An effective exchange rate index for the euro area

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Since 11 May, the Bank of England has published a daily effective exchange rate index for the euro area. The index is calculated using close-of-business rates in London, and is supplied to agencies such as Datastream, Reuters, Bloomberg and the Financial Times. It is compiled on the basis developed and used by the International Monetary Fund (IMF), as with the other effective exchange rate series published by the Bank.

This article describes the calculation of the index since the initial value of the euro was set on 31 December 1998, and also for the preceding period. The index is calculated by weighting together the individual exchange rates of the eleven euro-area countries against non euro area currencies; so it represents an effective index for the eleven countries as a group, rather than for the euro as a currency. The base year for the series is 1990, the same as the other effective exchange rate series published by the Bank and the IMF.

The article compares the Bank's euro-area index with recent movements of the euro against the US dollar, sterling, the Japanese yen and the Swiss franc; with the Bank for International Settlements (BIS) index provisionally used by the European Central Bank (ECB); and with the IMF's 'broad' euro-area index, which has a greater country coverage. It also notes how the introduction of the euro has affected the exchange rate indices for individual countries.

Country effective exchange rates

An 'effective exchange rate' for a country is a measure of the value of that country's currency against a basket of other currencies. It is calculated as a weighted average of exchange rates, expressed as an index relative to a base date. The weights are often based on trade flows, reflecting the relative importance of each of the other countries for the country's competitiveness.

The Bank currently publishes exchange rate indices for sterling and the currencies of 20 other countries, using the IMF's method and weights, derived from trade flows in manufactured goods from 1989–91.[1] The sterling index is published hourly during the London business day. The other indices are published daily, at close of business in the London market. The IMF itself does not publish daily effective rate indices.

Implications of the euro for the country indices

The introduction of the euro on 31 December 1998 has not affected these country exchange rate indices. The same

21 country rates are still published, including indices for all the euro-area countries, which are now best thought of as indicators of national competitiveness. There are no discontinuities in the indices—the underlying calculations are the same.[2] The trade weights used for both 'in' and 'out' countries are unchanged, and the exchange rates for the 'legacy currencies' (such as DM or FFr) continue to be input for countries where the euro has been adopted.

From the beginning of 1999, these legacy currency exchange rates are calculated using the conversion rates irrevocably fixed on 31 December 1998. For example, the Deutsche Mark's value against the US dollar is calculated by multiplying the current euro rate against the US dollar by the Deutsche Mark/euro fixed conversion rate.[3]

The individual country indices for the euro-area countries will continue to provide useful and timely information for the assessment of national competitiveness. They differ from the index for the euro area as a whole for two reasons. First, the national indices tend to be more stable, because a large proportion of each country's trade will be with other

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(1) The basic formula for the exchange rate index (ERI) of country j is: $ERI_j = \prod_{i=1}^{20} \left(\frac{curr_i}{curr_j} \right)^{w_i}$ where each bilateral exchange rate series is indexed

to 1990 = 100 (or equivalently, since the formulation uses geometric weights, the final index is indexed to 1990 = 100). See the note on the calculation of effective exchange rates on page 24 of the February 1995 *Quarterly Bulletin* for further details.
(2) As explained in the IMF's October 1998 *World Economic Outlook* (Box 5.5, 'The euro area and effective exchange rates').
(3) That is, DM/US$$_t$ = (euro/US$$)_t$ • (DM/euro)$_{31\,Dec\,98}$. Note that DM/US$ = number of DM per US$, and similarly for other exchange rates. Market convention is to refer to this rate as US$/DM.

euro-area countries at the fixed conversion rates (see below). This proportion will vary across countries. Second, the geographical composition of the trade weights differs for each euro-area country. For example, Ireland has a higher weight than the euro area as a whole for trade with the United Kingdom.

