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The new BIS effective exchange rate indices¹

The BIS effective exchange rate (EER) indices have been expanded and updated. The new indices cover 52 economies based on a consistent methodology, and reflect recent developments in global trade by using time-varying weighting patterns. The newly calculated indices have been made available to the public on the BIS website.

JEL classification: F10, F31.

An effective exchange rate (EER) provides a better indicator of the macroeconomic effects of exchange rates than any single bilateral rate. A nominal effective exchange rate (NEER) is an index of some weighted average of bilateral exchange rates. A real effective exchange rate (REER) is the NEER adjusted by some measure of relative prices or costs; changes in the REER thus take into account both nominal exchange rate developments and the inflation differential vis-à-vis trading partners. In both policy and market analysis, EERs serve various purposes: as a measure of international competitiveness, as components of monetary/financial conditions indices, as a gauge of the transmission of external shocks, as an intermediate target for monetary policy or as an operational target.² Therefore, accurate measures of EERs are essential for both policymakers and market participants.

Since 1993, the BIS has maintained EERs for 27 economies, both for research support for BIS publications and meetings of central banks, and for shorter-term analysis and market monitoring. The original weighting system of the EER indices was based solely on 1990 trade flows.³ The rapid developments in the global trade arena over the last decade, however, have made it necessary to expand the coverage and review the trade weights. This special feature first describes the main points of the new BIS EER indices,

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² Singapore, for example, uses the EER as an operational target, where foreign exchange intervention is used to control the exchange rate; see MAS (2001).

³ See the list in Appendix I. For a methodological explanation, see Turner and Van't dack (1993). Prior to 1993, the BIS calculated EER indices for the G10 countries based on a different methodology; see Koch (1984).

including the expansion of the coverage to 52 economies, the adoption of time-varying trade weights, and statistical adjustments for China's trade that take account of Hong Kong SAR's⁴ significant role as an entrepôt for the mainland, as well as the partial reporting of trade between China and Taiwan, China⁵ due to transhipment via Hong Kong. In the next section, the article examines the impact of these changes on the EER indices of a few selected currencies and compares the updated indices with the BIS's previous calculations, as well as with national calculations. The feature ends with a brief conclusion.

For the first time, the BIS will make the EER indices and the associated weights available to the public through its website on a regular basis (see www.bis.org/statistics/eer.htm).

Methodology

Weighting scheme and its limitations

The weighting scheme adopted is based on Turner and Van't dack (1993). The NEER is calculated as the geometric weighted average of a basket of bilateral exchange rates, and the REER is the NEER adjusted with the corresponding relative consumer prices.⁶ The weights are derived from manufacturing trade flows⁷ and capture both direct bilateral trade and third-market competition by *double-weighting* (see the box for details).⁸

The weighting scheme is trade-based and captures direct and third-market competition ...

This trade-based weighting methodology has its theoretical underpinnings in Armington (1969), and implicitly assumes that there is only one type of good differentiated by country of origin, with a constant elasticity of substitution. Ideally, the weights are such that a change in cross rates has no effect on a country's key macroeconomic aggregates as long as the real effective exchange rate remains constant (Gudmundsson (forthcoming)). However, there are at least two reasons why the weights so derived are only an approximation of "ideal" EER weights.

First, given the high degree of international product differentiation, the elasticity of substitution between imports from different economies may vary. Therefore, fluctuations of different foreign currencies may not have the same

⁴ Hereinafter referred to as Hong Kong.

⁵ Hereinafter referred to as Taiwan.

⁶ For a detailed discussion on the choice of deflator, see Chinn (2005).

⁷ Manufactures are defined as goods under SITC (revision 3) classification 5 to 8. Trade data are obtained from the UN Commodity Trade Statistics Database (UN Comtrade), OECD International Trade by Commodity Statistics and the Directorate General of Budget, Accounting and Statistics, Taiwan.

⁸ Note that this is not the only methodology for EER calculations. An alternative trade-based approach which is similar in essence but different in the arithmetic is used by the IMF and the Bank of England (see, for example, Bayoumi et al (2005) and Lynch and Whitaker (2004)). See also Appendix II for a comparison of the different methodologies.

An explanation of double-weighting^①

This box sets out formally the double-weighting scheme used in the BIS EER calculation. Consider the EER basket of economy j , and the weight it puts on economy i . There are k foreign markets and h foreign producers. Economy j trades bilaterally with i ; in addition, j 's exports compete with i 's exports and all other exports of h in k markets. Thus, to capture the impact of the relative exchange rate changes between i and j , the weights in an EER basket need to reflect import competition, direct export competition and third-market export competition. Algebraically, the weight of i (w_i) in the EER basket of j can be expressed as:

$$(1) \quad \text{Import weight} \quad w_i^m = m_j^i / m_j$$

$$(2) \quad \text{Export weight} \quad w_i^x = \left(\frac{x_j^i}{x_j} \right) \left(\frac{y_i}{y_i + \sum_h x_h^i} \right) + \sum_{k \neq i} \left(\frac{x_j^k}{x_j} \right) \left(\frac{x_i^k}{y_k + \sum_h x_h^k} \right)$$

