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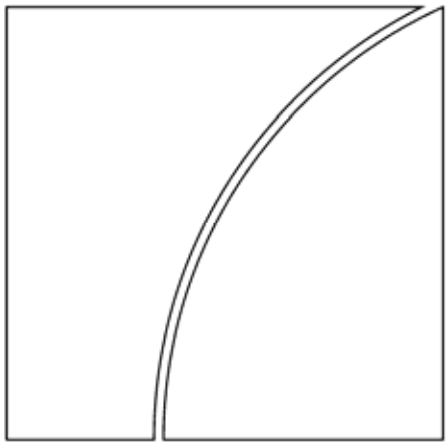

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Estimation of Asian effective exchange rates: a technical note

by San Sau Fung, Marc Klau, Guonan Ma and Robert McCauley

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Abstract

Discussion of exchange rate policy in Asia would benefit from appropriate measures of exchange rates on a multilateral basis. The purpose of this paper is to refine the construction of the effective exchange rates (EERs) for Asian economies, to make allowances for the role of Hong Kong SAR as an entrepôt and to reflect the fast-growing intra-regional trade. For the scenarios under consideration, it turns out that adjusting for re-export trade through Hong Kong SAR is generally more important in the determination of trade weights than updating the base year. The proposed refinements have important policy implications, particularly in estimating the relative sizes of currency blocs, should the region's exchange rate policies become more oriented to trade baskets than to bilateral dollar rates.

Estimation of Asian effective exchange rates: a technical note

San Sau Fung, Marc Klau, Guonan Ma and Robert McCauley[1]

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[1] The views expressed in this papers are those of the authors and do not necessarily reflect those of the BIS. We are grateful for the comments by David Archer, Claudio Borio, Michael Chui, Gabriele Galati and the participants of the Hong Kong Institute of Monetary Research seminar in April 2005.

Introduction

Discussion of exchange rate policy in Asia would benefit from appropriate measures of exchange rates on a multilateral basis. Indeed, measures of effective exchange rates (EERs) serve policy and market analysis in various ways: as an indicator of external competitiveness; as an ingredient in a monetary or financial condition index; as a reference point for foreign exchange policy; or even as an operating target. For example, on 21 July 2005, the Chinese government started the shift of its exchange rate regime from a previous de facto dollar peg to a managed float with reference to a basket of currencies (Ma et al, 2005). Policy-makers' and market participants' measures of effective exchange rates also condition the reaction of one currency to movements in trading partners' currencies. Better measures of effective exchange rates could thus allow those rates to play their assigned role more appropriately.[2]

The measurement of effective exchange rates in Asia faces two challenges. First, trade relationships within Asia and between Asia and the rest of the world are veiled by Hong Kong SAR's[3] entrepôt trade. Hong Kong's status as trade entrepôt for China is a long-standing challenge that has become more important as China's trade has bulked larger, even though Hong Kong's share of China's trade has been secularly falling (from 36% in 1991 to 10% in 2005). While the effect of Hong Kong's entrepôt role in obscuring trade relationships within Asia and between Asia and the rest of the world is at some level understood by policy-makers and market analysts, we are not aware of a systematic effort to adjust measures of effective exchange rates for entrepôt trade. Secondly, intra-regional trade is growing very fast in Asia, particularly trade with China. For instance, China has recently become Korea's top export market, displacing the United States. This development challenges the statistician to use updated data to generate relevant measures of the effective exchange rate.

The purpose of this paper is to refine the construction of the effective exchange rates for Asian economies, to make allowances for the role of Hong Kong as an entrepôt and to reflect the fast-growing intra-regional trade.

The paper is organised as follows. The first section outlines two refinements, namely the adjustment for entrepôt trade and the use of more up-to-date trade data, in the estimation of the Asian effective exchange rates, and shows how they affect the calculated weights. For the sake of concreteness, and considering that the Hong Kong trade adjustment most affects the weights for the effective index for mainland China, this section takes the Chinese renminbi (RMB) as the example in the analysis. In this spirit, the second section presents the estimated trade weights and compares RMB nominal effective exchange rates (NEERs) and real effective exchange rates (REERs) with and without the two refinements. It also compares the effect of each refinement separately. The third section covers the same ground for other Asian exchange rates. Where possible, it also compares the refined measures to effective exchange rate measures used by policy-makers in the region. The last section briefly discusses the implications of our refinements and summarises the main findings of the paper.

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[2] For applications in policy and market analysis, see Leahy (1998); Buldorini et al (2002), Hargreaves and Strong (2003), and Suttle and Fernandez (2005).

[3] Hong Kong SAR hereafter referred to as Hong Kong.

1. Refinements in the calculation of effective exchange rates

The NEER is usually calculated as a geometrically weighted average of a basket of bilateral exchange rates. The REER is NEER deflated by a similarly weighted average of foreign prices or costs relative to those in the home economy. Key choices in the construction of an effective exchange rate include the weighting scheme employed, the range of currencies to be included in the basket, and the base period for the trade weights.[4, 5]

For analytical simplicity, we base our calculations on a bilateral-weighting scheme and a basket of 33 currencies,[6] and review two possible improvements for the construction of the effective exchange rates of Asian currencies – an adjustment for trade through and around Hong Kong, and an updated base period to take into account the rising intra-regional trade. Of course, it is in the nature of effective exchange rate estimation that an adjustment of trade flows for one economy simultaneously amounts to an adjustment of trade flows for its trading partners. Nevertheless, for the sake of concreteness, we often take the Chinese renminbi as an example in what follows. Then we turn to a broader discussion of the implications for Asian effective exchange rates in a subsequent section.[7]

1.1 Adjusting for Hong Kong's re-export trade

There is a consensus that the official trade data published by both China and its trading partners give a distorted view of their underlying trade relationships, mainly because a substantial amount of China's two-way trade with the rest of the world takes the form of Hong Kong's re-exports.[8] In 2005, Hong Kong's merchandise re-exports to and from China amounted to USD 125 billion and USD 168 billion respectively. These trade flows are significant relative to China's total imports of USD 660 billion and exports of USD 762 billion in the same year. This is not as easy a problem to correct as might first appear, because the value of the re-export trade includes a mark up (or re-export margin) accruing to Hong Kong, and this should be regarded as service trade with Hong Kong rather than manufacturing trade with China.[9]

If one parts the veil of Hong Kong, then the trade weights for both China and its trading partners look different. In particular, in the EER basket of RMB, naive trade weights overstate the flow of manufactured goods from China destined for final sale in Hong Kong and understate the flow to China's other trading partners. From these other trading partners' point of view, naive trade data overweights Hong Kong and underweights China. Hence there is a need to systematically adjust the reported trade data.

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4 Broadly speaking, for trade weight-based EER, there are two classes of weighting schemes, namely the "bilateral weighting scheme" and "double-weighting scheme". The bilateral trade weighting scheme (or *single-weighting* scheme) assigns weights to trading partners strictly in proportion to their share in the home economy's total trade. It implicitly assumes that in each export market, the domestic producer constitutes the sole competitor, ignoring the competition from other exporters also selling to that market. The *double-weighting* scheme, by contrast, captures the "third market effect", ie the competition between home exporters, domestic suppliers and all other exporters to all the economies considered in the currency basket.

5 The BIS effective exchange rate indices cover 52 economies using time-varying trade weights and take into account third-market competition. See Klau and Fung (2006).

6 For the list of the economies, refer to Table 1.

7 Appendix 1 details the general data requirement and data sources.

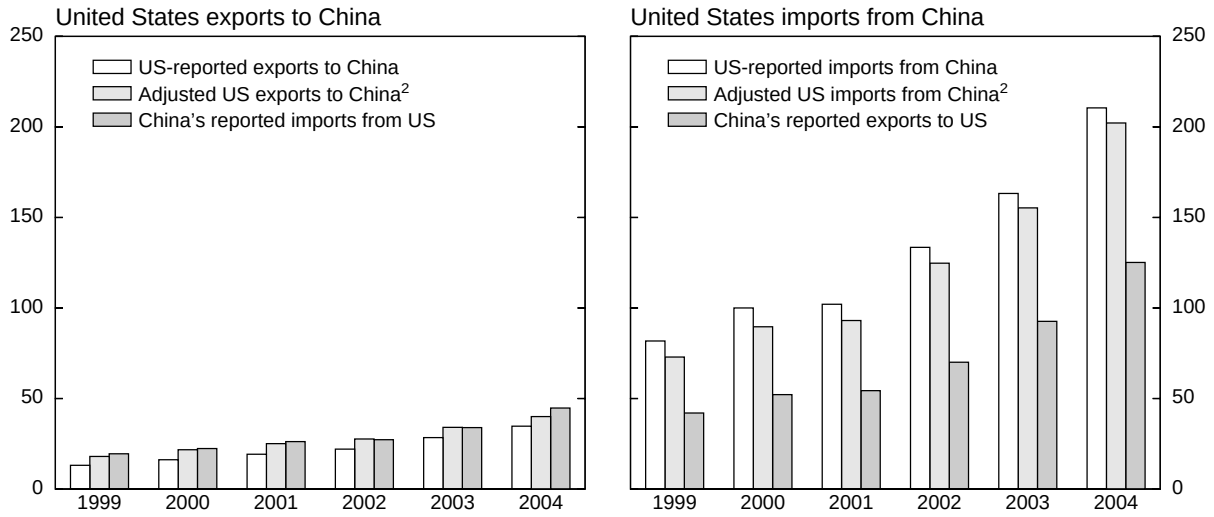
8 Re-exports are defined as "foreign goods exported in the same state as previously imported… directly to the rest of the world" (United Nations (1998)). It normally involves a change in the ownership of the goods from the original exporters to the re-exporters.

9 On Hong Kong's service trade, see Ha and Fan (2003).

Our data adjustment builds on attempts to reconcile the Chinese and US data on the scale of the bilateral trade imbalance. Different treatment of China-US trade through Hong Kong has given rise to a much remarked-on and considerably analysed discrepancy between the US and Chinese measures of their bilateral trade balance.[10] In particular, the US data have suggested a huge imbalance, while the Chinese data a more modest one. It appears that the discrepancy arises because both sides look through the veil of Hong Kong in a one-sided way, that is, on their import side only. These reconciliation exercises have thus tended to accept the Chinese view of their imports from the US and the US view of their imports from China (Graph 1). In this paper, we generalise the analysis developed in such reconciliation exercises to China's trade with all its major trading partners, including the particularly obscure trade across the Straits of Taiwan. Then we use adjusted trade data to derive improved weights for the effective baskets of the currencies of China and its trading partners. We do not generalise the adjustment for non-China related Hong Kong re-export trade or to entrepôt trade in Singapore, nor could we account for the broader regional economic integration in the form of supply chains (Box 1).