The euro-area index

The new euro-area effective rate index (EERI) is calculated in the same way as for an individual country, treating the euro-area countries as a bloc. Trade within the euro area is excluded, so the weights are based solely on trade with countries outside the euro area. The method and weights are those used by the IMF. The box on page 192 summarises the approach, which allows the index to be calculated for the period before the introduction of the euro.

The Bank's index is calculated on the same basis as the index published monthly by the IMF, but is based on close-of-business rates in London, and is available daily. Figures for the index are made available to data agencies such as Reuters, Bloomberg and Datastream. Monthly and quarterly figures will be published in the Bank's *Monetary and Financial Statistics* ('BankStats'), starting with the May 1999 edition. Longer runs of historical data are available on request from the Bank's statistics division.[1] The IMF figures are published in *International Financial Statistics*, together with other data for the euro area, and in the *World Economic Outlook*.[2]

The Bank's euro-area index has been calculated as far back as January 1975, the same starting-date as for the other country effective rates published by the Bank (the IMF's index is available back to 1957). Following standard IMF and Bank practice, the base year for the published index will be 1990, reflecting the use of weights based on manufacturing trade between 1989–91.[3] But the choice of base period is arbitrary, and in this article the index has been rescaled where this makes it easier to compare with other series.

Chart 1 compares movements in the EERI with changes in the euro against other currencies since 4 January 1999. The euro has depreciated substantially against the US dollar, but the fall in the euro-area index has been less, close to the depreciation against sterling (which has the highest weight in the index—see Table A). The euro has been relatively strong against the Japanese yen and the Swiss franc. Taken together, sterling, the US dollar, the Japanese yen and the Swiss franc amount to 83% of the index weight.

Though the EERI will, as an average, be more stable than many of the individual bilateral euro exchange rates, it will tend to be more volatile than the individual country competitiveness indicators (eg for Germany). This is

Chart 1
The EERI and the euro against other currencies
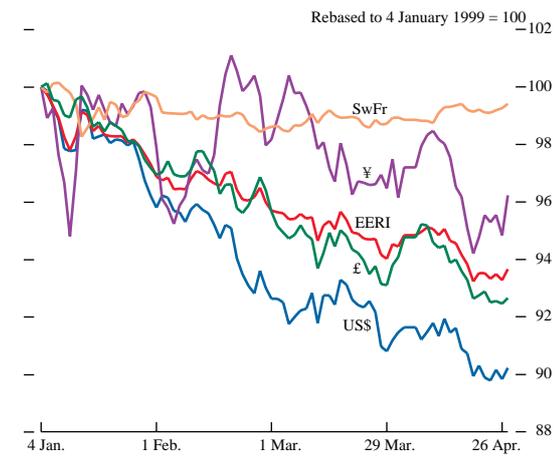
Table A
Euro-area effective exchange rate weights[a]

Per cent

	Bank/IMF	BIS
Australia	0.4	0.9
Canada	2.0	1.9
Denmark	3.3	3.3
Greece	1.3	1.6
Japan	14.4	16.9
New Zealand	0.2	0.1
Norway	2.0	1.8
Sweden	7.8	6.6
Switzerland	12.6	10.6
United Kingdom	30.4	23.1
United States	25.6	23.0
Hong Kong SAR	0.0	1.8
Singapore	0.0	2.2
South Korea	0.0	3.2
Taiwan	0.0	2.9
Total	**100.0**	**100.0**

(a) The weights shown are rounded.

because a high proportion of country trade is with other members of the euro area at fixed nominal exchange rates, damping down movements in the country indices.