$$(3) \quad \text{Overall weight} \quad w_i = \left(\frac{m_j}{x_j + m_j} \right) w_i^m + \left(\frac{x_j}{x_j + m_j} \right) w_i^x$$

where: x_j^i (m_j^i) = economy j 's exports to (imports from) economy i

x_j (m_j) = economy j 's total exports (imports)

y_i = home supply of domestic gross manufacturing output of economy i

$\sum_h x_h^i$ = sum of exports from h (excluding j) to i

The import weight (expression (1)) captures the competition among i and other exporters to j . The more dependent j is on imports from i , the stronger the effects of i 's exchange rate variations are on j 's economy and thus i should weigh more heavily in j 's EER basket. In a sense, the import weight measures the *relative* importance among the different economies that j imports from, and this does not depend on the size of the domestic producers of j . Hence, the import weight takes the form of a simple bilateral share and y_j does not enter the equation.

The export weight (expression (2)) is "double-weighted" and can be decomposed into direct export competition and third-market competition. The first term on the right-hand side of the expression measures the direct competition between j 's exports to i and the domestic manufactures in i 's market. Unlike the import weight, which is a simple bilateral import share, the direct export weight is a bilateral export share multiplied by a measure of the openness of economy i . Intuitively, when i is an important market for j 's exports (measured by x_j^i/x_j), and/or when i is relatively less open to trade (ie i supplies domestically a large proportion of manufactures – measured by $y_i/(y_i + \sum_h x_h^i)$), – and j 's exports face stronger competition with i 's domestic manufactures in i 's market), then i should take more weight in j 's EER basket.

The third-market competition is captured by the second term in the right-hand side of expression (2). Consider all other markets k in which i and j compete with each other: from j 's perspective, if k is an important market for j 's exports (measured by x_k^i/x_j), and/or if i 's exports account for a large share of k 's market (measured by $x_i^k/(y_k + \sum_h x_h^k)$), this would imply that i is a more important competitor to j in the third markets and as a consequence should weigh higher in j 's EER basket.

The overall weight is then constructed by weighting the import and export weights with the relative size of total imports and exports in j 's total trade (expression (3)).

^① This box draws on Turner and Van't dack (1993).

impact on the variables of interest (eg relative demand or domestic prices) for given weights.⁹

Second, because of the one-good assumption, the weights derived with aggregated trade data disregard the varying elasticities of substitution between different types of goods, as well as the different price and income elasticities of demand for these goods. Hence, the BIS estimates of the EERs may not sufficiently capture the exchange rate effects on relative demand or prices for products differentiated by type. This may not be a major concern if the economies compete in terms of a similar mix of manufactures (eg among advanced economies), but would be questionable if the exports were not substitutes for each other (eg goods produced by advanced and emerging economies).

... but ignores
varying elasticities
of substitution
between goods of
different origins and
types

International vertical specialisation is a specific case where products of different origins are not necessarily competing. The most notable example of this is in East Asia, where the supply chain is such that certain countries (eg Japan or Korea) export high-tech components to other countries (mainly China) for assembly, and the final products are subsequently exported outside the region.¹⁰ One should therefore be aware that trade weights ignoring vertical specialisation may be biased for certain purposes in at least the following ways. First, weights derived from gross value trade data do not necessarily reflect the value added from different origins at the different stages of production, nor do they consider the ultimate location of the demand for the intermediate goods. Hence, the relative importance of different trading partners may be misassigned in some EER baskets. Second, for economies at the end of the production chain, some imports (components) and exports (final goods) become complements. The response of imports and exports to exchange rate changes would be different from that traditionally analysed.¹¹ Third, vertical specialisation may further vary the elasticities of substitution between goods (especially labour-intensive manufactures) from different origins.

International
vertical
specialisation

Another limitation of the methodology is that trade in commercial services has been ignored. Like manufactures, services from different economies are differentiated and competing, and an effective exchange rate index that also includes services trade would better gauge overall competitiveness, particularly for small and open economies. However, the availability of bilateral services trade statistics is limited, so that it is difficult to account consistently for

Omission of
services trade

⁹ See Spilimbergo and Vamvakidis (2000).

¹⁰ An adjustment for vertical specialisation is almost impossible because standard trade data are recorded in gross value rather than value added terms. Even if trade data with a detailed breakdown by product are available (thereby enabling the distinction between components and final manufactured goods on aggregate), it is impossible to single out what proportion of the final products to a *particular* destination contains the components from which *particular* origin.