Graph 1

Bilateral trade between China and the United States[1]



[1] In billions of US dollars. [2] Accounted for re-exports via Hong Kong using Hong Kong re-exports statistics.

Sources: UN Comtrade; national data; BIS calculations.

[10] Feenstra et al (1999), Fung and Lau (1998), Lardy (1996), and US Department of Commerce (1995).

Box 1

Other entrepôt trade and vertical specialisation in Asia

To some extent Hong Kong also serves as an entrepôt for trade between Asian economies not including China. For example, some of Japan's exports to Korea flow through Hong Kong. However, judging from the Hong Kong data, such flows are small relative to flows involving China (Panel A of Graph 2). From the other Asian economies' perspectives, such trade flows are even smaller compared with their total trade. Thus, we ignore non-China related Hong Kong re-export trade.

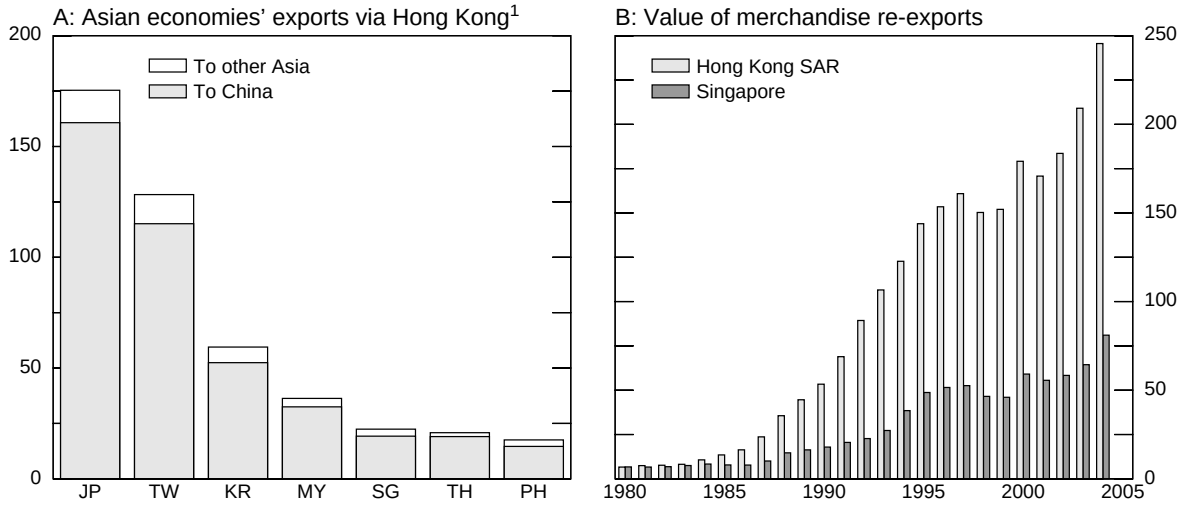
The discussion of Hong Kong in Asia's intra-regional trade naturally brings Singapore to mind, since the city-state serves similarly as a re-export hub, especially for Malaysia and Indonesia. The lack of detailed bilateral re-export data, however, prevents us from carrying out a parallel adjustment for Singapore. Thus, the absence of detailed trade statistics for Singapore makes it difficult to be sure of the appropriate weights. Inaction on this front is also partly justified by the fact that Singapore's merchandise re-export trade is of a much smaller scale than that of Hong Kong (Panel B of Graph 2).

The growing vertical specialisation among east Asian economies may pose further bias in estimating the appropriate EER weights. More specifically, regional vertical specialisation refers to production chains in which each country specialises in the stage of its own comparative advantage. For example, a supply chain can be formed with Japan or Korea exporting high-tech components to China for labour-intensive assembly, and the final products are subsequently exported outside the region. Therefore, gross trade data may not reflect accurately the value added from the different stages of production, nor do they represent the ultimate location driving the demand (eg Japanese chips exported to China could be driven by demand for computers in the US). It would thus imply that in some EER baskets, the weights on countries at the end of the production chain may be overestimated, relative to the original source of supply and the final destination of demand. However, given that trade data are recorded in gross value rather than value added terms, an adjustment for vertical specialisation is difficult, and one should keep this in mind in the interpretation of EER weights.

Graph 2

Re-export trade in Asia

In billions of US dollars



[1] In 2004; the horizontal axis indicates the economies from where the goods are originated.

Sources: WTO; national data.

With this background, our trade data adjustment methodology can now be presented formally. Denote China as *c* and its trading partner as *i*. Under a bilateral weighting scheme, the weight on economy *i* (w_i) in an EER basket of the RMB can be expressed as:

$$w_i = \left(m_c^i + x_c^i\right) / \left(m_c + x_c\right) \quad (1)$$

where x_c^i = China's exports to economy *i*

m_c^i = China's imports from economy *i*

x_c = China's total exports

m_c = China's total imports

As seen from (1), we need bilateral trade data (x_c^i and m_c^i) to construct weights (w_i) on the chosen currencies in the RMB EER basket. However, because trade data compiled by China do not consistently account for the varying extent of indirect trade via Hong Kong over time, we use counterpart data from China's trading partners. Let us denote:

DM^i = Economy *i*'s *reported* exports to China (thus China's direct imports from *i*)

DX^i = Economy *i*'s *reported* imports from China (thus China's total exports to *i*)[11]

First, recall that on *i*'s export side, exports to Hong Kong as the first known destination include a large share of trade that is ultimately shipped to mainland China, making DM^i an underestimate of m_c^i. Second, on *i*'s import side, the reported trade statistics normally include all goods originated from China, whether imported directly or indirectly through Hong Kong (the "rules of origin"). However, the imports through Hong Kong do generally receive some value added in the territory. The inclusion of the value of the Hong Kong mark up on *i*'s imports makes DX^i an overestimate of x_c^i.

These distortions can be removed by using the appropriate statistics. Specifically, China's imports from *i* are taken as *i*'s reported (direct) exports to China, plus *i*'s indirect exports to China via Hong Kong, less the Hong Kong margin. At the same time, China's exports to *i* should be *i*'s reported imports from China less the margin associated with the re-exports through Hong Kong. Algebraically,

$$m_c^i = DM^i + RM^i (1 - h_1) \quad (2)$$

$$x_c^i = DX^i - RX^i (h_2) \quad (3)$$

where RM^i = Hong Kong's re-exports originating from *i* and destined for China

RX^i = Hong Kong's re-exports originating from China and destined for *i*

h_1 = Re-export margin for goods going from *i* via Hong Kong to China

h_2 = Re-export margin for goods going from China via Hong Kong to *i*

We rely on Hong Kong surveys of average margins on re-exports for h_1 and h_2 conducted annually.[12] For 2004, the margin on China-sourced goods (h_2) is higher at 24% than that on

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[11] DM^i takes into account the costs of insurance and freight (cif) while DX^i takes into account the free on board (fob) factor.

[12] Alternative methods of estimating the markup are discussed in Feenstra et al (1998). To estimate h_2, they compare the unit-value of Hong Kong imports from China and the unit-value of Hong Kong re-exports from China to the US (and to the world). However, the same methodology applied to the estimation of h_1 (markup from US via Hong Kong to China) sometimes produces negative numbers. The authors ascribed this impossible result to measurement errors.

goods sourced elsewhere bound for China (h_1) at 8%. This may reflect that income levels for skilled labour in Hong Kong are closer to that of China's trading partners than China.

Stepping back, and changing the point of view to the trading partner, the adjustment adds to the China trade of most trading partners save Hong Kong. Basically, their exports to China through Hong Kong are being added (with the small 8% margin deducted), while only the Hong Kong mark up is being deducted from their imports from China through Hong Kong.

This adjustment procedure is applied to 31 of China's trading partners.[13] Those receiving exceptional treatment are Taiwan, China (hereafter, Taiwan) and Hong Kong, which are addressed as special cases in Box 2. For Taiwan, we have to make allowances for the merchandise transhipment between China and Taiwan (not captured by Hong Kong's re-export data), and for Hong Kong, its own domestic exports bound for China.

Throughout this paper, *unadjusted* trade data refers to that reported by the relevant authorities (except for China, where we solely use data of its trading partners) and *adjusted* trade data refers to that derived from the adjustment procedures described above. The importance of these trade data adjustments can be illustrated by the example of the bilateral China-US trade imbalance (Graph 1). According to the US data, the bilateral US trade deficit with China was USD 176 billion in 2004. On the basis of China's own data, the bilateral Sino-US trade deficit was only USD 80 billion. After the adjustment of the trade data, the bilateral trade imbalance was revised to USD 162 billion.[14] We will highlight the important impact of trade data revision on both trade weights in the RMB EER basket and the RMB effective exchange rates by comparing the estimates using the adjusted trade data with those using unadjusted trade data.

[13] For economies whose re-export trade via Hong Kong to China is not reported by the Hong Kong authorities, we estimate using data of an economy of geographical proximity. For example, we use Mexico (its ratio of of exports/imports via Hong Kong to/from China) as a proxy for Brazil and Chile.

[14] The estimate is closer to the US figure than the Chinese figure not because the US measure is in principle better than the Chinese measure. Both countries' import data are not far from our estimates. It is just that the US imports (as reported by the US) are larger than Chinese imports (as reported by China).

Box 2

Special trade data adjustments for Hong Kong and Taiwan

Hong Kong is one of China's biggest trading partners, serving uniquely as an entrepôt. However, in the RMB EER basket and in the baskets of China's major trading partners, Hong Kong should take a much smaller weight than the usually consulted trade data would imply. On the one hand, from Hong Kong's perspective, its exports to China include its re-exports originated from other countries. But Hong Kong's weight should be based on just its *domestic* exports (goods manufactured locally in Hong Kong), as reported by the Hong Kong government. On the other hand, Hong Kong's imports include goods that are subsequently re-exported elsewhere. However, Hong Kong's weight should be based on just *retained* imports, ie goods imported and *consumed locally* in Hong Kong. Such data are unavailable and have to be estimated by eliminating the re-export elements from the total imports, taking into account the re-export margin. After these modifications, Hong Kong's domestic exports to China represent China's true (free on board) imports from Hong Kong; likewise, Hong Kong's retained imports (minus cost of insurance and freight) sourced from China represent China's true exports to Hong Kong. With such an adjustment, Hong Kong's own share in China's total manufacturing imports for 1999-2001 declines from 5% to 4%, while its share of China's manufacturing exports falls from 24% to 4%. The asymmetry in the adjustment on the import and export sides reflects the fact that the origin of imports is usually better recorded than the final destination of exports. The adjustment redistributes Hong Kong's share of China's exports to other economies: Japan's share of China's exports rises from 14% to 18% and the US share rises from 28% to 35%.