This relative volatility of the euro-area index was evident even before the introduction of the euro. As Chart 2 shows,

Chart 2
The EERI and the German competitiveness indicator
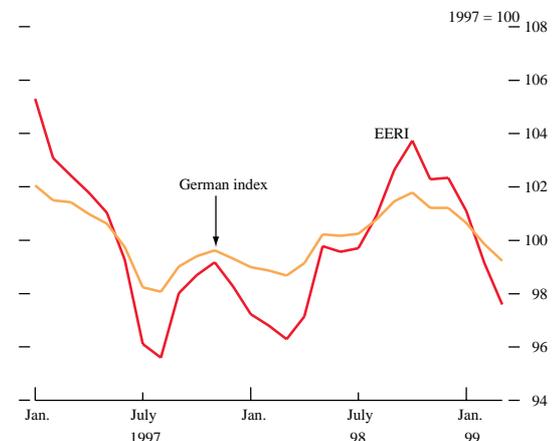
(1) From John Henderson of the Bank's Monetary and Financial Statistics Division, on 0171 601 4342.
(2) The IMF's index was first published in the April 1999 issue of *International Financial Statistics*. A preliminary series, based on a slightly different method, was published in the October 1998 *World Economic Outlook*.
(3) These weights are periodically reviewed and updated by the IMF. But unless the country coverage changes, new weights tend not to lead to major changes in the movements of an index, as trade patterns change quite slowly over time.

Method for calculating the euro-area effective exchange rate index

The method and weighting scheme used to calculate the euro-area effective exchange rate index (EERI) is that developed and used by the IMF, as with the individual country exchange rate indices published by the Bank.[1]

Weights

The country weights for the competitor countries to the euro area, for example the United States relative to the United Kingdom (see Table A on page 191), are based on the same figures as the country indices (trade in manufacturing in 1989–91), but with the euro area treated as a unit, ie excluding trade within the euro area.

The weights are based on the relative extent of competition from firms based in the United States, Japan, United Kingdom etc in the markets where euro-area firms are active. For example, the weight for Japan will be determined by the relative importance of Japanese firms:

● in the euro-area home market (for which import shares are used); and

● in the euro-area's export markets.

Japanese firms are likely to dominate the Japanese home market, but may also compete strongly with euro-area firms' exports in other markets such as the United States. The IMF method allows for this competition in 'third markets', rather than using simple export shares.[2] For example, even if exports to Japan represent a low share of euro-area exports, the weight of the Japanese yen will be boosted if Japanese firms compete strongly with euro-area firms in key markets such as the United States.

From 31 December 1998

For the period since the external value of the euro was set on 31 December 1998, the EERI is calculated by averaging quotes for the euro against the US dollar, sterling, the Japanese yen etc, weighted by the relative importance of these countries for euro-area external trade, as discussed above.

The index is a geometric weighted average, ie:

$$EERI = \prod_{i}^{UK,Jap,US,....} \left(\frac{curr_i}{euro} \right)^{w_i} \qquad \textbf{(i)}$$

or equivalently,[3] using US dollar quotes:

$$EERI = \frac{\$}{euro} \prod_{i}^{UK,Japan,....} \left(\frac{curr_i}{\$} \right)^{w_i} \qquad \textbf{(ii)}$$

Before 31 December 1998

It is possible to calculate an EERI for the period prior to the euro, by averaging the bilateral exchange rates of the eleven euro-area countries. The relative weights for the US dollar, sterling etc are the same as for the period since 31 December 1998. In addition, weights are required to reflect the relative importance of each euro-area country's exchange rates (such as the relative importance of the Deutsche Mark/US dollar compared with the French franc/US dollar). These 'internal weights' are based on the country shares of trade outside the euro area, as shown in the table below.

Internal weights[a] **used in the EERI**

Per cent

Germany	33.2
France	19.7
Italy	14.8
Belgium/Luxembourg	9.2
Netherlands	8.2
Spain	6.7
Austria	4.4
Finland	1.5
Portugal	1.3
Ireland	1.1
Total	**100.0**

(a) The weights shown are rounded.

The IMF method uses these internal weights to construct a geometrically weighted basket of the 'in' countries' exchange rates against the US dollar, giving a 'synthetic' value for the euro.[4] This is then used in place of the actual euro exchange rates (using formula **(ii)** above). This synthetic US dollar/euro rate is shown in the chart below. The synthetic index is similar to that published by the Financial Times; the main difference is that the Financial Times series was GDP-weighted, using arithmetic weights (Datastream also publishes a similar index).