¹¹ That is, in general, an appreciation of the local currency does not necessarily lead to a decrease in exports and an increase in imports.

services trade across all economies.¹² As a result, the BIS indices only consider manufacturing trade. A few organisations have included some simplified form of services trade in calculating the EER weights. For example, the Bank of England utilises the bilateral services trade data from the UK Office for National Statistics (Lynch and Whitaker (2004)). The IMF includes trade in services by assuming that it is geographically distributed in exactly the same manner as that in manufactured goods,¹³ and for some economies also includes tourism services (Bayoumi et al (2005)). The Reserve Bank of New Zealand's TWI (trade-weighted index) weights the selected currencies partly by their trade shares and partly by their GDP, the latter designed to pick up some trade in services and intangibles (Hargreaves and White (1999)). The Hong Kong Monetary Authority calculates a measure of the REER based solely on services trade (Ha and Fan (2003)).

For the reasons above, effective exchange rates should not be taken as a sufficient summary statistic of competitiveness. A full assessment of the macroeconomic effects would in principle call for a disaggregated international macroeconomic model that takes into account at least all the caveats mentioned.¹⁴ The limitations of the measure notwithstanding, trade weight-based measures of EERs still serve as useful indicators.

Basket expansion

New BIS EER basket is expanded ...

... with broad and narrow indices available

The new BIS EER basket has been broadened to include 52 economies, to reflect the rising importance of the emerging market economies in Asia, central and eastern Europe and Latin America (see the list in Appendix I). Based on this basket, the EER indices ("broad indices") for all 52 economies are now calculated using a consistent methodology. In addition, as a result of the basket expansion, the representativeness of the existing indices is much improved and the 52 economies account for 93% of total world trade in 2004.

The broad indices are available from 1994; prior to that date, some exchange rate, price and/or trade data were limited, and some of the current countries in the sample did not exist. The existing EER indices for 27 economies, based on a reduced basket, will be maintained. The indices are referred to as "narrow indices" and are available from 1964.¹⁵

¹² The OECD publishes statistics on trade in services for 28 economies (27 OECD member countries and Hong Kong) from 1999. However, the geographical coverage is not as extensive as for merchandise trade.

¹³ This considers only the aggregate extent of services trade relative to total trade for each economy, rather than using actual bilateral services trade flows.

¹⁴ The Multilateral Exchange Rate Model (MERM) of the IMF was an attempt to do this, but the MERM index has not been published since 1992.

¹⁵ It is common practice for some central banks to make different sets of EER indices available. For example, the Federal Reserve publishes three series of EERs of the US dollar – the broad index (with a basket of 26 economies), the major index (with a basket of seven major currencies – the euro, Canadian dollar, yen, pound sterling, Swiss franc, Australian dollar and Swedish krona) and the other important trading partners (OITP) index (with a basket of the residual 19 currencies not in the major index). The ECB computes the so-called EER-12, EER-23 and EER-42, the number suffix corresponding to the size of the basket. The Bank of

There are three specific issues concerning the treatment of the euro area. First, for both the broad and the narrow baskets, a set of EER indices for the euro area as a single entity is calculated, and they can be used as indicators (eg on competitiveness) for the euro area as a whole.¹⁶ Second, the euro area is taken as an entity in computing the EER indices for other economies, and intra-euro area competition is ignored. Third, a set of EER indices for each euro area country is also individually available; these indices do, however, take intra-euro area competition into account.

Treatment of the euro area

Although the broad basket is more representative than the narrow one, neither should be regarded as the “better” measure, and which one to study depends on the context. The narrow indices may better gauge the competitiveness among advanced countries (for example, if their products have similar elasticities of substitution, as discussed in the previous subsection).¹⁷ The broad indices, on the other hand, give a more global picture by taking the emerging market economies into account. As a result, they would be more useful in analyses of issues such as the sustainability of the external trade balances.

Different purposes of broad and narrow indices

Another consideration in the construction of the baskets is that some countries may have experienced episodes of extremely high inflation. The sharp depreciation associated with their currencies, were they to be included in the basket, would dominate the short-term movements of the *nominal* EERs of other currencies and make such movements too erratic for assessments of competitiveness. The effects on the index could be significant even if the weights of these high-inflation countries are small. To partially account for this, Mexico is excluded from the calculation of the *narrow nominal* EERs. In addition, the broad indices start from 1994, when the episodes of very high inflation for countries like Brazil and Turkey were coming to their end.

Accounting for currencies of high-inflation countries

Time-varying weights

To accommodate the rapidly changing trade patterns (notably the emergence of some Asian and Latin American economies over the last decade) and to better represent the corresponding effects of exchange rate changes, we adopt time-varying weights in the new EER calculations. More specifically, for the broad indices, we assign the three-year average trade weights of 1993–95, 1996–98, 1999–2001 and 2002–04 to the corresponding periods, and then construct “chain-linked” indices. This last set of weights is also used to calculate EERs for the latest period until the next set of three-year trade data (ie 2005–07) becomes fully available, when the indices will be revised with their

Use of time-varying weights ...

England maintains a Sterling ERI (exchange rate index) and a Broad ERI with a basket of 15 and 24 currencies respectively in 2003 (see Appendix II for further details).

¹⁶ A “theoretical” euro exchange rate based on a weighted average of the legacy currencies is used as a proxy for the euro prior to 1999. See Buldorini et al (2002).