Trade data between mainland China and Taiwan have not been accurately recorded. The published Taiwanese data fail to report most of Taiwan's "indirect" trade with China – re-exports through Hong Kong and offshore transhipments via Hong Kong – and thus discrepancies between mainland and Taiwan trade data are large, especially in Taiwan's exports to China. The key difference between re-exports and transhipment is that the former are cleared by Hong Kong customs (and thus recorded in Hong Kong's statistics as re-exports) while the latter are not. Transhipments do not normally involve a change in the ownership of the goods, and can be viewed as the nautical version of the flights across the Straits around the lunar new year in 2005 that had to enter Hong Kong airspace en route. As a result of such unreported sail-bys, using Hong Kong's re-export data alone is not sufficient to correct for the cross-Strait inconsistency in trade data. Two agencies in Taiwan (the Mainland Affairs Council and the Bureau of Foreign Trade[15]) produce separate estimates of cross-Strait trade flows, taking into account both re-exports and transhipments. We use the simple average of these two estimates in our calculations. Since 2002, the two agencies have unified their statistics. Given the political controversy over this trade, it is possible that there are biases in these estimates. We have not, however, been able to form a prior regarding the size, or indeed sign, of any such bias and thus we take them as a usable measure of the cross-Strait trade patterns.

1.2 Updating the base year

On the presumption that trade patterns tend to be fairly stable over time, a frequent practice in the calculation of effective exchange rates is to base trade weights on trade data for some base year and not to update the base year for an extended period. However, the rapid economic integration within Asia in the last decade (despite the Asian crisis, regional trade picked up sharply afterwards; see Panel A of Graph 3) shows that trade patterns can evolve quickly. Moreover, regional trade agreements under discussion among ASEAN[16] and China, Japan and Korea (the "ASEAN +3"), could quicken the change in these patterns. Use of

[15] See Appendix 1.

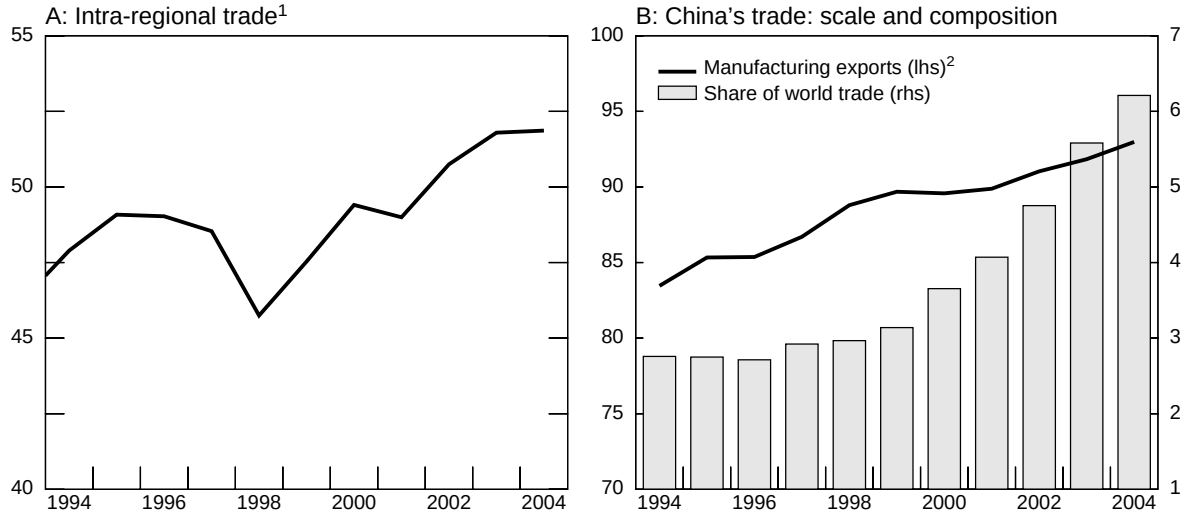
[16] Association of Southeast Asian Nations, comprising Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam.

weights based on decade-old trade patterns thus runs the risk of overweighting Europe and North America and underweighting Asia.

Moreover, China's external trade has grown particularly rapidly and has shifted towards manufacturing (Panel B of Graph 3). China's share in global trade rose from less than 2% in the early 1990s to more than 6% in 2004. Over the same period, China's exports shifted away from primary to manufactured goods as its economy industrialised, to over 90% of its total exports in 2004. In the process, China's imports have increasingly come from the rest of Asia while its exports have increasingly gone to the US market. These facts highlight China's emergence as a major link in the global manufacturing supply chain, specialising in labour-intensive activities. With China's accession to the WTO, these trade patterns are likely to evolve further.

Graph 3
Asia's changing trade patterns

In per cent



[1] Total trade between China, Hong Kong SAR, India, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Taiwan (China) and Thailand; as a share of their total global trade. [2] Goods classified under SITC (revision 3) sections 5 through 8; as a share of total exports.

Sources: IMF; UN Comtrade.

To accommodate these rapid changes in Asia's, particularly China's, trade patterns, we update our *trade weights* and *effective exchange rate indices* based on 1991 trade data to a more recent base period of 1999-2001. Comparison of the results based on earlier and later data can shed light on the implications of the shifting trade patterns in Asia.[17]

2. Refining the RMB effective exchange rate

This section and the next bring together the above two refinements in the determination of weights and the construction of effective exchange rate indices. This section focuses on the

[17] Admittedly, an ideal approach is to update trade weights regularly and "chain-link" the effective exchange rate indices calculated with contemporaneous trade weights. For example, see Klau and Fung (2006).

Chinese renminbi, and the next section analyses other Asian currencies. To facilitate the discussion, we compare the calculation results under two scenarios:

- *Base scenario*: unadjusted trade data and 1991 trade weights
- *Refined scenario*: adjusted trade data and 1999-2001 trade weights

These two scenarios are compared in terms of both the trade weights in the RMB EER basket and the RMB effective exchange rate indices. It should be recognised at the outset that, while the trade weights are influenced by both refinements, measures of effective exchange rates are also affected by interactions between the new weights and the paths of exchange rates and prices. We first analyse the combined effects of the refinements on the trade weights and effective exchange rates, and then discuss the independent impact of each refinement separately.

2.1 Comparison of basket weights with both refinements

A juxtaposition of the trade weights in the RMB EER basket under the two scenarios results in two striking contrasts (Table 1). First, the combined trade weight on Asia (including Japan) in the RMB EER basket decreases substantially with the refinements. In particular, it falls by 8 percentage points, from 55% under the base scenario to 47% under the refined scenario. Within Asia, the decline of the Asian weight is more than entirely due to the sharp reduction in the weight of Hong Kong (from 35% under the base scenario to only 5% under the refined scenario). The refined scenario increases the weights on all the other Asian economies in the basket, most notably Taiwan, Korea and Japan. Similarly, the weight on the US, China's single largest export market, increases by 7 percentage points. The weight of the euro area remains more or less the same under both scenarios. As is demonstrated below, this somewhat surprising result reflects that the increase in the weight on Europe from looking through the veil of Hong Kong is offset by the declining importance of Europe as a trading partner of China over the 1990s.[18]

A second, and less obvious, contrast is that the refined scenario reduces the weight on the US dollar. This is true in relation to a narrow "dollar bloc" comprising not only the US but also Hong Kong and Malaysia (at least before July 2005), with their pegged currencies.[19] In the RMB EER basket, the weight on this dollar bloc would be almost halved, from 55% under the base scenario to just 33%, owing to the redistribution of Hong Kong's trade weight to economies other than the US. This is also true in relation to a broader "dollar bloc" including in addition the Philippines, Brazil, Chile and Mexico, for which the weight declined from 56% to 35%.

2.2 Comparison of effective exchange rates with both refinements

The RMB NEERs and REERs under the base and refined scenarios show similarities and differences (Graph 4). On the one hand, the RMB effective exchange rates broadly follow similar movements under the two scenarios, with a correlation coefficient of 99% for the monthly NEER and 95% for the monthly REER between April 1994 and June 2006. On the other hand, however, the effective exchange rates under these two scenarios can sometimes diverge by as much as several percentage points. In particular, the refined NEER shows a much sharper appreciation of the RMB both during the Asian crisis around late 1997 and

[18] This pair of offsetting effects, however, has no counterpart in the weight in the euro area effective exchange rate on China because China became a more important trading partner for Europe over the same decade.

[19] Malaysia followed China in abandoning a pure dollar peg on 21 July 2005.

during the final part of the dollar strengthening cycle into the first quarter of 2002. This is consistent with the decreased dollar bloc weight in the refined scenario, given that some Asian currencies (eg the Korean won and the New Taiwan dollar, which gained much weight in China's basket) depreciated against the dollar during the episodes mentioned. In addition, the gap between the REER indices under the two scenarios exhibits similar trends.

Overall, the RMB effective exchange rates under the refined scenario appear to be more volatile than those under the base scenario. Table 2 confirms this visual impression for both the nominal and real effective exchange rates. The most important reason behind the increased effective exchange rate volatility *as measured* under the refined scenario is the sharply reduced dollar bloc weight in the RMB EER basket after the refinements. Given the history of the RMB's tight dollar link between 1994 and 2005, an RMB EER basket assigning a smaller dollar bloc weight will translate fluctuations in the bilateral dollar rates of other trading partners' currencies into an increase in the effective volatility of the RMB.[20] This finding again underscores the importance of properly measuring the trade weights in the effective exchange rate estimation, since an overweighting of the dollar bloc conveys an exaggerated impression of currency stability under a dollar peg.[21]

[20] Given the paths of other bilateral dollar exchange rates, the effective volatility as calculated depends on the weights assigned to different currencies in the basket. At the limit, a 100% weight on the dollar bloc means that the bilateral dollar exchange rate and effective exchange rate are essentially the same. In other words, under a tight dollar link and a (misassigned) 100% weight on the dollar bloc, the RMB volatility would be zero in both effective and bilateral terms.

[21] Note also that the RMB REERs are more volatile than their nominal counterparts under both scenarios. This may reflect instability in the inflation process in China, with food bulking large in the consumer price index.

