers (p. 41).

- 31 The equation used for sterilization and the sources of data are the same as in chapter 6.
- 32 In addition, while there has been a better matching in the current composition of assets and liabilities in the developing East Asia region, this is largely due to an accumulation of reserves in foreign currency terms. It is important to ensure that individual corporates and financial institutions take appropriate care to manage the risks associated with these currency mismatch risks.
- 33 Conversely, developing countries in East Asia and other systemically important countries in Asia like India need to be given a larger voice in international macroeconomic and monetary affairs.
- 34 Xie (2006) highlights concerns of excessive liquidity growth in China. As he notes: China's macro today resembles that of Southeast Asia ten years ago: (1) Booming exports and expectations of currency appreciation are sustaining massive surplus liquidity in the banking system; (2) Banks lend mainly against collateral, especially land, which channels a rising share of the excess liquidity into land, causing land inflation. The land inflation increases the value of the collateral, which causes more liquidity to flow into land; (3) Low interest rates cause speculative demand for property with a large foreign component; and (4) Property inflation causes ordinary households to advance purchase decisions for fear of higher future prices.
- 35 Of course, this rebalancing will not occur absent commitment by the US to address its gaping fiscal deficit.
- 36 IMF (2005b, chapter 4) examines the impact of Asian currency appreciation especially in the case of the Chinese Renminbi — on global imbalances.
- 37 The intuition behind this is that an exchange rate appreciation could reduce inflows into East Asia in view of the higher asset prices, while outflows may be motivated by capital gains attained through the local currency appreciation as well as the fact that overseas assets will be relatively cheaper when converted to local currency terms. This is a real

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possibility; for instance, Ma and McCauley (2002) find that an increasing share of surplus US dollar liquidity in Chinese banks has been channelled into US Treasury bonds and notes, particularly agency bonds.

38 Mody and Negishi (2001) elaborate on M&A activity in East Asia post-crisis:

The share of M&A in East Asia's FDI rose from 6 percent in 1995 to 13 percent in 1997 and increased further, to 30 percent, in 1999. Thus, the much-talked-about resilience of FDI during the crisis was due entirely to the rapid increase in M&A rather than to traditional foreign investment in "greenfield" projects (those designed to build new means of production). Recent FDI based on mergers and acquisitions reflects foreign-based firms' entry into services (nontradable) sectors, whereas Greenfield FDI was predominantly focused on manufacturing of goods for export and also of domestic substitutes for imports. Much of the East Asian M&A activity has been in sectors such as wholesale and retail trade, real estate, and financial services.

- 39 Caballero and Krishnamurthy (2001) make a broadly similar argument. A much narrower — US-China centric — version of this is the Bretton Woods II hypothesis outlined by Dooley et al. (2004). See Eichengreen (2005) and Aizenman and Siregar (2006) for critiques of the Dooley et al. argument.
- 40 The World Bank (2005a) discusses the latter two costs and Rodrik (2006) discusses the issue of opportunity costs. These costs need to be balanced against the likelihood that higher reserve holdings reduce a country's perceived international credit standing, hence lowering the country's risk premium.

- 1 This chapter draws and develops upon a paper completed by the second author for the Office of Regional Economic Integration, Asian Development Bank (ADB). Views expressed are strictly personal and should not be attributed to the ADB.
- 2 The discussion here most closely follows Adams (2006) who focuses on contemporary exchange rate and monetary policy issues for Asia.
- 3 Frankel (2001) and Rajan (2006) use modified versions of the Swan diagram to discuss the issue of optimal policy responses during a currency crisis period.
- 4 That is, they are not "inflation-nutters" a la Meryn King (1996).
- 5 See chapter 2 of this volume and Mishkin (2002) for fuller discussions of these issues.
- 6 For discussions of the MCI in the context of Hong Kong and Mainland China, see HKMA (2000) and Peng and Leung (2005), respectively. However, it is important to keep in mind that while the MCI is a useful indicator of domestic financial conditions, it can be problematic if used as an operational target per se (see Stevens, 1998 for a critical discussion of the MCI).
- 7 The MCI is easily derived from standard open economy macro models in which aggregate demand is a function of real interest rates and real exchange rates (for instance, see Ball, 1999 and the Annex at the end of this chapter).
- 8 See chapter 2 of this volume for a more detailed discussion of the weights given to output versus inflation in an inflation targeting framework. See Ghosh and Rajan (2007) for a review of the empirical literature on the extent of exchange rate pass-through in Asia.