¹⁷ Spilimbergo and Vamvakidis (2000) estimate the manufacturing export equations for 56 countries for a period of 26 years, and find that on average the explanatory power can be significantly improved by using partitioned REERs (grouped by OECD and non-OECD countries), instead of standard REERs, as explanatory variables.

... to incorporate changes in trade patterns

corresponding weights.¹⁸ Consistent with the broad indices, we have also implemented time-varying weights starting from 1990 on the narrow indices, based on three-year averaging. However, the 1990–92 weights remain in place prior to 1990.¹⁹

One benefit of using time-varying weights rather than a static updating of the base period is that this procedure not only incorporates recent changes in trade patterns, but also better reflects the contemporaneous situation over all past periods. The resulting indices give a more accurate picture of medium- to long-term exchange rate movements by taking into account the varying importance of different trading partners at different times.²⁰ Moreover, the use of a three-year average smooths out potentially aberrant year-to-year variations in trade. Some central banks (eg the Federal Reserve and the Bank of England) and international organisations (eg the OECD) have similarly implemented time-varying weights in their EER calculations, with weights usually updated yearly.

Trade data adjustment related to China and Hong Kong

China's external trade via Hong Kong re-exports ...

A substantial portion of China's external trade takes place in the form of re-exports via Hong Kong, and official trade statistics of China and its trading partners do not consistently take this into account.^{21, 22} Relative to "genuine" (ie domestic demand/supply driven) trade flows, trade weights derived without a correction would assign an incorrect relative importance to China and to Hong Kong in the baskets of all currencies. More precisely, in an unadjusted Chinese renminbi EER basket, Hong Kong would be overweighted and all other trading partners underweighted; in an unadjusted Hong Kong dollar EER basket, China would be overweighted and all others underweighted. In addition, for all other EER baskets in general, China would be underweighted and Hong Kong would be overweighted. As a consequence, the EERs so calculated would be a less powerful indicator of the macroeconomic effects of exchange rate changes, as they would not necessarily reflect the ultimate demand driving these trade flows. Aside from the EERs of the renminbi and the

¹⁸ See Appendix I for the most recent set of weights used in the calculation of the broad indices.

¹⁹ This is in part due to the limited availability of consistent trade data, but also in consideration of the view that the loss of accuracy was unlikely to be significant (trade patterns evolved relatively slowly at that time).

²⁰ However, a statistical drawback of chain-linked EER indices is that any changes in the weighting pattern would permanently affect the levels of the indices, even when the exchange rates and the weights revert to their initial levels.

²¹ 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)). In 2004, Hong Kong's merchandise re-exports to and from China amounted to US\$ 109 billion and US\$ 146 billion respectively. Even allowing for the re-export markup, these trade flows are significant relative to China's total imports of US\$ 561 billion and exports of US\$ 593 billion in the same year.

²² Similar concerns can also be posed for Singapore, which serves as an entrepôt for Malaysia and Indonesia. The lack of bilateral re-export data, however, prevents us from carrying out a parallel adjustment. This is also partly justified by the fact that Singapore's merchandise re-export trade is of a smaller scale than that of Hong Kong.

Hong Kong dollar, a misassignment of weights is not a concern for other currencies as long as both the renminbi and Hong Kong dollar move in parallel. But it would matter were the renminbi and the Hong Kong dollar to diverge significantly from each other; the likelihood of this has increased since the Chinese authorities adopted the new exchange rate regime in July 2005.

Detailed bilateral re-export data enable us to correct for the role of Hong Kong as an entrepôt of mainland China.²³ In calculating the EER basket weights, the portion of trade between China and a third economy via Hong Kong, which is often recorded as trade with Hong Kong by raw trade statistics, is assigned back to the appropriate economies. This is feasible since re-export data for Hong Kong are available with a breakdown by *both* the origin and the final destination. Correspondingly, the Hong Kong dollar EER weights relate only to Hong Kong's domestic exports (ie local manufactures) and retained imports (ie imports for domestic consumption).

... has been
adjusted using
available
statistics ...

Certain issues deserve attention in the adjustment procedure. First, Hong Kong traders often apply a pure markup (without the value added associated with labour or capital) to the goods they re-export. This has been corrected using survey data of the average re-export markup.²⁴ Second, some trade between China and Taiwan takes place in the form of transhipment via Hong Kong, and this is reported by neither economy's official trade statistics.²⁵ An estimate of cross-strait trade is available,²⁶ and without any other alternative we take this as an implementable measure.

... with special
attention to re-
export markup and
transhipment

With these adjustments, the resulting EERs for China and Hong Kong, and potentially for other currencies, are more representative of the final trade patterns and hence of the competitiveness of the corresponding economies. Looking ahead, though, the role of Hong Kong as an entrepôt of the mainland could diminish considerably, given the rapid development of Chinese ports around Shanghai and Shenzhen. This would also tend to reduce the significance of the adjustment.