As the chart shows, the overall effective exchange rate moves closely with the synthetic US dollar/euro rate, except for the mid 1980s, when the US dollar was particularly strong.

The EERI and the synthetic US dollar/euro exchange rate

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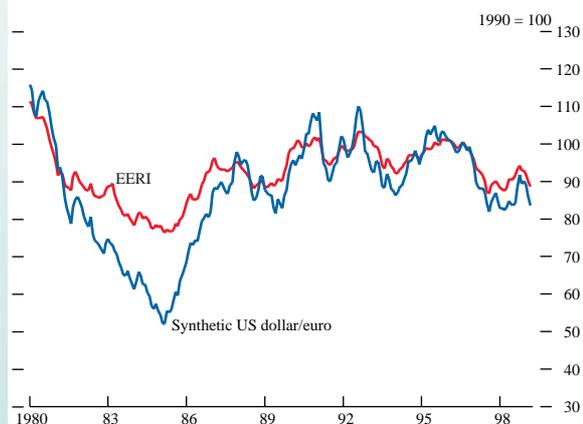
(1) Details are given in the IMF's *Survey* publication, Vol 28, No 8, April 1999.
(2) See Zanello and Desruelle, *IMF Working Paper* 97/71, May 1997.

(3) Since w_i sum to 1. This can be derived as follows: $EERI = \prod_{i}^{UK,Japan,....} \left(\frac{curr_i}{\$} \bullet \frac{\$}{euro} \right)^{w_i} = \prod_{i}^{UK,Japan,....} \left(\frac{\$}{euro} \right)^{w_i} \bullet \left(\frac{curr_i}{\$} \right)^{w_i}$

(4) An equivalent method is to calculate effective exchange rates for each euro-area country, based only on trade outside the euro area, and then to weight these by their importance to total trade outside the euro area.

since January 1997, the EERI has been more volatile than the German index, reflecting the high weight in the German index of the other euro-area countries, whose currencies were relatively stable against the Deutsche Mark before the rates were fixed on 31 December 1998.

Other euro-area effective exchange rate indices

Other organisations have also developed methods of calculating effective exchange rate indices for the euro area. The main differences relate to the countries included and the weights used, though the basic philosophy is very similar. The ECB currently publishes an index, calculated by the BIS, in its *Monthly Bulletin*. The ECB plans to publish its own index shortly. The European Commission also publishes an index.[1]

Table A compares the Bank/IMF weights with those of the BIS, which uses a slightly wider coverage. Both the IMF and BIS weights are calculated from trade flows of manufactured goods, allowing not only for bilateral trade but also for third-country effects (see the box on page 192).[2] In both indices, the largest weight is for the United Kingdom.

As the underlying method and coverage used by the BIS are similar to those of the Bank/IMF, the two indices move closely together, as Chart 3 shows.

Chart 3
Bank of England and BIS effective exchange rate indices for the euro area
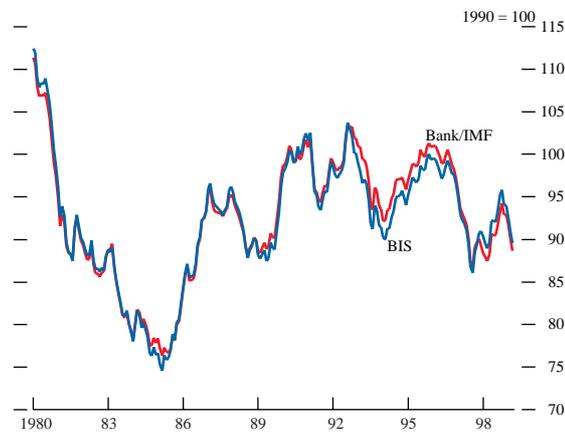
Complementary indices

Real indices

The indices published by the Bank are nominal, ie they are simple weighted averages of actual bilateral exchange rates. Such averages can in themselves be useful, for example when thinking about the overall impact of an interest rate change on a currency.

