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A Proposed International Unit of Account: Implications for Financial Markets, Commodity Markets, and Research

Lok Sang Ho*

Abstract

There are substantial benefits from having an indexed unit of account for denominating bonds, contracting, and for quoting commodity prices. A new real effective exchange rate (REER) index is derived using GDP weights and an implicit world price index obtained incidental to the derivation of the indexed unit of account. In a prototype exports function estimation, this new index beats most of the other published real effective exchange rate indices. The superior performance is probably due to the fact that with globalization and production fragmentation trade weights have become increasingly misleading because of the prevalence of re-exports and even re-re-exports.

1. Introduction

The launch of the Euro in 1999 made history for humankind. It marked the unification of 11 currencies across Europe,[1] and rekindled hope that perhaps one day there could be one single currency across the world. Indeed, shortly after the Euro's debut, the IMF hosted an economic forum on the subject: "One World, One Currency: Destination or Delusion?" on November 8, 2000.

This dream remains just as elusive today, however. Several countries, including the UK and Denmark, continue to hesitate joining the Euro Zone, and at one point or another some Euro Zone countries have actually wondered whether they should revert to their national currencies. ("Italy should bring back the lira, says minister," Philip Thornton reporting in *The Independent*, Saturday, 4 June 2005)

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[1] Greece was not among the original 11 countries in 1999 but adopted the Euro in 2001 prior to the circulation of the physical currency from January 2002.

After the strike of the financial market tsunami subsequent to the demise of Lehman Brothers in 2008, it has become clear that some countries would want to have independent monetary policy to deal with their problems, which a common central bank may ignore or may be unable to do anything about. But the world will still benefit from having a common *international unit of account*, one that stands for a unit of real global purchasing power, to serve as the basis for quoting commodity prices, for contracting, and more specifically for denominating bonds.

Taking after the cue from Fisher (1913, 1913a and Coats, 1994)[2] Ho (2000) introduced such a unit and called it the "World Currency Unit" (WCU). He argued that the use of a common indexed unit of account, such as the WCU, for denominating bonds will improve the efficiency of the world's capital market, because it makes real interest rates more transparent and integrates the world's capital market. If bond issuers around the world widely use such a common unit of account, real yields will be more transparent and more comparable. I shall argue in this paper that the case for quoting commodity prices in the WCU and for general contracting is no less compelling because an indexed unit of account reduces uncertainty and fosters a better informed market. A better informed market is a more efficient market. In addition, I shall argue that the WCU can make the world's financial markets more stable and less hazardous.

Finally, I shall demonstrate how we can derive a new effective exchange rate index and a new real effective exchange rate index from the WCU construct. These new indices will be shown to be highly functional, while another by-product of the WCU construct, namely the "benchmark currency basket," will prove useful for countries that opt for a currency basket peg.

In the next section, I shall explain the conceptual basis of the WCU. I shall demonstrate that there are two approaches to valuing the WCU and that they are equivalent. Section 3 will argue that the use of the WCU in commodity price quotations and in bond denomination will significantly improve financial market stability. Section 4 will demonstrate how the WCU methodology can be used to

[2] Irving Fisher (1913, 1913a) was probably the first proponent of the use of indexing to standardize the purchasing power of money. Following his proposal, Coats (1994) explored the use of an indexed unit of account to serve as a monetary anchor. More recently, Robert Shiller has been advocating the use of indexed units of account for contracting and for market transactions. See Shiller (2003).

work out a superior effective exchange rate index and a superior real effective exchange rate index, compared to other published indices. Finally, Section 5 will offer other policy implications and draw some conclusions.

2. The World Currency Unit and Related Concepts

Two Alternative Approaches to WCU Valuation

According to Ho (2000), the WCU is a basket of world output as defined in some base year. The nominal values of a basket of GDP are translated into a common currency and added up. For example, the dollar value of a WCU_0 is some fraction λ of the sum of the GDPs[3] in the basket as defined in the base year 0, all translated into US dollars. Suppose the base year is 0, and n market economies are included in the WCU. Its valuation in US dollars at any time t can be stated as:

$$V_t = \lambda \sum_i GDP_{i0} \frac{P_{it}}{P_{i0}} e_{it} \qquad [1]$$

where the domestic GDPs are first inflated into current price valuations using the Consumer Price Index[4] and then converted into US dollars at the current exchange rate e_{it}. V_t can, of course, be expressed in other currencies using the relevant exchange rates.