Comparison of EER indices²⁷

What is the impact of the above methodological refinements on the EER indices? We illustrate this with the recent evolution in the NEERs of the US

Impact of
refinement on:

²³ Fung et al (forthcoming) give a systematic account of the adjustment procedures and their implications. Re-export data are available in *Annual Review of Hong Kong External Merchandise Trade*, published by the Hong Kong Census and Statistics Department.

²⁴ A survey on average re-export margin (with goods originating from China and from the rest of the world) is conducted annually by the Hong Kong Census and Statistics Department, and the data were obtained directly from the Department.

²⁵ The difference between re-export and transhipment is that the latter is not cleared by the customs and does not normally involve a change in the ownership of the goods. Transhipment may explain the discrepancy of trade statistics between China and Taiwan.

²⁶ Published in *Cross-Strait Economic Statistics Monthly*, Mainland Affairs Council, Taiwan.

²⁷ See Appendix III for a graphical illustration of the new REERs of all 52 economies.

dollar, euro and yen, and by comparing the different series with the respective official calculations. In addition, in order to assess the effect of adjustment for entrepôt trade related to China, we also look at the renminbi indices.

NEERs for the US dollar, euro and yen

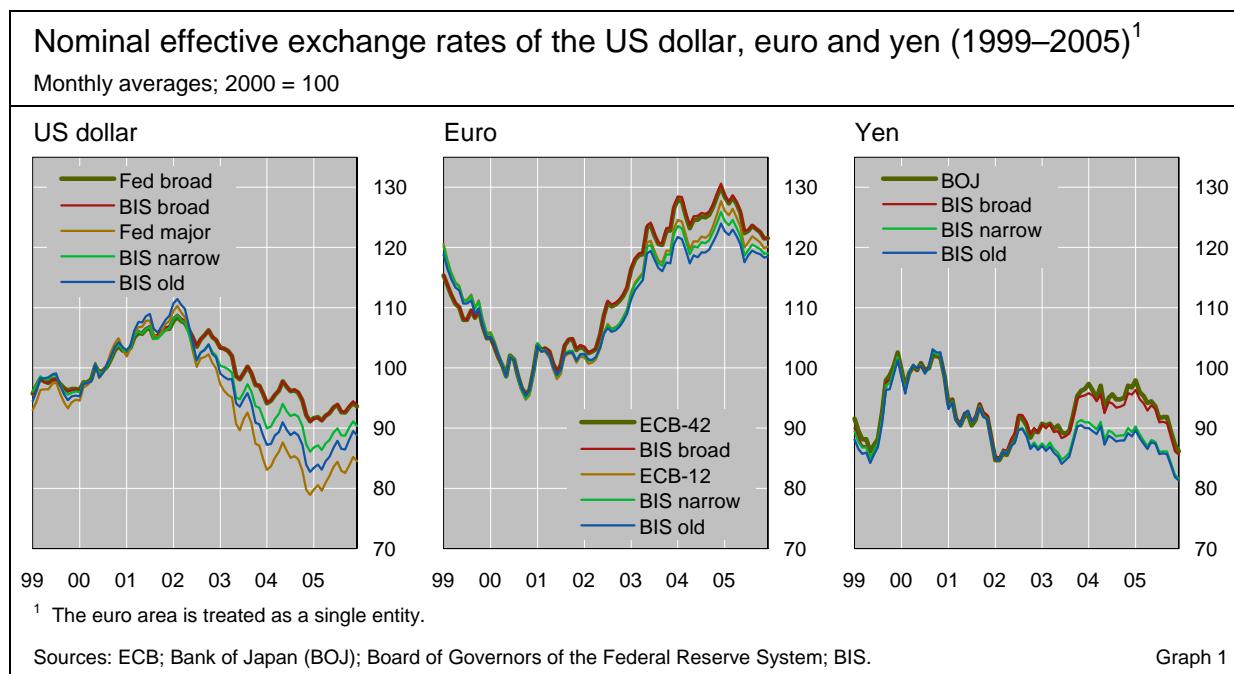
The BIS broad indices for the dollar, euro and yen closely track the corresponding official series of the US Federal Reserve, the ECB and the Bank of Japan respectively, while the narrow and the old indices seem to show more divergence (Graph 1). For these currencies, much of the difference between the old and new series can be explained by the expansion in the basket, although the updating of trade weights also has some effect.

US dollar ...

Looking at the US dollar over the period early 2002 to end-2004, the nominal depreciation implied by the broad index is around 10 percentage points smaller than that implied by the old index (Graph 1, left-hand panel). This is due to the enlargement of the EER basket (eg the inclusion of China and other emerging economies)²⁸ and, conditional on the original basket, the updated weights (eg the decreased weight on Japan). Since most non-Japan Asian currencies showed limited appreciation vis-à-vis the US dollar during this period, an increase in their weights in the broad dollar index would imply a smaller effective depreciation of the dollar.

... euro ...

Similarly, the differences between the broad and narrow measures of the euro (Graph 1, centre panel) can be explained by the inclusion of China in the broad basket. With the renminbi closely linked to the US dollar, the euro indices that put a higher weight on China would imply a bigger nominal effective appreciation of the euro.