But for analysing competitiveness, real indices are more appropriate. These adjust for differential movements in price or cost inflation. They give an average measure of a country's prices or costs relative to those of other countries, expressed in a common currency.[3]

Real exchange rate measures can change even when the nominal exchange rate is fixed. If country A's costs or prices rise more quickly than country B's, with the nominal exchange rate unchanged, country A's real exchange rate against country B would appreciate.

Broad indices

The Bank's EERI is 'narrow', covering a core of countries that account for around 55% of trade with countries outside the euro area. For a comprehensive measure of competitiveness, the exchange rate index should include as many countries as possible, given data availability. This suggests that the ideal exchange rate measure should be a broad real index.

But there are a number of reasons why it is useful to consider a number of exchange rate indicators, rather than focusing on only one. Table B summarises some of these reasons, which are discussed below in the context of the euro area.

Table B
Advantages (+) and disadvantages (–) of different effective exchange rate indices

	Nominal	Real
Broad	+ Coverage – Inflation leads to strong trends + Can be available daily	+ Coverage + Adjusts for inflation – Measurement problems – Not timely – Not available daily
Narrow	– Coverage + Narrow countries cover most trade – Even modest inflation can matter + Exchange rate movements more volatile than inflation + Available hourly + Useful average of market rates for assessing monetary policy	– Coverage + Adjusts for inflation + Narrow countries cover most trade + Similar to broad real in practice – Not available daily

Real and broad euro-area indices

The IMF produces a real effective exchange rate for the euro area, consistent with its nominal index and constructed using unit labour costs in manufacturing. It also produces a broad real index with a wider country coverage (the ECB intends to do so as well).[4] The IMF's broad real index includes a further twelve countries and uses consumer prices, as unit labour costs in manufacturing are not easily available for all these countries. The weights include trade in tourism as well as in manufacturing.

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(1) The European Commission's index is available from the EC web site at europa.eu.int/comm/off/rep/pccr.
(2) The BIS index is based on manufacturing trade in 1990, and includes third-country effects on exports, but uses a slightly different method to estimate the size of markets.

(3) For country j: $\quad real\ ERI_j = \prod_{i=1}^{20} \left(\frac{curr_i\ /\ P_i}{curr_j\ /\ P_j} \right)^{w_i} = \prod_{i=1}^{20} \left(\frac{P_j}{P_i} \times \frac{curr_i}{curr_j} \right)^{w_i}$ \quad where P is a price (or cost) index, based on 1990 = 100.

(4) The Bank does not publish a broad index for the euro area (all the Bank's published effective rates are on the narrow basis and in nominal terms, though broad and real indices are routinely monitored). See Chart 1.18 in the February 1999 *Inflation Report* for the broad sterling index.

As part of the calculation of the broad real index, the IMF computes a broad nominal series, shown in Chart 4a with its real equivalent. The chart illustrates the strong trend in the broad nominal index over the period since 1980, reflecting very high inflation rates in some of the countries.

Chart 4a
Broad nominal and real effective IMF exchange rates for the euro area

Note: CPI = consumer price index.
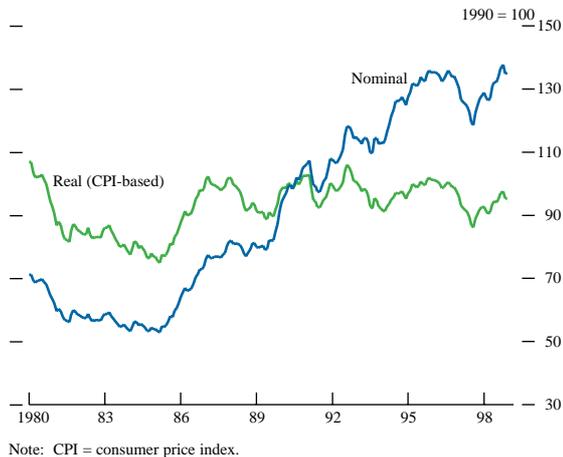
By contrast, the standard (ie 'narrow') nominal IMF index moves closely in line with its real equivalent (as shown in Chart 4b). This reflects the relative variability of exchange rates and inflation rates for the countries included in the index (for individual countries, though the short-term movements are close, the longer-term trends diverge; for example, over the past few decades, the nominal index for Italy has trended down relative to the real index).