It can be easily demonstrated that equation [1] is equivalent to a basket of currencies, each "normalized" and weighted by the country's GDP in the base year, and each further indexed to its domestic price index. "Normalizing" here means that we scale up (e.g., the Japanese Yen will need to be scaled up) or down (e.g., the British Pound) an exchange rate time series by dividing the entire time series with the *base year exchange rate* ($=e_{it}/e_{i0}$, for all t in the series), so that during the base year the normalized exchange rate for any currency is US$1 to one standardized unit of that currency.

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[3] λ in principle can be defined arbitrarily, as it defines the size of the basket. In Ho (2000) it was defined so that the WCU in the base year was worth US$100. Defined as $\frac{1}{\sum GDP_{j0}.e_{j0}}$, a WCU in the base year would be worth US$1.

[4] The CPI is used because it is updated monthly and is generally not subject to revisions as are implicit GDP deflators.

To demonstrate this, consider a basket of GDP-weighted normalized currencies with value equal to:

$$\sum_i \frac{GDP_{i0}.e_{i0}}{\sum GDP_{j0}.e_{j0}} . \frac{e_{it}}{e_{i0}}$$

Note that this is like so many cents of i's GDP in the base year revalued at current exchange rates, and summing over i. Now "index" the currencies with the respective consumer price indices. Then the value of this indexed basket at time t =

$$\sum_i \frac{GDP_{i0}.e_{i0}}{\sum GDP_{j0}.e_{j0}} . \frac{e_{it}}{e_{i0}} \frac{P_{it}}{P_{i0}} \qquad [2]$$

Comparing [1] with [2], we can see that if λ is equal to $\frac{1}{\sum GDP_{j0}.e_{j0}}$, they are identical.[5]

Base Year

The WCU is always defined with reference to some base year. Because the rates of economic growth for different countries are different, there is a need to re-weight from time to time. Thus, for each five year window after calculating the current market values of the WCU, we can splice the series together to form one long time series by consistency scaling ("chaining").[6] For the entire chained time series there will be one common "time series base year." It should be noted additional countries may be included in a new five year window, for example, to accommodate the expansion of the Euro zone. We will use the following notations to indicate two concepts of base years.

- $WCU^{2005}{}_{2000}$ indicates that the WCU is calculated using 2005 GDP weights but is part of a time series with 2000 as the base year.

[5] Whereas this unit is worth $1 in the base year Ho (2000) defined λ so that the base year GDP basket was worth US100. Then [2] would need to be multiplied by 100， and λ would become $\frac{100}{\sum GDP_{j0}.e_{j0}}$.

[6] In principle, the re-weighting can be done every year with continuous "chaining." Because GDP data is subject to revision, however, even when this is done the latest GDP weights would still be those of at least a couple of years ago.

- WCU_{2000} indicates that it is a series with 2000 as the "time series base year" and *variable GDP weights* from one five year window to another within the series.

Figure 1 shows that the WCU_{2000} has been commanding a larger and larger number of US dollars indicating that the real purchasing power of the US dollar has declined significantly since 1975, when the series began. As it turns out, this secular decline in the purchasing power of the US dollar is mainly due to inflation, and not so much because of the depreciation of the currency vis-à-vis other currencies.