²⁸ In 2004, China alone accounted for more than 10% of the United States' total trade.

The impact of the refinements is also quite evident for the yen (Graph 1, right-hand panel). This is not surprising given the sustained growth of intraregional trade in Asia. For instance, from early 2002 to end-2004, the nominal appreciation of the yen measured by the new broad BIS index is 6.5 percentage points higher than that measured by the old index. This difference can once again be explained by the emergence of Asian trading partners, as their currencies add a bigger “dollar bloc” weight to the yen basket. Since, over the period discussed, the yen appreciated against the dollar and depreciated against the euro, a bigger dollar bloc in the yen basket effectively implies a greater appreciation of the yen, and the behaviour of the Bank of Japan index seems to confirm this conclusion.²⁹

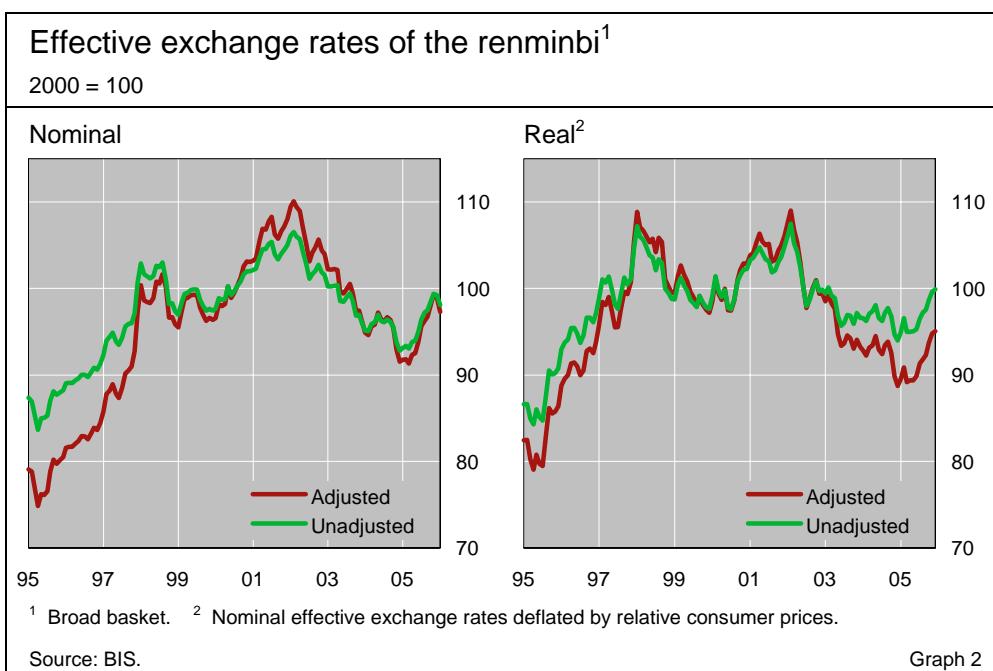
... and yen

Trade data adjustment and the Chinese renminbi

The effect of the adjustment concerning China’s re-exports is not apparent in the EER indices of the currencies just discussed, for reasons explained in the methodology section. However, the adjustment does have a noticeable impact on the renminbi and Hong Kong dollar EER indices, and we illustrate this with the former.

Impact of trade data adjustment on renminbi

Consider the adjusted renminbi EER basket. With a redistribution of weights from Hong Kong to China’s other Asian trading partners (particularly Japan and Taiwan), the dollar bloc in the renminbi basket (largely associated with the HKD/USD peg) now decreases. This implies that, with the renminbi and US dollar remaining closely linked, the adjusted renminbi EER indices show more sensitivity to any movements in non-US dollar currencies, as can be seen in Graph 2.



²⁹ It should, however, be noted that the Bank of Japan EERs use only bilateral export weights.

The adjustment has implications for macroeconomic analysis. For example, as calculated by the improved measures, the deflationary shock to China during the Asian crisis is shown to be much sharper, owing to the heavier weights on many depreciating Asian currencies and, correspondingly, a lighter weight on the Hong Kong dollar. Thus, the renminbi appreciated much more in effective terms than would have been measured otherwise (Graph 2, left-hand panel).

Conclusion

International trade patterns have changed dramatically over the last decade, in both scale and geographical distribution. To better incorporate these developments, the BIS has updated its effective exchange rate indices. In particular, it has expanded the country coverage, and followed the increasingly common practice of allowing for time-varying weights. Moreover, in consideration of China's growing significance in global trade, it has also made special adjustments in EER measures to account for the mainland's indirect trade with the rest of the world via Hong Kong. The new weights better represent trade flows, and should improve the usefulness of the BIS effective exchange rate indices as reliable indicators of exchange rate movements and their impact.