Chart 4b
Narrow nominal and real effective IMF exchange rates for the euro area

Note: ULC = unit labour costs.
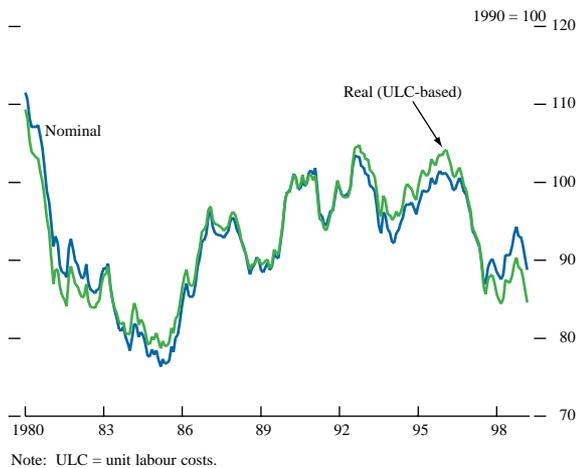
Analysing nominal indices can help to explain the recent economic conjuncture, before the price and cost data needed to compute the real indices are available. For some countries, reliable up-to-date price or cost indices are not easily available. But care needs to be taken to allow explicitly for likely differences in inflation. This applies particularly to broader indices.

For the euro area, the narrow nominal measure has been a reasonably good proxy for changes in the narrow real rate. It also has the advantage of being available almost instantly, whereas cost and price indicators are only available monthly. And, arguably, the nominal index has a more straightforward interpretation—real rate movements can reflect price or cost movements that may not be well measured (eg because of index number biases).

The narrow real index has the advantage of tracking the broad real index reasonably closely (see Chart 5). This reflects the overlap between the indices when the countries are weighted for their importance to trade. The narrow-index countries represent nearly 80% of the broad index, with none of the additional countries having a weight of more than 3% (South Korea, People's Republic of China, Brazil, Taiwan and Hong Kong SAR have weights of more than 2%).

Chart 5
Narrow vs broad IMF real effective exchange rates for the euro area

Note: ULC = unit labour costs; CPI = consumer price index.
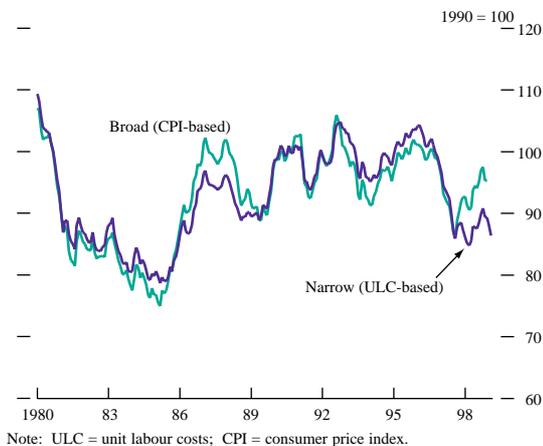
But a wider coverage does give a more comprehensive picture of relative competitiveness. This is particularly useful when there are large changes in the real exchange rate with particular countries that are not included in the narrow indices. With the large depreciations of East Asian currencies in 1997, indices with a wider coverage have been very useful (one of the largest divergences between the narrow and broad real indices has been over this period, as Chart 5 shows).