Table 1

Trade weights in the EER baskets of the Chinese renminbi[1]

In per cent

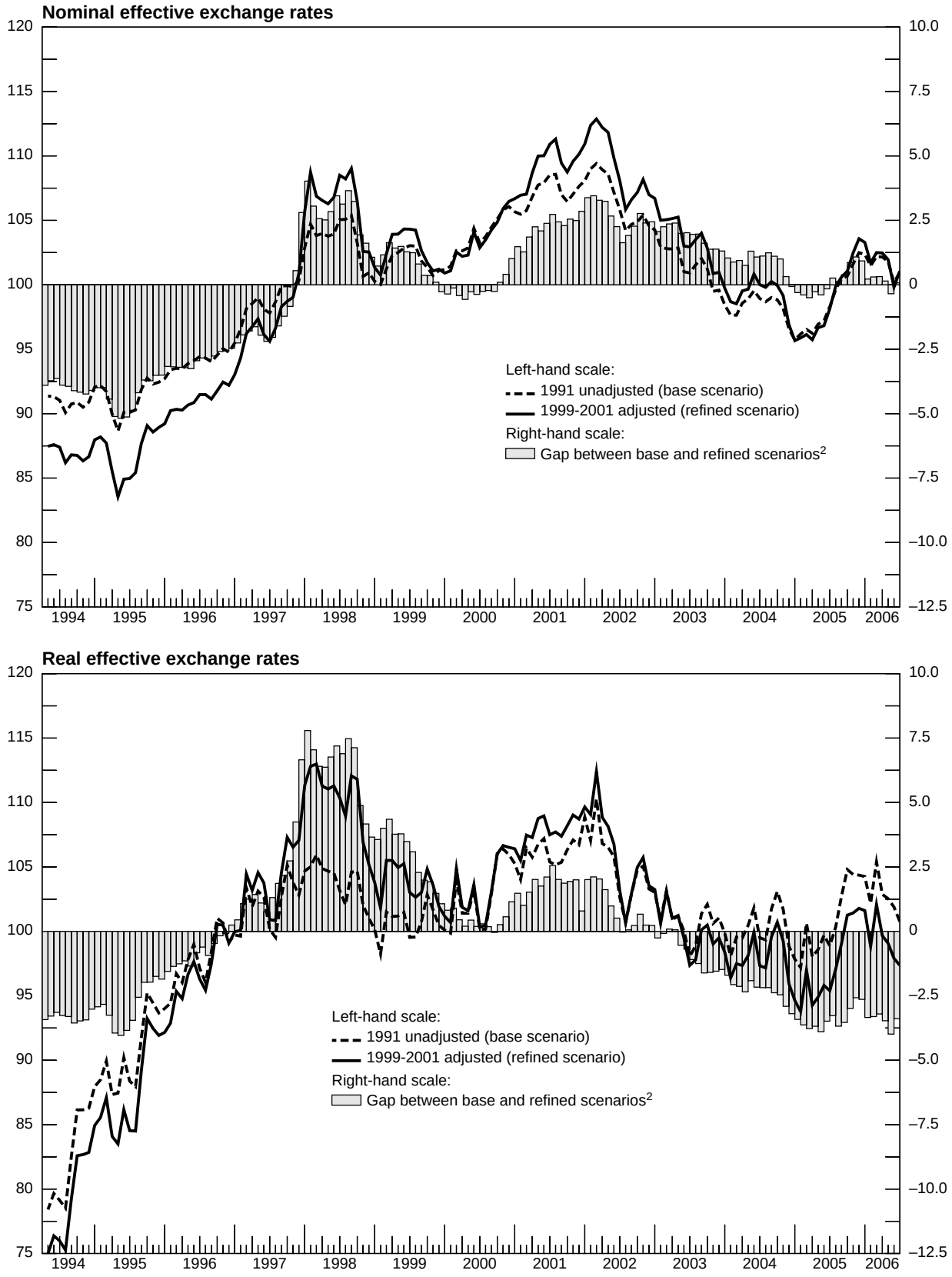
Base period	1991		1999-2001	
Trade data	unadjusted	adjusted	unadjusted	adjusted
	Base scenario	*I*	*II*	**Refined scenario**
Asia	**54.8**	**48.3**	**50.7**	**46.5**
Hong Kong	34.7	11.5	21.1	4.8
India	0.0	0.0	0.4	0.4
Indonesia	0.9	1.3	0.5	0.6
Japan	13.7	20.1	16.4	20.7
Korea	2.5	4.0	5.6	7.1
Malaysia	0.5	0.7	1.1	1.3
Philippines	0.2	0.2	0.3	0.4
Singapore	1.3	1.7	2.4	2.8
Taiwan (China)	0.3	7.8	2.0	7.2
Thailand	0.8	0.9	1.1	1.3
North America	**21.8**	**24.5**	**26.9**	**28.7**
United States	20.1	22.6	25.0	26.7
Canada	1.7	1.9	1.9	2.1
Euro area	**17.3**	**20.2**	**15.4**	**17.2**
Austria	0.6	0.7	0.4	0.4
Belgium	1.0	1.2	1.1	1.2
Finland	0.4	0.4	0.5	0.6
France	3.2	3.8	2.8	3.1
Germany	7.3	8.5	5.7	6.4
Greece	0.2	0.2	0.2	0.2
Ireland	0.1	0.1	0.2	0.3
Italy	2.5	3.0	1.9	2.3
Netherlands	0.9	1.0	1.5	1.5
Portugal	0.1	0.1	0.1	0.1
Spain	1.1	1.3	1.0	1.1
Other Europe	**4.3**	**5.3**	**4.2**	**4.6**
Denmark	0.4	0.5	0.4	0.4
Norway	0.1	0.3	0.2	0.3
Sweden	0.6	0.7	0.6	0.7
Switzerland	0.7	0.9	0.5	0.6
United Kingdom	2.4	2.9	2.5	2.6
Others	**1.8**	**1.7**	**2.8**	**3.0**
Australia	1.2	1.2	1.2	1.3
Brazil	0.1	0.1	0.3	0.4
Chile	0.1	0.1	0.3	0.3
Mexico	0.2	0.2	0.7	0.8
New Zealand	0.3	0.1	0.3	0.2
Memo:				
Asia excl. HK	*20.1*	*36.8*	*29.6*	*41.7*
Asia excl. HK and JP	*6.4*	*16.7*	*13.2*	*21.0*
Narrow dollar bloc[2]	*55.3*	*34.8*	*47.2*	*32.8*
Broad dollar bloc[3]	*55.9*	*35.4*	*48.8*	*34.7*

[1] Based on bilateral weighting scheme. [2] Comprising US, Hong Kong and Malaysia. [3] Comprising the narrow dollar bloc and Brazil, Chile, Mexico and the Philippines.

Graph 4

Effective exchange rates for China[1]

Sample average = 100



[1] Based on bilateral weighting scheme and a basket of 34 currencies. [2] In percentage points.

Source: BIS calculations.

Table 2

Effective exchange rates for China: volatility comparison[1]

In standard deviation of annualised monthly percentage changes

Index	Base scenario[2]	Refined scenario[3]
NEER	2.9	4.0
REER	6.2	6.7

[1] Sample period = April 1994 to June 2006. [2] Unadjusted trade data, 1991 trade weights. [3] Adjusted trade data, 1999-2001 trade weights.

2.3 Comparison with each refinement considered separately

Closer examination of the trade weights and effective exchange rate estimates helps shed light on the independent impacts owing to each refinement and their interaction. The unshaded columns of Table 1 can be compared to the shaded columns to see the partial effects.

2.3.1 Effects of trade data adjustment

The adjustment of the trade data to reflect Hong Kong's entrepôt trade and Taiwanese transhipments through Hong Kong makes more difference than the update of the base years. A comparison of the column labelled "base scenario" and Column *I* of Table 1 shows how weights based on 1991 data would have differed with the adjustment of the trade data. A key result is that the weights on Japan and Taiwan in the RMB EER basket would have gained much from just the trade data revision to account for Hong Kong's re-export trade and cross-Strait transhipment. The large increase in the weights on the yen and Taiwan dollar, and these currencies' depreciation against the dollar (and RMB) around the Asian crisis and during the late phase of the dollar's upcycle, result in the adjusted RMB NEER showing a larger appreciation in these episodes.[22]

The effect of adjusting for entrepôt trade and transhipments is smaller when more recent trade data are used (comparing Column *II* and the refined scenario in Table 1). This reflects the shrinking relative role of Hong Kong as an entrepôt (particularly for intra-regional trade within Asia) over the 1990s.[23]

2.3.2 Effects of base year updating

A comparison of weights based on the beginning of the 1990s with those based on the end of the 1990s, both incorporating the Hong Kong and Taiwan trade adjustments, suggests that

[22] One should be careful in interpreting the gaps and deviations of the effective exchange rate indices, as different ways of rebasing will have noticeable impact on their shape. In this paper, we consistently use the sample means for rebasing the indices.

[23] Using 1999-2001 trade as a base, the adjustment of Hong Kong and Taiwan trade reduces the weight on Hong Kong much less sharply than when 1991 data are used, by 16 percentage points rather than 23 percentage points. Weights on the US and the euro area both increase by about 2 percentage points. To varying degrees, the weights increased for other Asian economies.

the update itself does not have such a large impact on the effective exchange rate indices (Column *I* and refined scenario column in Table 1). First, Hong Kong's trade weight falls further upon a more updated base period, not because of Hong Kong's diminished entrepôt role (by construction in this comparison), but rather because of China's diversification of its manufacturing trade away from Hong Kong-produced and -consumed goods. Second, the trade weights of other Asian trading partners and the US all gain. This gives evidence of China's further integration with the rest of Asia, part of which, but not all, is linked to its similarly rapidly growing exports to the US market. China's trade growth with Asia and the US has outpaced that with Europe, and as a result the trade weights for most European economies decrease. Thus, whereas seeing through the veil of Hong Kong raises the weight on the euro area (by 3 percentage points based on 1991 trade), updating the base period lowers it (by 3 percentage points based on adjusted trade data). The fact that China's trade with the US has kept up with that with Asia means that the effect from updating the base year on the effective exchange rates is limited.

To sum up, the overall differences on the RMB effective exchange rates under the base and refined scenarios are largely attributable to the trade data adjustment. Looking forward, the importance of the Hong Kong re-export adjustment may diminish further, since it is unlikely that the Closer Economic Partnership Agreement will materially reverse the trend of market share loss of Hong Kong's entrepôt trade. Integration across the Taiwan Strait, however, may have a way to go (and the transhipment adjustment may bulk larger over time – or disappear entirely).