References

- Armington, P S (1969): "A theory of demand for products distinguished by place of production", *IMF Staff Papers*, vol 6, pp 159–78.
- Bank of Japan (2005): "Explanation of the effective exchange rate (nominal, real)", Research and Statistics Department, January.
- Bayoumi, T, J Lee and S Jayanthi (2005): "New rates from new weights", *IMF Working Paper WP/05/99*, May.
- Bulldorini, L, S Makrydakis and C Thimann (2002): "The effective exchange rates of the euro", *European Central Bank Occasional Paper Series* no 2, February.
- Chinn, M (2005): "A primer on real effective exchange rates: determinants, overvaluation, trade flows and competitive devaluation", *NBER Working Paper* no 11521, August.
- Durand M, J Simon and C Webb (1992): "OECD's indicators of international trade and competitiveness", *OECD Economics Department Working Papers* No 120, Paris.
- European Central Bank (2004): "The update of the euro effective exchange rate indices", September.
- Fung, S S, M Klau, G Ma and R McCauley: "Effective exchange rates in Asia with entrepôt and growing intraregional trade", forthcoming.

- Gudmundsson, M: "The role of the effective exchange rate in monetary frameworks: options, operations and effects", forthcoming.
- Ha, J and K Fan (2003): "Alternative measures of the real effective exchange rate", *Hong Kong Monetary Authority Quarterly Bulletin*, March, pp 16–21.
- Koch, E (1984): "The measurement of effective exchange rates", *BIS Working Papers*, no 10, September.
- Hargreaves, D and B White (1999): "Measures of New Zealand's effective exchange rate", *Reserve Bank of New Zealand Bulletin*, vol 62.
- Loretan, M (2005): "Indexes of the foreign exchange value of the dollar", *Federal Reserve Bulletin*, Winter.
- Lynch, B and S Whitaker (2004): "The new sterling ERI", *Bank of England Quarterly Bulletin*, Winter.
- Monetary Authority of Singapore (2001): *Singapore's exchange rate policy*, February.
- OECD (2005): *Main Economic Indicators*, September.
- Spilimbergo, A and A Vamvakidis (2000): "Real effective exchange rate and the constant elasticity of substitution assumption", *IMF Working Paper* no 128, July, Washington DC.
- Turner, P and J Van't dack (1993): "Measuring international price and cost competitiveness", *BIS Economic Papers*, no 39, Basel, November.
- United Nations (1998): "International merchandise trade statistics – concepts and definitions", *Statistics Division, Series M*, no 52, rev 2.

Appendix I: EER weights for broad indices (based on 2002–04 trade, in per cent)

Weight on: in the EER for:	United States	Euro area	Japan	Other industrial countries	Emerging Asia	Central and eastern Europe	Latin America and others
Industrial countries							
Australia*	17.4	17.8	14.2	13.2	33.8	1.0	2.5
Canada*	62.4	8.5	5.1	4.1	13.6	0.9	5.5
Denmark*	6.6	46.2	3.0	24.6	11.0	7.3	1.3
Iceland	10.8	40.4	4.7	27.3	9.7	6.1	1.1
Japan*	22.5	16.2	.	9.6	45.9	2.4	3.5
New Zealand*	14.7	15.6	14.6	27.1	25.5	0.8	1.8
Norway*	7.8	38.2	4.8	28.4	12.3	7.2	1.3
Sweden*	9.6	43.8	4.2	21.5	10.6	8.1	2.1
Switzerland*	10.2	55.9	5.0	10.0	10.6	5.7	2.6
United Kingdom*	13.6	48.9	5.1	8.8	14.6	6.1	2.8
United States*	.	18.5	11.9	23.2	29.4	2.2	14.8
Euro area*	17.5	.	8.0	29.6	22.7	17.8	4.5
Austria*	6.7	56.7	3.4	11.1	8.4	12.5	1.3
Belgium*	8.6	55.1	4.0	14.2	10.0	5.4	2.6
Finland*	8.3	37.8	5.2	21.6	13.0	12.2	1.9
France*	9.7	50.4	4.5	14.5	12.0	6.7	2.2
Germany*	10.9	38.1	5.2	16.3	14.0	13.0	2.6
Greece*	6.4	54.0	4.5	10.7	13.8	9.3	1.4
Ireland*	19.1	33.5	5.4	23.9	12.5	3.4	2.3
Italy*	8.3	49.6	4.0	13.4	11.7	10.2	2.6
Netherlands*	10.0	46.5	4.3	15.3	15.6	6.3	1.9
Portugal*	4.7	69.8	2.5	11.3	5.9	4.0	1.7
Spain*	5.8	59.6	3.6	12.7	10.1	5.6	2.5
Emerging Asia							
China	18.5	16.2	17.4	8.7	31.7	4.2	3.4
Hong Kong SAR*	13.9	12.8	13.8	8.8	46.0	1.9	2.9
India	16.9	26.6	7.2	13.7	27.5	4.1	4.0
Indonesia	14.9	15.9	18.8	9.4	36.6	2.2	2.3
Korea*	18.4	14.9	19.2	7.8	33.6	2.9	3.3
Malaysia	20.4	12.5	16.5	7.3	39.5	1.6	2.3
Philippines	22.3	11.6	21.7	6.2	34.4	1.8	2.0
Singapore*	16.6	13.4	14.3	7.8	44.6	1.5	1.9
Taiwan, China*	15.7	12.1	18.3	6.6	42.1	2.4	2.8
Thailand	14.4	13.0	22.6	7.9	37.5	2.0	2.6
Central and eastern Europe							
Bulgaria	5.1	55.5	2.5	9.5	8.7	17.5	1.1
Croatia	4.4	57.4	2.5	8.3	8.9	17.6	0.9
Czech Republic	5.4	55.0	3.4	10.7	11.1	13.3	1.1
Estonia	4.4	43.9	4.4	19.0	10.0	17.6	0.8
Hungary	5.8	54.0	4.1	10.6	13.1	11.3	1.3
Latvia	3.5	43.2	1.0	19.6	4.9	27.2	0.6
Lithuania	3.6	44.4	1.9	16.9	7.3	25.3	0.6
Poland	4.8	55.2	2.8	13.8	10.1	12.3	1.1
Romania	5.1	56.4	2.6	10.6	10.1	13.9	1.3
Russia	8.9	37.6	7.0	11.0	22.6	11.1	1.9
Slovakia	5.2	52.5	3.1	9.0	8.7	20.7	0.9
Slovenia	4.8	58.8	2.2	9.1	7.5	16.4	1.1
Turkey	7.9	48.2	4.1	13.6	14.2	9.7	2.4
Latin America and others							
Argentina	19.5	17.3	5.8	6.2	12.6	1.7	37.0
Brazil	28.3	23.0	6.7	9.5	16.0	2.6	13.9
Chile	20.3	22.1	6.5	8.3	21.3	2.0	19.6
Mexico*	61.1	9.0	5.3	6.8	14.6	0.7	2.6
Israel	25.7	30.6	5.1	14.5	15.8	5.7	2.6
South Africa	14.5	33.0	9.3	16.8	20.8	2.8	2.9