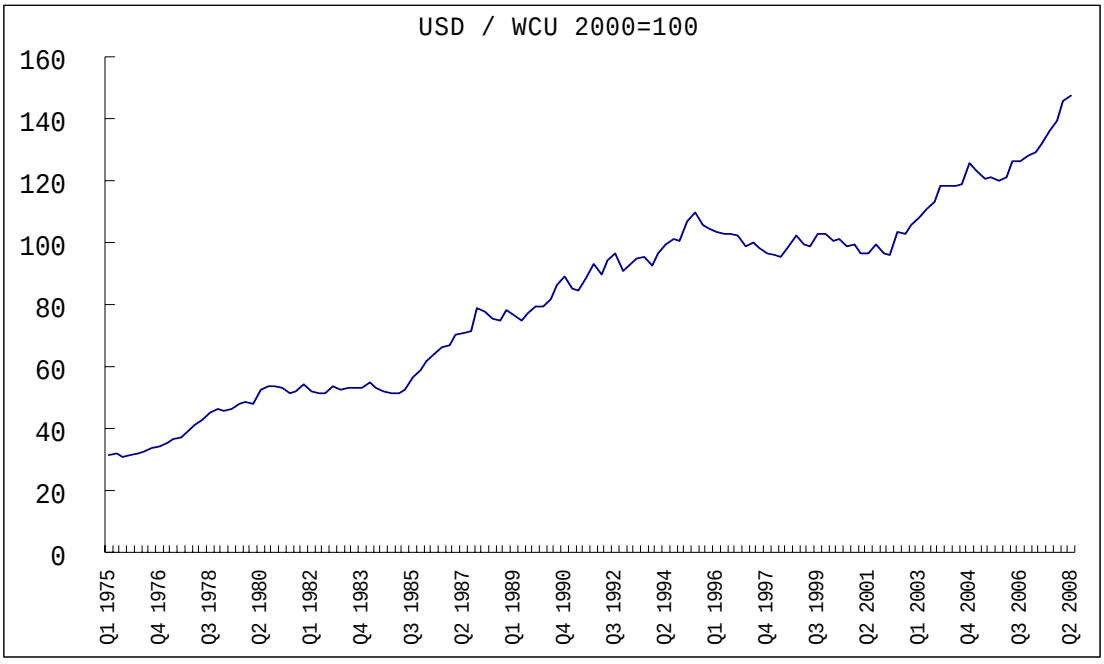

Figure 1. Nominal Value of WCU2000, 1975-2008 in USD
(GDP weights revised every 5 years; WCU=USD100 in 2000)

Same Global Purchasing Power vs Purchasing Power Parity

"Same global purchasing power" (GPP) as defined by the WCU is to be distinguished from "purchasing power parity" (PPP) in that while the former refers to how much of a currency is needed to buy the same basket of goods sourced *globally*, the latter refers to how the cost of *local* goods differs from country to county when expressed in a common currency. GPP is most relevant to an international investor or someone who travels widely and sources his consumption across the world. PPP is most relevant to someone who lives in one place rather than in another place and who sources his consumption locally.

Implicit Global Consumer Price Index (P_w), and Effective Exchange Rate Indices

Consider the unindexed currency basket, which is valued at $\sum_i \frac{GDP_{i0}.e_{i0}}{\sum GDP_{j0}.e_{j0}}.\frac{e_{it}}{e_{i0}}$ at time t and which is equal to US$1 in the base year. Denoted by e_{wt}, it is equal to $\frac{1}{\sum GDP_{j0}.e_{j0}}$ times $\sum_i GDP_{i0}.e_{i0}\frac{e_{it}}{e_{i0}}$. Thus it can be interpreted as a dollar's worth of the base year GDPs of all the included countries, valued in base year prices but at current exchange rates. Since it is an unindexed series and the implicit GDPs are all expressed in constant, base year prices, the time series is like a "real global GDP" series. We will call the *unindexed,* GDP-weighted currency basket "the benchmark basket." (BB) Figure 3 shows the value of this benchmark basket in current US dollars (e_w).

The price-indexed, GDP-weighted currency basket, called "the WCU_{xxxx}" where xxxx refers to the time series base year, consists of GDPs in current market prices. So this is like a "nominal global GDP" series.

We may divide the nominal series e_{wt} by the real series WCU_{xxxx} to obtain an "implicit world consumer price index P_w." With the implicit world CPI and the benchmark world currency basket defined, it is possible to define two other related concepts: namely, the relative exchange rate RER (relative to the valuation of the Benchmark Currency Basket, e_w), and the real effective exchange rate REER (against the BB countries) index.

Figure 2 indicates that the implicit world price has been rising rather fast in the 1970s but has slowed down considerably since then. As it turns out, the loss in the real purchasing power of the US dollar is due not so much to the nominal depreciation of the US dollar against other currencies but rather due to inflation, which had been eating away the purchasing power of most currencies. Indeed Figure 3 shows clearly that the un-indexed standard currency basket, which by definition was worth US$1 in 2000, was worth about US$1.25 in the late 1970s, similar to what it was worth in 2008.

Figure 2 and Figure 3 suggest that while in the short run movements in exchange rates dominate movements in the implicit price index in the valuation of the WCU, over the long run movements in the implicit price index dominates movements in exchange rates. This observation gives us comfort in updating valuation

information based on exchange rate movements on a daily basis but updating price information monthly.