- 9 We follow Adams (2006) in redefining the IB schedule in terms of the MCI and inflation rather growth. Adams (2006) refers to the MCI-based IB schedule as a "MM curve".
- 10 Note that we are focusing here on marginal changes. If the exchange rate depreciates significantly there may be perverse "balance sheet effects", leading to a real sector collapse and deflation, hence requiring a decline in interest rates. See Bird and Rajan (2004), Frankel (2001), Krugman (2003) and Rajan (2006) for a discussion of the impact of these balance sheet effects.
- 11 There has been a growing body of literature exploring various aspects of the precautionary motive for reserve hoarding. See Ouyang and Rajan (2008) for references.
- 12 Of course, the current account is impacted by domestic income which we take as constant since the focus is on policy responses to exogenous external shocks.
- 13 Insofar as reserves are viewed rightly or wrongly as a sign of strength, it is not just the existing size of reserves that matters, but also whether reserves are rising or falling. From a precautionary motive perspective it is likely that a high existing stock of reserves that is growing rather than declining would appear to be appropriate. This view is clearly open to debate, though the analytical framework above does not hinge on it.
- 14 Adams (2006) refers to the EB schedule as an augmented foreign exchange market pressure index or (FF) curve. His FF (EB) curve only represents the capital account. The same is true for Rajan (2006) whose EB curve is based on the risk-adjusted uncovered interest parity condition.
- 15 Note that we define external balance in terms of a quantity or reserves target as opposed to a price target. This is consistent with the fact that many emerging Asian economies have shifted to managed floating regimes of various sorts (see chapter 1 of this volume). The framework can also be analyzed in the case where a fixed exchange rate regime is maintained. We consider the consequences of a country choosing to peg its currency in Section 3.
- 16 See Ouyang, Rajan and Willett (2007a) who estimate sterilization for China using monthly data between 1999 and 2006, Ouyang, Rajan and Willett (2007b) who estimate sterilization in seven emerging Asia (Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand) using quarterly data between 1990 and 2004 and Ouyang and Rajan (2008) in the case of India.
- 17 This can arise either because of a shift in the risk parameter ( $\psi$ ) and/or a change in foreign interest rates ( $r^*$ ).
- 18 Indonesia in late 2005 comes to mind.
- 19 See Upper and Wooldridge (2006) for a discussion of this issue.
- 20 Or, more to the point, the deflationary era that persisted since the Asian crisis appears to have passed. Of course, this assumes that the US economy does not go into a sharp recession which would likely lead to global disinflationary if not outright deflationary pressures.
- 21 Application of various reserve adequacy benchmarks to Asia leads to the conclusion that most regional countries held excess reserves in 2003 (for instance, see Kim et al., Chan-Lau, 2004 and IMF, 2004, chapter 4): the stock piling of regional reserves has sky rocketed since then.
- 22 Also see IMF (2004) and World Bank (2005). Of course, if an economy has been maintaining a fairly stable and rigid exchange rate peg like China and Hong Kong

without there being opportunistic devaluations, it may be inappropriate to characterize that as being mercantilist. With regard to the supposed floaters in developing Asia, there is evidence that they continue to actively manage their currencies vis-à-vis the US dollar even post 1998 (for instance, Cavoli and Rajan, 2006 and Willett et al., 2005 and chapter 1 of this volume).

- 23 Given that our focus is on short-term policy interest rates, we do not broach the issue of the so-called "bond market conundrum", i.e. lack of steepening of the yield curve despite the ongoing monetary tightening. Kroszner (2006) discusses some of the reasons for this so-called "bond market conundrum". It is usually argued that large and sudden sell offs across several asset classes would likely involve a steepening of yield curves and a widening of credit spreads in the US. However, see Wu (2005) for a contrarian view.
- 24 However a lasting solution of these imbalances requires a global coordinated approach with the US taking centre stage. See Reddy (2006) for discussions of the coordinated steps that need to be taken by the US. Asia and Europe to facilitate an orderly and gradual resolution of the global imbalances.
- 25 For instance, see Roubini (2006) for a discussion of disorderly correction of global imbalances.
- 26 Some of the capital could move to other non-US assets such the Euro-based assets or gold.
- 27 Note that this does not necessarily imply stability in the US-Asian bilateral rates as the focus here is on effective rates. Thus, there could be a significant appreciation of Asian currencies vis-à-vis the US dollar but depreciation vis-à-vis the European currencies, for instance.