Note: Economies included in the narrow indices are indicated by asterisks; the corresponding EER weights are not shown in this table.

Source: BIS.

Appendix II: Comparison with selected alternative effective exchange rates

	BIS	IMF	OECD
Available currencies/economies	51 (including 11 euro area countries), plus a separate set for the euro area	Industrial System method: 164 (plus a separate set for the euro area) Global System method: 16 Others: 4	30 OECD countries; 7 dynamic Asian economies and 5 major emerging market countries, plus European Union (15) and euro area
Weighting scheme	Weighted average of import and double export weights. Export weights account for the relative importance of direct export competition and third-market competition	Takes into account commodity weights, manufacturing weights (with third-market effects) and, for some countries, tourism services weights; weighted by their relative importance in each country's total trade	Double-weighting; accounts for third-market competition
Underlying trade flow	Manufactured goods (SITC 5-8)	Commodities, manufactures, and for some countries tourism services trade; other services trade assumed to be distributed in the same manner as manufactured trade	Manufactured goods
Basket size ¹	Broad index: 51 Narrow index: 26	184 countries	46 countries
Base period for weights	Updated every three years; chain-linked	Updated discretely, fixed (most recent: 1999–2001)	Updated yearly; chain-linked
Deflator for REER	Consumer prices (except wholesale prices for India)	Consumer prices; for some currencies also unit labour costs and normalised unit labour costs	Consumer prices
	ECB	Bank of England	Federal Reserve Board
Available currencies/economies	Euro	Sterling, plus 10 non-sterling currencies (using IMF weights)	US dollar
Weighting scheme	Weighted average of import and double export weights. Export weights account for the relative importance of direct export competition and third-market competition	Takes into account import, bilateral export and third-market competition; weighted by their relative importance in the UK's total trade; location of competition weights are fixed across all countries	Simple average of import and export weights, with export weights being the average of direct export competition and third-market competition shares
Underlying trade flow	Manufactured goods (SITC 5–8)	Manufactured goods and services	<i>Imports</i> – total imports excluding oil <i>Exports</i> – total exports excluding gold and military items (but includes agricultural exports from 2002)
Basket size ²	EER-12 EER-23 EER-42	ERI: ³ 15 Broad ERI: 24	Broad Index: 26 Major Currency Index: 7 OITP: ⁴ 19
Base period for weights	Updated discretely; time-varying (1995–97; 1999–2001)	Updated yearly; chain-linked	Updated yearly; chain-linked
Deflator for REER	CPI, PPI, ULC in manufacturing, GDP deflator and ULC in total economy (harmonised; for EER-12 and EER-23) CPI (EER-42)	Consumer prices	Consumer prices

¹ Counting individual euro area countries. ² Counting the euro area as an entity. ³ Exchange rate index. To be included in the ERI, the partner country must account for 1% of either UK imports or exports; the threshold for the broad ERI is 0.5%. Thus the currency basket may change every year. ⁴ Other important trading partners.

Sources: Bayoumi et al (2005); ECB (2004); Loretan (2005); Lynch and Whitaker (2004); OECD (2005); BIS.

Appendix III: Real effective exchange rates (broad indices; quarterly averages, 2000 = 100)