3. Refining the effective exchange rate indices of other Asian currencies

Taking account of Asia's entrepôt and rising intra-regional trade matters not only for the effective exchange rate of the renminbi but also for that of other Asian currencies. In this section we apply the refinements to other Asian effective exchange rates. Where available, effective exchange rate weights of the respective central banks are compared to our calculations.

3.1 Weights on China and Hong Kong

In the previous section, we saw how taking account of the entrepôt trade through Hong Kong tends to redistribute the trade weights in the RMB EER basket away from Hong Kong and toward other trading partners. From the standpoint of the trading partners, this same adjustment tends to redistribute trade weights away from Hong Kong and toward China.

Thus, one salient comparison is between the trade weights for China and Hong Kong with and without the adjustment. Table 3 displays the weights on China and Hong Kong in the baskets of other Asian currencies under different scenarios. The weight on China under the refined scenario is a multiple of the weight under the base scenario for all of Asia save Hong Kong. Conversely, the weight on Hong Kong is lower under the refined scenario than under the base scenario for all of Asia save India.[24] In short, without an adjustment for China-related re-exports/transhipment via Hong Kong, China is easy to underweight and Hong

[24] This is because India's trade with Hong Kong has increased over the decade, more than offsetting the downward adjustment for re-export trade. If one compares the weights based on 1999-2001, the trade data adjustment decreases India's weight on Hong Kong by 3.4 percentage points. See Tables B and D of Appendix 2.

Kong to overweight. As for the resulting effective exchange rate indices, however, such a misallocation of trade weights has no effect, given both the RMB's and the Hong Kong dollar's tight links to the US dollar prior to the 21 July 2005 policy change. As shown in Graphs 5 and 6, the NEERs and REERs for other Asian economies (except Hong Kong and Singapore) are broadly the same under both scenarios.

Table 3

Weights on China and Hong Kong in the EER baskets of Asian currencies

In per cent

EER basket of	Weight on China			Weight on Hong Kong		
	Base scenario[1]	Refined scenario[2]	Official	Base scenario[1]	Refined scenario[2]	official
China	.	.	.	34.7	4.8	…
Hong Kong	33.5	19.4	42.0	.	.	.
India	0.0	3.6	6.7	3.6	3.9	4.1
Indonesia	3.5	5.0	0	2.3	1.4	0
Japan	4.3	13.6	7.1	4.5	1.7	6.3
Korea	2.6	12.9	…	4.6	2.3	…
Malaysia	1.2	3.8	…	3.2	1.9	…
Philippines	1.2	2.7	0	5.9	2.1	0
Singapore[3]	1.6	5.3	6.9	4.8	2.2	7.0
Taiwan (China)	0.1	13.5	…	12.3	2.6	…
Thailand	2.0	5.7	…	3.9	1.9	…

[1] 1991 trade data, unadjusted for re-exports/transhipment via Hong Kong. [2] 1999-2001 trade data, adjusted.
[3] The "official" weights shown for Singapore refer to the estimates by Malcolm (2004). See also Graph 8.

Sources: *Hong Kong Monthly Digest of Statistics December 2001,* Hong Kong Census and Statistics Department; Reserve Bank of India (2005); Bank of Japan; Bangko Sentral ng Pilipinas; IDEAGlobal; Malcolm (2004); BIS calculations.

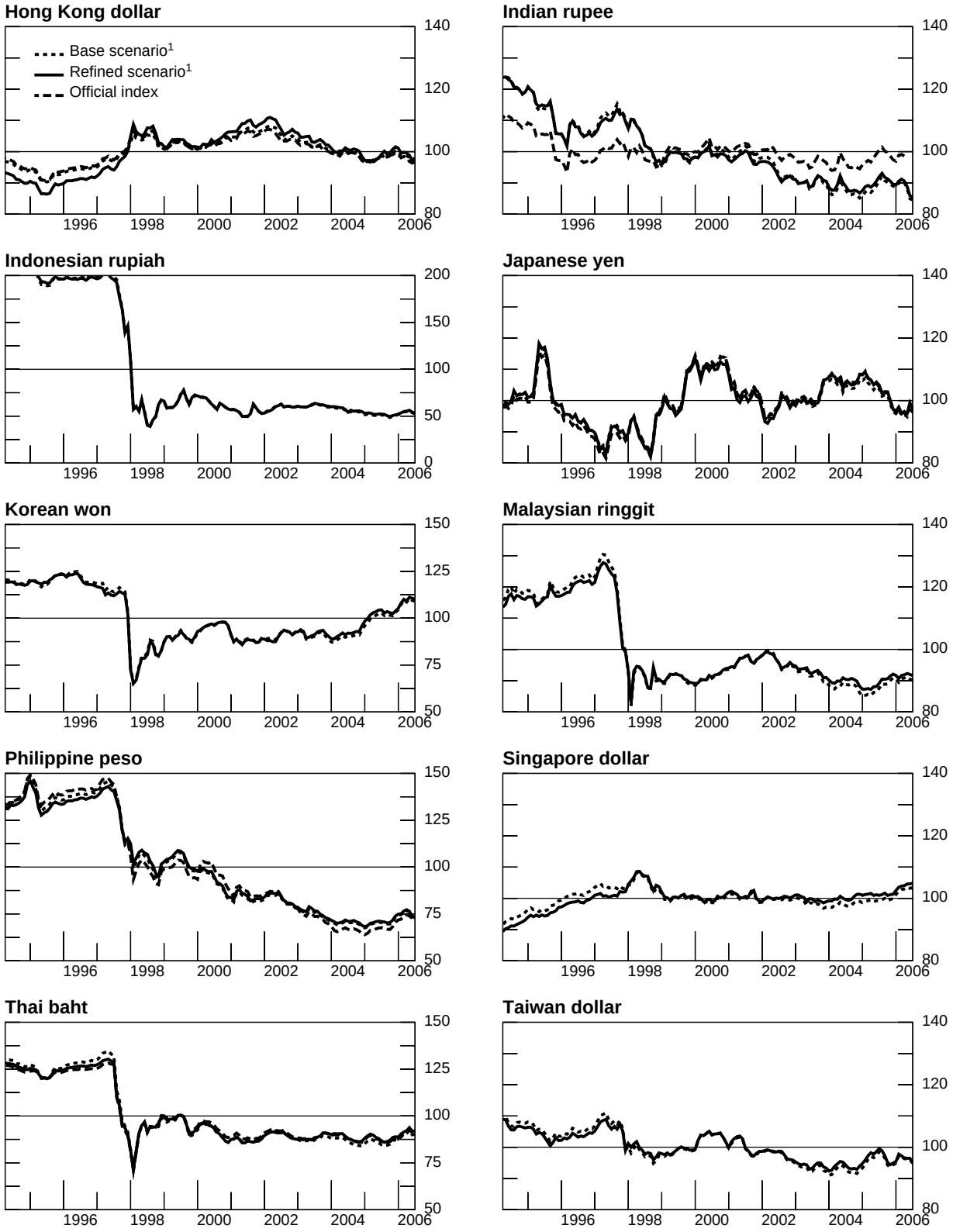
3.2 The case of Hong Kong

Hong Kong is, of course, a special case. The divergence in the Hong Kong dollar effective exchange rate indices shown in Graphs 5 and 6 is a natural consequence of the trade data adjustment. Under the refined scenario, as discussed in Box 2, we use Hong Kong's retained imports and domestic exports to derive the corresponding trade weights. Excluding re-exports, China is not as important a trading partner in manufactures for Hong Kong: the refined scenario puts a weight of just 19% on China, well below the 33.5% under the base scenario. Given the RMB's dollar link before July 2005, the "dollar bloc" in the Hong Kong dollar basket is thus overweighted under the base scenario, and the volatility of its effective exchange rate is accordingly understated under the same scenario. This finding parallels that for the RMB.

Graph 5

Nominal effective exchange rates for Asian currencies

Sample average = 100



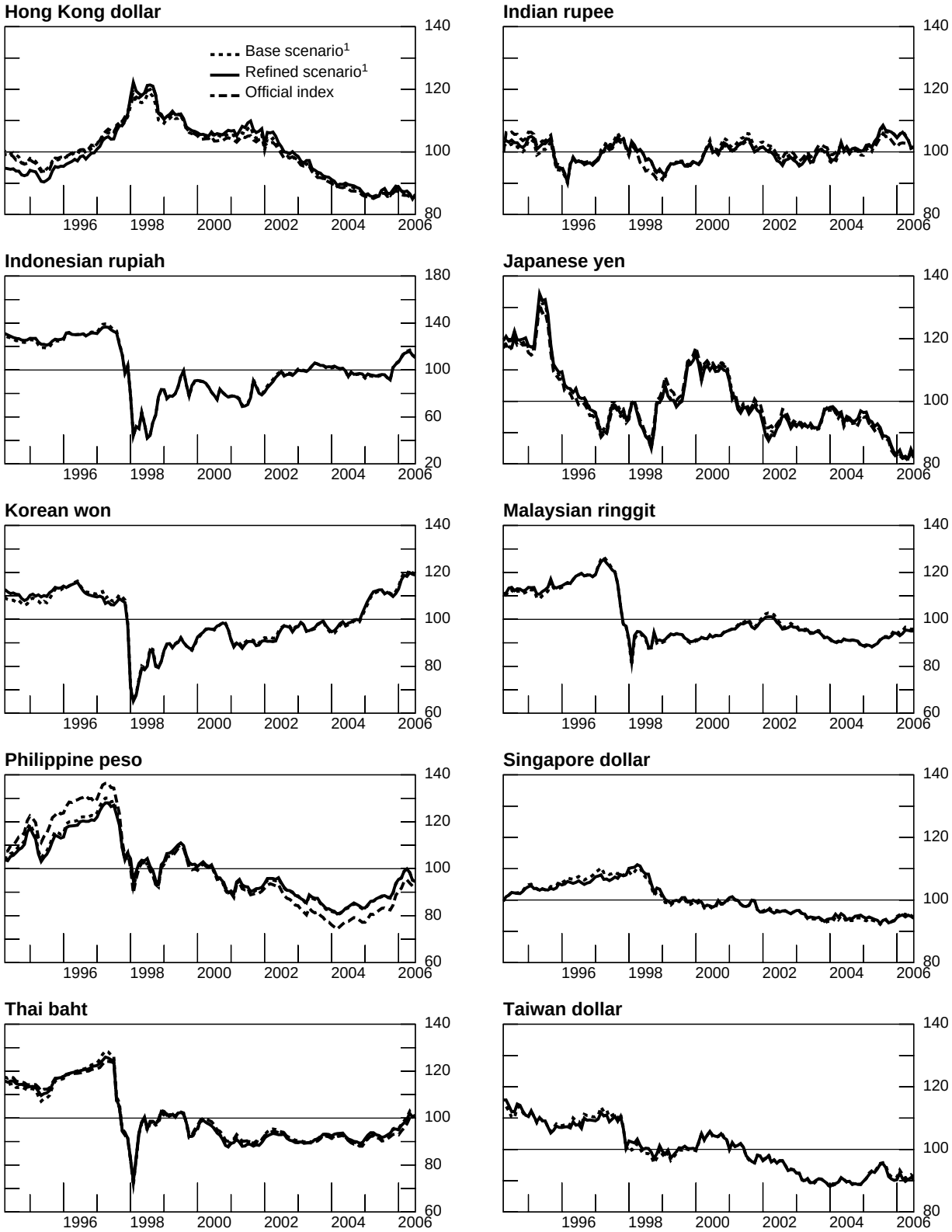
[1] Based on bilateral weighting scheme and a basket of 34 currencies.