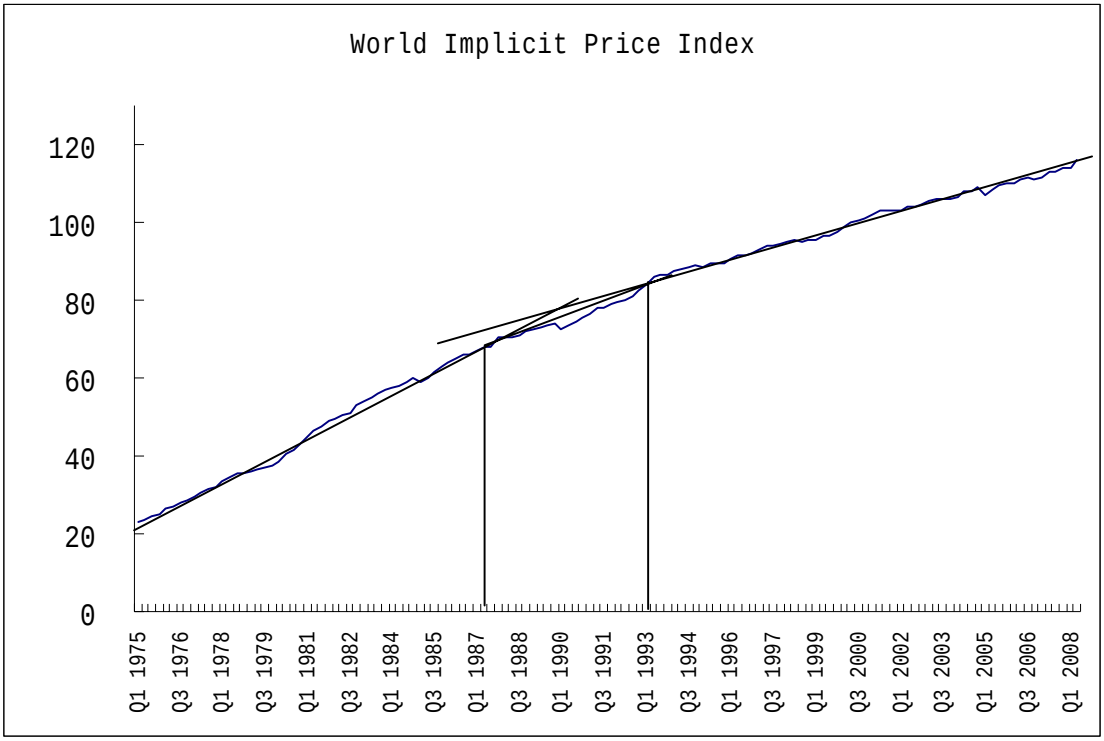

Figure 2. World Inflation Slowed Down Since the Late 1980s

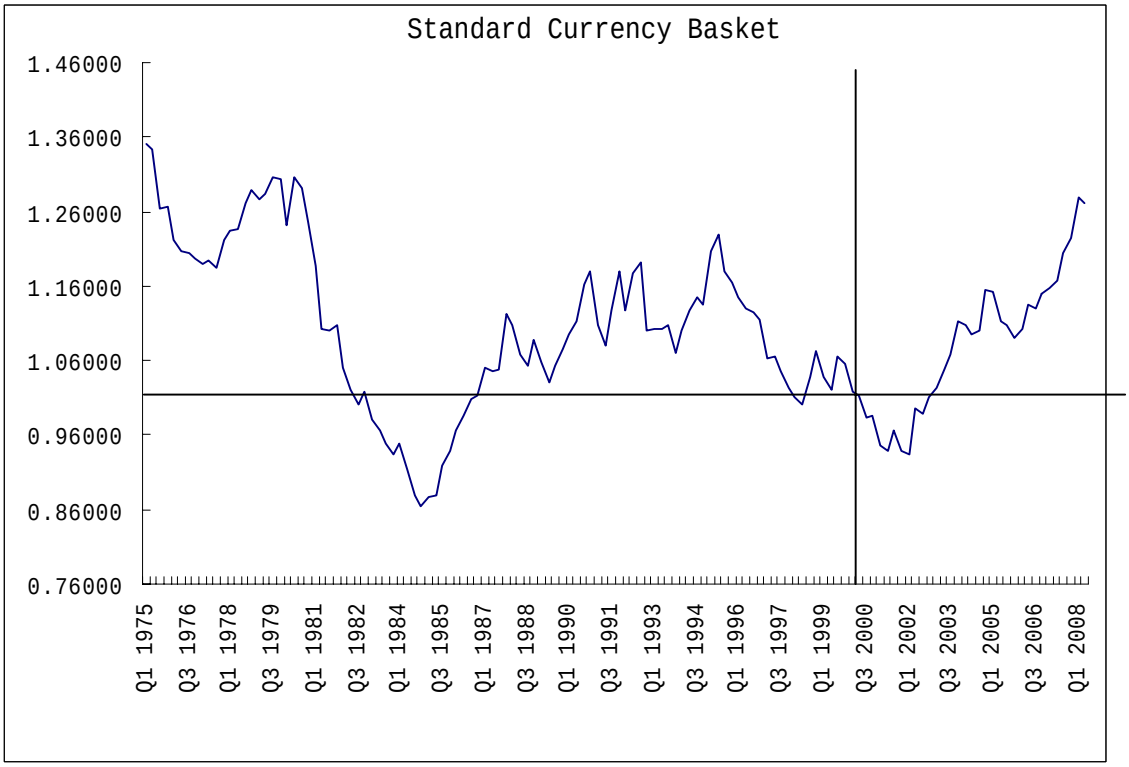

Figure 3. Value of the Standard Currency Basket in US Dollars, e_W

The *Relative Exchange Rate Index* for currency i against the benchmark currency basket is defined as:

$$RER(iw) = \frac{e_i}{e_w} \qquad [3]$$

which is the Exchange Value of Currency i against the US dollar divided by the Exchange Value of the BB against the USD.

The *Real Relative Exchange Rate Index* of currency i against the benchmark currency basket (RRE) is our *approximation* of the real effective exchange rate index and is represented by the following definition:

$$RRE(iw) = \frac{P_i}{P_w}\frac{e_i}{e_w} \qquad [4]$$

where P_i = Price index in country i, P_w= "World Implicit Price Index", while e_i/e_w is the Relative Exchange Rate Index. To say that [4] is an approximation of the conceptually correct real effective exchange rate index against the rest of the world is to acknowledge the fact that P_w is only the implicit price level of the countries included in the basket, that e_w is only the exchange value of the benchmark currency basket vis-à-vis the US dollar, and further that for any country i which is itself included in the benchmark currency basket, equation [4] is biased because the rest of the world strictly speaking should not include i.

Despite these shortcomings a nice thing about these definitions is that they dispense with the need to consider the different trading partners for different countries. It is simply assumed that any country trades with "the world," which is represented by the countries included in the benchmark basket.

Because this allows us to look at the exchange rate of any country with a common benchmark this approach provides tremendous convenience. Because in practice it seems to work very well (see section 4 below), equation [4] can serve as an alternative estimate of real effective exchange rates for *any* country.