- A much earlier version of this chapter was co-authored with Reza Siregar. The authors are happy to acknowledge his contribution.
- 2 More recently, however, there has been a move to integrate the APT countries plus India, Australia and New Zealand. These countries held the inaugural East Asian summit (EAS) in Kuala Lumpur, Malaysia in December 2005. See Kumar (2005) for a discussion of the EAS.
- 3 Gross capital flows and current account dynamics will not be covered here but there is some analysis in Chapters 7 and 8 of this volume. See Montiel (1994) and Rajan and Siregar (2002) for the former and Obstfeld (1998) and Taylor (2002) for the latter. Also see Lane and Milesi-Feretti (2001). While examination of cross-border capital flows is useful, it is probably of limited use as a measure of financial integration. For instance, a country that is highly integrated with international capital markets in the sense of there being no significant difference in domestic and international rates of return will experience little if any international portfolio capital flows (at least debt related flows). An interesting extension to this issue is provided in McCauley et al. (2002) and McCauley (2007) who examines the extent to which Asian bonds issued are bought by Asian counterparties. Morevoer, there is an interesting literature emerging where gravity type models are being employed for financial flows as a way of measuring the likely direction of capital between countries (see Kim, et al., 2006 and Poonpatipul et al., 2006).

- 4 Another arbitrage condition is the closed interest parity condition which essentially states that the returns on identical instruments of the same currency but traded in different markets (such as onshore and offshore markets) should be equalized. Any deviation arising from this condition can be interpreted as possible evidence of the existence of capital controls in one of the two countries or the existence of other political or country risks that may prevent interest rate equalization. The measurement of the closed interest differential is difficult for developing economies as it requires that a particular asset be traded sufficiently for there to be a liquid offshore market for it (see Obstfeld, 1998 and Frankel and Okwongu, 1996).
- 5 Throughout this chapter, the exchange rate is quoted as the domestic price of foreign currency. The forward margin can also be expressed as  $(f_{t,t+n} e_t)$  where  $f_{t,t+n}$  is a forward rate and  $e_t$  is the spot rate (both in logs).
- 6 The sample size varies slightly for each country. In de Brouwer's case, the equation estimated is:  $f_{i,t+n}^{d} = \alpha + \beta(i_t i_n^{*}) + \varepsilon_t$ . He finds that the CIDs narrowed in East Asia in the 1980s and 1990s.
- 7 The non-zero constant may be due to the presence of non-zero risk premia (country or currency).
- 8 Another strand of the literature involves testing UIP over longer horizons. Two such contributions are Chinn and Meredith (2004) and Montanes and Sanso-Navarro (2005), though both only estimate the relationship for industrial countries.
- 9 Using survey methods, Chinn and Frankel (1992) estimate the following equation:  $i_r = \alpha + \beta(i_t^* + \Delta e^{\alpha}_{t,t+n}) + \varepsilon_t$  for the period 1988–91 and find that the constant is typically quite high and the slope coefficient significantly different from unity.
- Frankel (1991) also presented some RIP differentials as part for his study. The differentials for Hong Kong, Japan, Malaysia and Singapore (with standard errors) are respectively -2.89 (0.94), -0.58 (0.62), 0.83 (1.00), 0.08 (0.68).
- 11 McCallum (1994) also believes that deviations from the UIP may be due to monetary policy decisions of central banks and proposes that a monetary policy reaction function be included in an expression for the UID. Bird and Rajan (2001) offer bank-based explanations for persistent interest rate differentials in East Asia. Also see Edwards and Khan (1985) and Willett et al. (2002).
- 12 In fact, the UIP may also be more valid over longer time horizons, i.e. over one year (see Madarassy and Chinn, 2002 and Chinn and Meredith, 2004).
- 13 There have also been several papers that have examined the time series properties of savings and investment. Feldstein (1983) extended the original work by adding time series regressions as did Obstfeld (1986). Both these studies found high correlations.
- 14 One would also expect savings and investment to be more highly correlated the more flexible the exchange rate regime.
- 15 In a recent study, Magud and Reinhart (2006) document the imposition of controls by many countries, including Asian ones. While the paper is comprehensive in its treatment of capital controls, its main purpose is to seek reasons why they are imposed/removed and to evaluate their effectiveness.
- 16 For a more complete comparison of various measures, see Nitithanprapas, et al. (2002).
- 17 If a common trend is shared by all variables in a system, it suggests that cointegration is present in the model. The more common trends that are identified, the less integrated the variables and, as such, fewer cointegrating relationships are found (for details, see Stock and Watson, 1988).