Sources: Hong Kong Monetary Authority; Reserve Bank of India; Bank of Japan; Bangko Sentral ng Pilipinas; Bank of Thailand; CEIC; BIS calculations.

Graph 6

Real effective exchange rates for Asian currencies

Sample average = 100



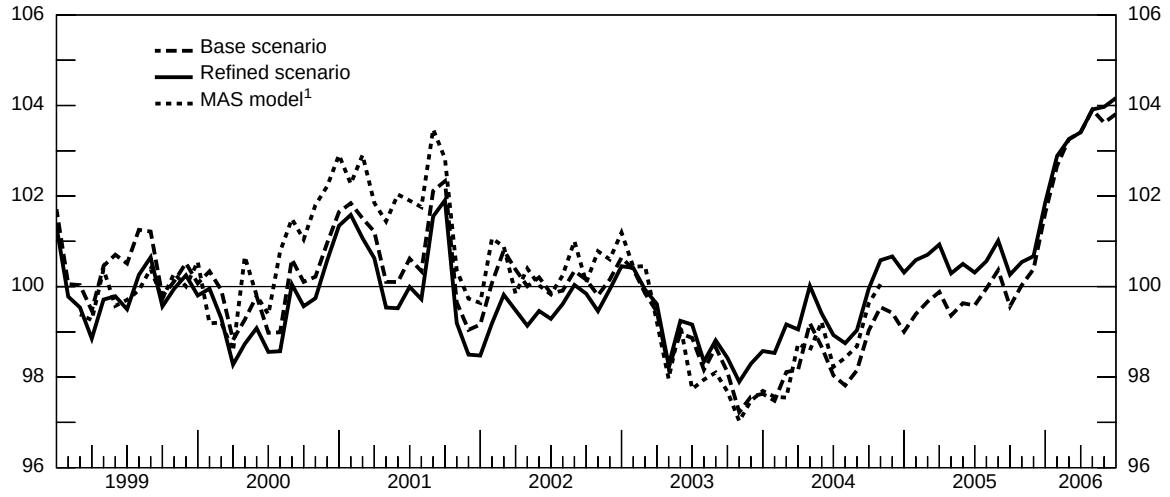
[1] Based on bilateral weighting scheme and a basket of 34 currencies.

Sources: Hong Kong Monetary Authority; Reserve Bank of India; Bank of Japan; Bangko Sentral ng Pilipinas; Bank of Thailand; CEIC; BIS calculations.

3.3 The case of Singapore

The growing intra-regional trade seems to have affected the Singapore dollar effective exchange rates substantially, as revealed in the relatively low correlation between the NEER under different scenarios (Table 4 and Graph 7). Recalling that no adjustments have been made for Singapore's own re-exports, this small open economy has been trading more with China, Korea and other ASEAN members, and relatively less with the US, European and Japanese markets on which it concentrated a decade ago. Since the weights on other Asian currencies are increased under the refined scenario, there is a divergence between the two Singapore dollar NEERs during the Asian crisis around 1998, owing to the sharp depreciation of the ringgit, the rupiah and the won (Graph 5).

Graph 7
Effective exchange rates of the Singapore dollar
Sample average = 100



[1] As estimated by Malcolm (2004).

Sources: Malcolm (2004); BIS calculations.

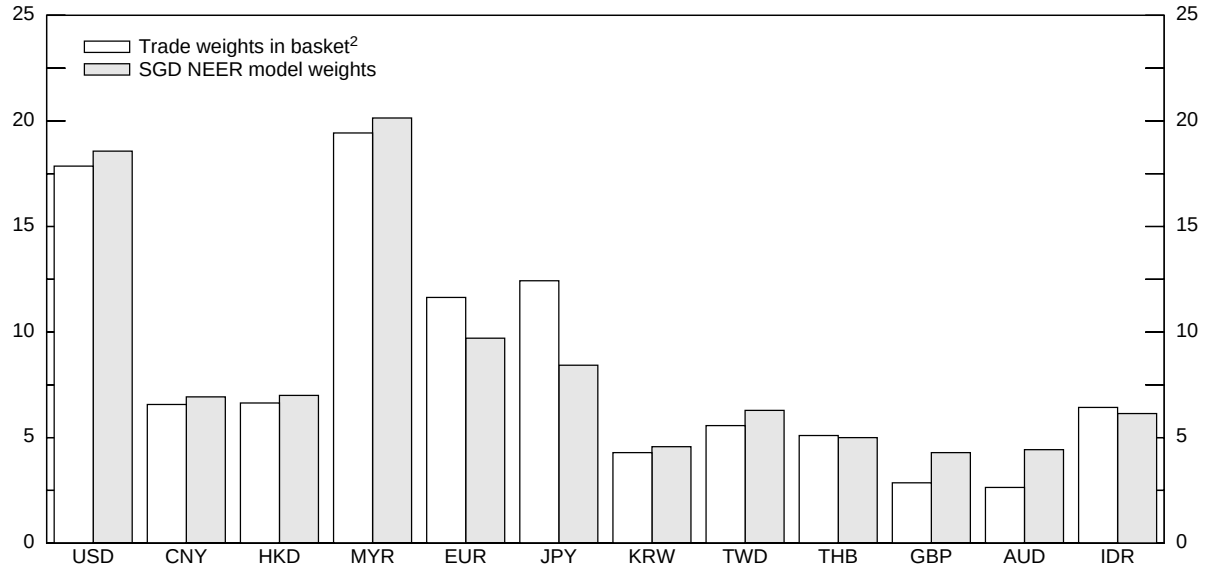
3.4 Comparison of refined scenario with official weights and effective exchange rates

A juxtaposition of the available official weights in Asia and those we compile under the refined scenario suggests that the role of Hong Kong as an entrepôt has not been taken on board by most of the Asian authorities, at least in their calculation of effective exchange rates (Table 3). Japan puts similar weights on China and on Hong Kong. Singapore does not disclose its official weights, but there is a cottage industry among analysts in Singapore to infer them from various revelations. Malcolm (2004), a market analyst, "guesstimates" that the Singaporean authorities assign nearly equal weights to China and Hong Kong in their nominal effective exchange rate for the Singapore dollar (Graph 8). If it appears that the Japanese authorities assign too heavy a weight to Hong Kong and too light a weight to China, the Singaporean authorities may put too heavy a weight to Hong Kong while assigning an appropriate weight to China. One can also argue that Hong Kong itself puts too heavy a weight on China (42%, more than double that of the refined scenario we propose). At this point, however, it should be recalled that our whole weighting scheme is based on

merchandise trade, and inclusion of trade in services could well shift weight back to China. The inclusion of service trade is a potential step ahead and poses further challenges to statisticians.[25]

Graph 8
Singapore dollar basket: best-fit model of MAS weights versus trade shares[1]

In per cent



[1] The total trade exposure of Singapore to the US dollar bloc (consisting of USD, CNY, HKD and MYR) is 50.6%, and the estimated model weight is 51.9%. [2] Average of last three years (2001-2003).

Source: Malcolm (2004).

In December 2005, the Reserve Bank of India officially broadened its basket to include both China and Hong Kong (RBI (2005)). Based on three-year moving average trade, the most recent weights in the RBI basket assigned to China and Hong Kong are 6.7% and 4.1% respectively. Compared with our calculations, which assign similar weights to China and Hong Kong in the basket for INR, the new Indian official weights suggest that the importance of China has grown even more rapidly since 2000.

Information available to the public suggests that neither China nor Hong Kong is included in the currently employed currency baskets in Indonesia or the Philippines.[26] If the respective central banks are to widen their currency baskets, they may be able to take on board the implications of Hong Kong as an entrepôt.

All that said, it bears repeating that as long as the Hong Kong dollar and the RMB track the US dollar, the practical importance of distinguishing them is limited. The high correlation of our base and refined scenario effective exchange rates, and the lack of any consistent

[25] In an extreme experiment, Ha and Fan (2003) use only services to derive trade weights for Hong Kong. This is perhaps the first post-industrial effective exchange rate calculation.

[26] The rather narrow basket (comprising the euro area, Japan, UK and US only) in the Philippine official index explains the deviation between their and our calculation shown in Graphs 5 and 6. In particular, the inclusion of other Asian currencies (particularly those of China and Hong Kong) in our calculation suggests that the peso has not depreciated by as much as implied in the official index after the dollar peaked in 2002.

pattern of their relative volatilities, suggest as much (Table 4).[27] However, since the renminbi regime shift in July 2005, such a distinction would no doubt become more important and meaningful over time, as the renminbi volatility against the dollar increases.

Table 4

Correlation and volatility of exchange rates under different scenarios

Sample period: January 1999 to June 2006

	Correlation between effective exchange rates under the base and refined scenarios[1]		Volatility[2]		
	NEER	REER	NEER (base scenario)	NEER (refined scenario)	Bilateral USD
Chinese renminbi	98.0	86.8	2.7	3.5	0.6
Hong Kong dollar	99.5	99.8	2.3	2.8	0.3
Indian rupee	99.2	96.5	4.8	4.2	3.0
Indonesian rupiah	99.6	99.8	15.5	15.3	15.8
Japanese yen	97.9	99.6	7.0	7.1	8.1
Korean won	99.1	99.7	5.5	5.5	6.5
Malaysian ringgit	99.1	99.6	3.4	2.9	1.0
Philippine peso	100.0	100.0	5.6	5.6	5.4
Singapore dollar	88.6	98.5	2.4	2.3	3.8
New Taiwan dollar	99.7	99.7	3.5	3.4	4.1
Thai baht	96.6	98.0	4.9	4.6	5.5
Memo:					
US dollar			*.*	*3.6*	
Euro			*.*	*5.4*	*8.5*

[1] In per cent. [2] Standard deviation of annualised monthly percentage changes.

4. Concluding remarks

The measurement of effective exchange rates in Asia faces two challenges. First, trade relationships in Asia and between Asia and the rest of the world are veiled by Hong Kong's entrepôt trade. While the effect of Hong Kong's entrepôt role in obscuring trade relationships within Asia and between Asia and the rest of the world is at some level understood by policy-makers and market analysts, we are not aware of a systematic effort to adjust measures of effective exchange rates for entrepôt trade. Secondly, intra-regional trade is growing very fast in Asia, particularly trade with China.

In response, this paper has refined the measurement of Asian effective exchange rates by taking account of Hong Kong's entrepôt trade and updating the base year. It turns out that

[27] Again, note the exception of the refined Singapore dollar effective exchange rate behaving quite differently from the base one. The lowish correlation of the Chinese REER in the two scenarios presumably reflects the interaction of different weights on Hong Kong and its exceptional and sustained deflation.

adjusting for trade through Hong Kong is generally more important in the determination of trade weights than updating the base year. This is true even though entrepôt and transhipment trade through Hong Kong accounts for a declining share of China's trade. The capacity of the trade through Hong Kong to challenge the interpretation of trade data has been well recognised in the studies that attempt to reconcile US and Chinese data on their bilateral balance, but has not been incorporated into extant calculations of effective exchange rates in the region.

In our view, effective exchange rates can serve as a useful indicator for policy discussion, and their improved measurement carries important implications for policy analysis – whether in measuring external competitiveness, or assessing monetary and financial conditions, or determining the exchange rate intervention or even the exchange rate regime itself. Looking across economies, perceptions, correct or otherwise, of effective exchange rates can affect how trading partners react to each other's exchange rates. If policy-makers consider a calculated effective exchange rate as a useful reference in policy discussion, then a proper measure is needed. We have focused on deriving more appropriate measures. Looking ahead, improved measurements of effective exchange rates could facilitate the discussion of such issues as currency stability measured in either effective or bilateral terms, the evolving weights on major currency blocs in the baskets of the RMB and other Asian currencies, and possible interactions among east Asian currencies (Fung et al, 2006).

The refinements also matter for macroeconomic analysis. For example, as implied by the improved measure, the deflationary shock to China during the Asian crisis, when the renminbi was tightly linked to the dollar, was much sharper than heretofore appreciated, owing to the heavier weight on many depreciating Asian currencies (and correspondingly a lighter weight on the Hong Kong dollar). That is, the renminbi appreciated much more in effective terms than otherwise measured.

The most important message is that effective exchange rates constructed without our proposed refinements would overweight the dollar bloc, narrowly or broadly, defined in the RMB EER basket. Therefore, as the Chinese authorities intend to adopt some effective orientation in their exchange rate policy, the relative weights in basket have to be determined more carefully than just looking at simple trade flows. Furthermore, without the refinements, the effective exchange rates of other Asian currencies could underweight the RMB relative to the Hong Kong dollar. These relative weights would matter more if the orientations of the RMB and Hong Kong dollar diverge further.

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Appendix 1 General data requirements

Trade data

In this paper, manufacturing trade data (SITC classification 5 to 8) of China's trading partners are used to compute the trade weights. Trade data are taken directly from the OECD (International Trade by Commodity Statistics), the United Nation's Comtrade Database or from national data. For reporter economies without bilateral trade data by SITC breakdowns, the manufacturing part is estimated by taking the manufacturing ratio of its total trade as a reference.

For trade data adjustment, the re-export trade statistics are published by the Hong Kong SAR Government (in *Annual Review of Hong Kong External Merchandise Trade*), but a breakdown into manufacturing goods is unavailable. The manufacturing parts of re-exports are thus estimated through manufacturing trade ratios derived from China's direct bilateral trade statistics. Due to data limitations, we also assume that the re-export margins are not economy-specific and are constant across all of China's trading partners.

Taiwan (China) estimates of cross-Strait trade flow are publicly available from the Mainland Affairs Council, *Cross-Strait Economic Statistics Monthly,* (http://www.mac.gov.tw/english/english/csexchan/rpt/index.htm) and Bureau of Foreign Trade (http://cus93.trade.gov.tw/english/FSCE/FSC0011E.ASP).

Deflator

Consumer price indices (CPI) are used as the price deflator for the REER calculation, except for India, where the wholesale price index (WPI) is used.

Appendix 2 Trade weight tables

Table A

Trade weights under base scenario (1991 unadjusted trade data)

In per cent

	Reporters										
	CN	**HK**	**ID**	**IN**	**JP**	**KR**	**MY**	**PH**	**SG**	**TH**	**TW**
Partners											
AT	0.6	0.5	0.4	0.6	0.7	0.3	0.2	0.2	0.3	0.7	0.4
AU	1.2	1.2	2.5	1.2	2.1	1.5	1.4	1.8	1.8	1.5	1.8
BE	1.0	1.0	1.4	10.8	1.5	0.8	1.0	1.0	0.7	2.0	0.8
BR	0.1	0.2	0.5	1.0	0.7	0.6	0.5	1.0	0.3	0.7	0.7
CA	1.7	1.3	1.0	1.5	2.3	2.2	0.9	1.2	0.8	1.1	2.0
CH	0.7	1.2	0.9	1.9	1.4	0.8	0.8	0.6	1.1	1.8	0.9
CL	0.1	0.2	0.3	0.1	0.3	0.4	0.1	0.1	0.1	0.1	0.5
CN		33.5	3.5	0.0	4.3	2.6	1.2	1.2	1.6	2.0	0.1
DE	7.3	5.5	8.7	12.6	8.1	6.2	5.3	5.8	4.7	7.0	6.1
DK	0.4	0.4	0.3	0.6	0.4	0.4	0.2	0.2	0.2	0.5	0.2
ES	1.1	0.8	0.7	1.1	0.9	0.7	0.3	0.4	0.5	0.5	0.8
FI	0.4	0.2	0.3	0.6	0.3	0.3	0.2	0.2	0.2	0.3	0.2
FR	3.2	1.6	2.8	3.9	2.7	2.2	1.6	1.8	2.2	2.1	2.1
GB	2.4	3.2	3.6	10.6	3.8	2.8	4.7	3.4	3.6	3.2	2.6
GR	0.2	0.1	0.1	0.1	0.3	0.2	0.0	0.0	0.1	0.1	0.1
HK	34.7		2.3	3.6	4.5	4.6	3.2	5.9	4.8	3.9	12.3
ID	0.9	0.7		0.6	2.0	1.7	1.0	0.9	2.6	0.5	1.3
IE	0.1	0.1	0.1	0.1	0.4	0.1	0.1	0.1	0.2	0.1	0.1
IN	0.0	0.4	0.3		0.6	0.5	0.3	0.2	0.8	2.0	0.2
IT	2.5	1.7	2.6	4.0	2.1	2.0	1.3	1.1	1.5	2.0	1.6
JP	13.7	10.3	26.8	10.4		27.6	22.7	21.2	17.8	30.4	22.3
KR	2.5	3.3	6.2	2.2	7.6		2.5	4.4	2.8	3.0	2.4
MX	0.2	0.3	0.3	0.5	0.8	0.8	0.1	0.1	0.1	0.3	0.5
MY	0.5	0.9	1.1	0.7	2.4	1.3		1.3	15.5	1.5	2.0
NL	0.9	1.3	2.8	2.2	2.1	1.4	1.3	2.0	2.0	1.8	2.5
NO	0.3	0.2	0.1	0.3	0.4	0.3	0.2	0.1	0.2	0.3	0.2
NZ	0.1	0.1	0.1	0.2	0.4	0.2	0.2	0.1	0.2	0.1	0.2
PH	0.2	0.7	0.5	0.3	0.9	0.7	0.5		0.8	0.4	0.9
PT	0.1	0.1	0.0	0.2	0.2	0.1	0.0	0.0	0.1	0.1	0.1
SE	0.6	0.5	0.8	1.1	0.8	0.8	0.9	0.3	0.6	0.9	0.8
SG	1.3	2.7	7.6	2.7	3.5	2.8	19.8	3.7		7.9	3.0
TH	0.8	1.2	0.8	1.1	3.1	1.2	1.6	2.0	4.2		1.6
TW	0.3	6.1	5.0	1.8	6.2	2.5	4.9	6.4	5.0	4.1	
US	20.1	18.4	15.1	21.5	32.3	29.1	21.0	31.0	22.6	17.3	28.5

Table B

Trade weights under refined scenario (1999-2001 adjusted trade data)