- 18 There is sizable literature on this topic. One of the most recent papers is Chinn and Ito (2005).
- 19 However, see McCauley, et al. (2002) for a counter argument.

- 1 This chapter is an updated and revised version of a paper originally published by the authors in *China and the World* Economy, 15 (4), pp. 17–34. Reprinted with permission.
- 2 For a summary of the CEPA, see IMF (2005a), www.tdctrade.com/econforum/tdc/ tdc060701.htm and www.tdctrade.com/econforum/tdc/tdc051101.htm.
- 3 Two other ways of overcoming the lack of business cycle synchronization would be through greater labour mobility or through provision of fiscal subsidies. We do not discuss these issues further in the present chapter.
- 4 Apart from Mainland China, the economics specified by the Hong Kong Census Bureau are Japan, Taiwan, US, Singapore, Korea, Malaysia, Germany, Thailand and the Philippines.
- 5 Re-exports are not included in these figures.
- 6 In addition, the Pan-Pearl River Delta initiative has been put in place to further intensify Hong Kong and Macau's integration with Mainland Chinese provinces around the Pearl River Delta.
- 7 See http://www.tdctrade.com/econforum/tdc/tdc041205.htm.
- 8 The data series for both economies, especially China, does not exhibit the amounts of volatility necessary for rigorous testing. As such we present some casual empirical evidence on basic trends or patterns in the data so as to gain some basic insights into the possibility of deeper financial links between the two economies.
- 9 Line 60L from the IMF (2005b).
- 10 This is done to remove cyclical movements.
- 11 A sufficient condition for RIP to hold is that UIP and PPP must simultaneously hold. Because PPP assumes goods price arbitrage, it is a measure of real sector integration. The UIP is a measure of financial integration. The RIP is a measure of both (see chapter 9 of this volume).
- 12 Although it might be premature to analyze equity market integration between Hong Kong and the Mainland in view of the controls on outflows imposed by Mainland China (though the Mainland is progressively liberalizing via the Qualified Domestic Institutional Investor or QDII Scheme), data limitations preclude consideration of FDI integration. Suffice it to note that Hong Kong accounts for approximately 40 percent of the Mainland's realized FDI, with the bulk of these investments in the Guangdong Province. Conversely, Hong Kong is the largest destination of FDI from the Mainland (Hattari and Rajan, 2008).
- 13 The relationship between trade and financial integration, and OCA are explored in Rajan (2005).
- 14 Equivalent tests were carried out using the Philips-Perron (PP) and Kiatkowski-Phillips-Schmidt-Shin (KPSS) tests for unit root and stationarity respectively. The results were consistent with the ADF tests presented above and therefore are not reported here. They are available upon request.

- 15 In other words, we are testing for the significance of the off-diagonal terms in *B*. For the Granger Causality tests, the SVAR in equation is presented as  $X_i = A^{-1}B(L)X_{i-1} + A^{-i}\xi_i$ .
- 16 We tried several methods as part of robustness testing. The Blanchard and Quah (1989) (also see Xu, 2006) method was ruled out because a large number of observations are needed to provide effective results. Several Cholesky orderings were tested, as was identification based on the correlations of the error terms of the unrestricted VAR. It turns out that, although subtle differences exist, the identification method that was finally decided upon yielded quite similar results to several Cholesky orderings and very similar results to the identification based on error correlations.
- 17 An interesting article by the HKMA (2002) discusses external claims and liabilities of Hong Kong's banking system vis-à-vis the Mainland. Also see IMF (2005a).
- 18 The data used for Figure 7 and Table 5 is the same as for previous sections with the addition of US GDP (seasonally adjusted) and US CPI. These data are taken from the IMF IFS database for the same time period as in previous sections.
- 19 As in the previous section, lag length was chosen using Schwartz criteria.
- 20 Conversely, there is a high degree of currency substitution between the Hong Kong dollar and the RMB in southern China.
- 21 Apart from pegging to the RMB or fully adopting the RMB, other options could be pegging to a basket of currencies (including the RMB and the US dollar) or independent or managed floating (which would almost inevitably mean that over time the market would move the Hong Kong dollar with the RMB).

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