In per cent

	Reporters										
	CN	**HK**	**ID**	**IN**	**JP**	**KR**	**MY**	**PH**	**SG**	**TH**	**TW**
Partners											
AT	0.4	0.3	0.4	0.3	0.3	0.2	0.1	0.1	0.2	0.2	0.3
AU	1.3	0.9	3.0	1.3	1.7	1.5	1.8	0.9	1.6	1.9	1.3
BE	1.2	0.6	1.8	10.2	1.1	0.7	0.8	0.4	0.6	1.7	0.8
BR	0.4	0.2	0.4	0.7	0.5	0.9	0.2	0.1	0.2	0.3	0.4
CA	2.1	1.2	1.0	1.8	1.6	1.4	0.7	0.6	0.4	0.8	1.1
CH	0.6	1.7	0.5	1.8	0.9	0.5	0.4	0.4	1.2	0.9	0.6
CL	0.3	0.0	0.2	0.2	0.1	0.5	0.1	0.0	0.0	0.1	0.3
CN		19.4	5.0	3.6	13.6	12.9	3.8	2.7	5.3	5.7	13.5
DE	6.4	4.2	5.0	7.7	5.1	4.2	3.3	3.6	3.8	3.6	4.5
DK	0.4	0.2	0.3	0.6	0.3	0.3	0.1	0.1	0.1	0.3	0.2
ES	1.1	0.5	1.2	1.5	0.7	0.8	0.3	0.3	0.4	0.7	0.5
FI	0.6	0.4	0.4	0.5	0.3	0.4	0.2	0.6	0.3	0.4	0.3
FR	3.1	2.1	2.0	3.3	2.0	1.8	1.5	1.0	1.9	1.9	1.5
GB	2.6	4.5	3.8	9.1	3.3	2.9	3.3	3.0	2.8	3.1	2.5
GR	0.2	0.1	0.2	0.2	0.2	0.6	0.1	0.0	0.0	0.2	0.1
HK	4.8		1.4	3.9	1.7	2.3	1.9	2.1	2.2	1.9	2.6
ID	0.6	0.9		1.1	1.9	1.8	1.9	1.1	3.0	1.8	1.2
IE	0.3	0.4	0.2	0.3	0.9	0.6	1.0	0.6	0.9	0.3	0.4
IN	0.4	2.2	1.0		0.6	0.9	0.8	0.3	1.5	0.9	0.5
IT	2.3	2.2	1.7	3.8	1.7	1.6	0.7	0.6	0.8	1.3	1.2
JP	20.7	13.0	18.7	6.6		19.0	17.7	19.7	13.5	23.8	20.9
KR	7.1	6.3	5.1	3.0	6.5		3.8	6.0	4.0	3.2	5.2
MX	0.8	0.4	0.4	0.5	1.0	1.2	0.5	0.4	0.6	0.6	0.7
MY	1.3	3.3	3.6	2.0	3.5	2.8		3.7	18.7	5.1	3.4
NL	1.5	1.4	2.6	2.2	2.3	1.6	3.1	5.4	2.4	2.5	2.9
NO	0.3	0.1	0.1	0.2	0.2	0.4	0.1	0.0	0.1	0.1	0.1
NZ	0.2	0.1	0.2	0.2	0.3	0.2	0.2	0.1	0.2	0.2	0.1
PH	0.4	1.5	1.2	0.4	2.4	2.0	2.3		2.7	2.2	2.7
PT	0.1	0.1	0.1	0.3	0.2	0.2	0.0	0.0	0.0	0.1	0.1
SE	0.7	0.5	0.6	1.0	0.7	0.5	0.6	0.3	0.3	0.6	0.5
SG	2.8	5.8	13.1	4.3	3.6	3.4	16.7	7.6		8.2	3.8
TH	1.3	2.2	2.6	1.7	3.2	1.4	3.5	3.5	4.8		2.1
TW	7.2	7.1	4.0	1.7	7.2	4.9	5.3	7.9	5.6	5.0	
US	26.7	16.2	18.0	24.0	30.6	25.7	23.1	26.9	19.7	20.1	23.6

Table C

Trade weights (1991 adjusted trade data)

In per cent

	Reporters										
	CN	**HK**	**ID**	**IN**	**JP**	**KR**	**MY**	**PH**	**SG**	**TH**	**TW**
Partners											
AT	0.7	0.5	0.4	0.6	0.7	0.3	0.2	0.2	0.3	0.7	0.4
AU	1.2	1.0	2.5	1.2	2.1	1.6	1.4	1.9	1.8	1.5	1.8
BE	1.2	0.7	1.4	11.0	1.5	0.9	1.0	1.1	0.7	2.0	0.8
BR	0.1	0.3	0.5	1.0	0.7	0.6	0.5	1.0	0.3	0.7	0.7
CA	1.9	1.2	1.0	1.6	2.3	2.2	0.9	1.3	0.9	1.1	2.0
CH	0.9	1.3	0.9	1.9	1.4	0.8	0.8	0.7	1.1	1.9	0.9
CL	0.1	0.1	0.3	0.1	0.3	0.4	0.1	0.1	0.1	0.1	0.5
CN		17.0	4.3	0.1	5.3	3.7	1.3	1.5	1.9	2.0	7.0
DE	8.5	6.2	8.7	12.8	8.1	6.2	5.3	6.0	4.8	7.1	6.2
DK	0.5	0.3	0.3	0.6	0.4	0.5	0.2	0.2	0.2	0.5	0.2
ES	1.3	0.5	0.7	1.1	0.9	0.7	0.3	0.4	0.5	0.5	0.8
FI	0.4	0.3	0.3	0.6	0.3	0.3	0.2	0.2	0.2	0.3	0.2
FR	3.8	1.6	2.8	3.9	2.8	2.3	1.6	1.8	2.2	2.1	2.2
GB	2.9	4.6	3.6	10.8	3.9	2.9	4.7	3.5	3.7	3.3	2.7
GR	0.2	0.1	0.1	0.1	0.3	0.2	0.0	0.0	0.1	0.1	0.1
HK	11.5		1.6	1.7	3.0	2.5	2.0	2.9	2.8	2.2	4.7
ID	1.3	0.8		0.6	2.0	1.7	1.0	0.9	2.6	0.5	1.3
IE	0.1	0.1	0.1	0.1	0.4	0.1	0.1	0.1	0.3	0.1	0.1
IN	0.0	0.5	0.3		0.7	0.5	0.4	0.3	0.8	2.0	0.2
IT	3.0	2.3	2.6	4.1	2.1	2.1	1.3	1.2	1.5	2.0	1.6
JP	20.1	18.5	26.8	10.6		27.9	23.0	21.8	18.2	30.9	22.4
KR	4.0	4.4	6.2	2.3	7.6		2.6	4.5	2.8	3.1	2.4
MX	0.2	0.2	0.3	0.5	0.8	0.9	0.1	0.1	0.2	0.3	0.5
MY	0.7	1.6	1.1	0.8	2.4	1.3		1.3	15.8	1.5	2.0
NL	1.0	1.6	2.8	2.3	2.1	1.4	1.3	2.0	2.0	1.8	2.5
NO	0.3	0.2	0.1	0.3	0.4	0.3	0.2	0.1	0.2	0.3	0.2
NZ	0.1	0.2	0.1	0.2	0.4	0.2	0.2	0.1	0.2	0.1	0.2
PH	0.2	0.7	0.5	0.3	0.9	0.7	0.5		0.8	0.4	0.9
PT	0.1	0.0	0.0	0.2	0.2	0.1	0.0	0.0	0.1	0.1	0.1
SE	0.7	0.6	0.8	1.2	0.8	0.8	1.0	0.3	0.6	1.0	0.8
SG	1.7	4.1	7.6	2.7	3.6	2.8	20.0	3.9		8.1	3.0
TH	0.9	1.6	0.8	1.1	3.1	1.2	1.6	2.0	4.3		1.6
TW	7.8	8.4	5.0	1.8	6.2	2.5	4.9	6.6	5.1	4.2	
US	22.6	18.6	15.1	21.9	32.5	29.5	21.2	31.9	23.0	17.6	28.7

Table D

Trade weights (1999-2001 unadjusted trade data)

In per cent

	Reporters										
	CN	**HK**	**ID**	**IN**	**JP**	**KR**	**MY**	**PH**	**SG**	**TH**	**TW**
Partners											
AT	0.4	0.2	0.4	0.3	0.3	0.2	0.1	0.1	0.2	0.2	0.3
AU	1.2	1.1	3.0	1.3	1.7	1.5	1.7	0.9	1.5	1.9	1.2
BE	1.1	0.7	1.8	9.8	1.1	0.6	0.8	0.4	0.6	1.7	0.8
BR	0.3	0.3	0.4	0.6	0.5	0.9	0.2	0.1	0.2	0.3	0.4
CA	1.9	1.2	1.0	1.7	1.6	1.4	0.7	0.6	0.4	0.7	1.1
CH	0.5	0.8	0.5	1.7	0.9	0.4	0.4	0.4	1.1	0.9	0.6
CL	0.3	0.2	0.2	0.2	0.1	0.5	0.1	0.0	0.0	0.1	0.3
CN		39.7	4.2	3.4	12.0	11.3	3.5	2.3	4.9	5.1	5.0
DE	5.7	3.4	5.0	7.4	5.0	4.2	3.3	3.5	3.7	3.6	4.3
DK	0.4	0.3	0.3	0.6	0.3	0.3	0.1	0.1	0.1	0.3	0.2
ES	1.0	0.6	1.2	1.4	0.7	0.8	0.3	0.3	0.4	0.7	0.5
FI	0.5	0.2	0.4	0.4	0.3	0.4	0.2	0.6	0.3	0.4	0.3
FR	2.8	1.7	2.0	3.1	2.0	1.7	1.5	0.9	1.9	1.9	1.5
GB	2.5	3.4	3.8	8.8	3.2	2.9	3.2	2.9	2.8	3.1	2.4
GR	0.2	0.1	0.2	0.2	0.2	0.6	0.1	0.0	0.0	0.2	0.1
HK	21.1		2.9	7.3	4.1	4.6	4.2	5.2	5.2	3.8	14.4
ID	0.5	0.5		1.1	1.9	1.8	1.9	1.1	3.0	1.7	1.2
IE	0.2	0.2	0.2	0.3	0.8	0.6	1.0	0.6	0.9	0.3	0.4
IN	0.4	0.9	1.0		0.5	0.9	0.8	0.3	1.5	0.9	0.5
IT	1.9	1.3	1.7	3.6	1.7	1.6	0.7	0.5	0.8	1.3	1.2
JP	16.4	8.5	18.5	6.3		18.9	17.3	19.1	13.1	23.5	20.1
KR	5.6	2.9	5.0	2.9	6.5		3.7	5.8	3.9	3.1	5.0
MX	0.7	0.4	0.4	0.5	1.0	1.2	0.5	0.4	0.6	0.5	0.7
MY	1.1	1.4	3.6	2.0	3.5	2.8		3.6	18.2	5.0	3.2
NL	1.5	1.4	2.6	2.2	2.3	1.6	3.0	5.2	2.3	2.5	2.8
NO	0.3	0.1	0.1	0.2	0.2	0.4	0.1	0.0	0.1	0.1	0.1
NZ	0.2	0.1	0.2	0.2	0.3	0.2	0.2	0.1	0.2	0.2	0.1
PH	0.3	1.0	1.2	0.4	2.3	2.0	2.2		2.7	2.2	2.6
PT	0.1	0.1	0.1	0.3	0.2	0.2	0.0	0.0	0.0	0.1	0.1
SE	0.6	0.4	0.6	1.0	0.7	0.5	0.6	0.3	0.3	0.6	0.5
SG	2.4	3.0	13.0	4.2	3.5	3.4	16.4	7.4		8.1	3.7
TH	1.1	1.2	2.6	1.7	3.2	1.3	3.4	3.4	4.6		2.1
TW	2.0	4.4	3.9	1.6	7.1	4.9	5.2	7.7	5.5	5.0	
US	25.0	18.3	17.9	23.1	30.3	25.5	22.7	26.1	19.1	19.8	22.6

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