3. Financial Market Instability and How the WCUxxxx May Help

Table 1. Episodes of Real Appreciation of the US Dollar against the WCU basket

	% Real Appreciation	% Change in US GDP
1980Q4-1981Q2 (US recession)	4.90%	**-0.23 in 1980**
1981Q4-1982Q3 (US recession)	5.41%	**-1.94 in 1982**
1984Q1-1985Q1 (No growth in HK)	5.27%	+7.19 in 1984
1995Q2-1998Q2 (AFC from 1997)	14.99%	+3.70 & +4.50 in 1996 and 1997 respectively
2000Q2-2002Q1 (Mild US Recession)	5.74%	+0.75 in 2001

It is interesting to note that in the past, when the US dollar was strong against the WCU_{2000}, the US was typically in some form of recession or there was some kind of financial crisis occurring somewhere. In particular, the US dollar was extremely strong against the WCU_{2000} ahead of and during the Asian Financial Crisis. It appears therefore that the AFC had something to do with *de facto* monetary tightness (Ho, 2003). During the time ahead of and the crisis, many of the Asian economies had double-digit nominal interest rates even though the US had much lower interest rates of only around 5-6%. While relatively low interest rates and strong asset prices kept the US growing, the high nominal interest rates in many Asian countries translated into very high real interest rates. This was exacerbated when the US dollar was gaining strength, given that many of the Asian currencies were to some extent tied to the US dollar. In 1985 while Hong Kong registered almost no growth on account of the strong US dollar (to which the HKD was linked), the Reagan tax cuts helped avoid a recession for the US.

The financial market tsunami of 2008 had its origin in the sub-prime mortgage market and the ensuing credit crunch. However, the development of the financial market turmoil shows that it was compounded by the surge of commodity prices—particularly the spike of oil prices (Figure 4).

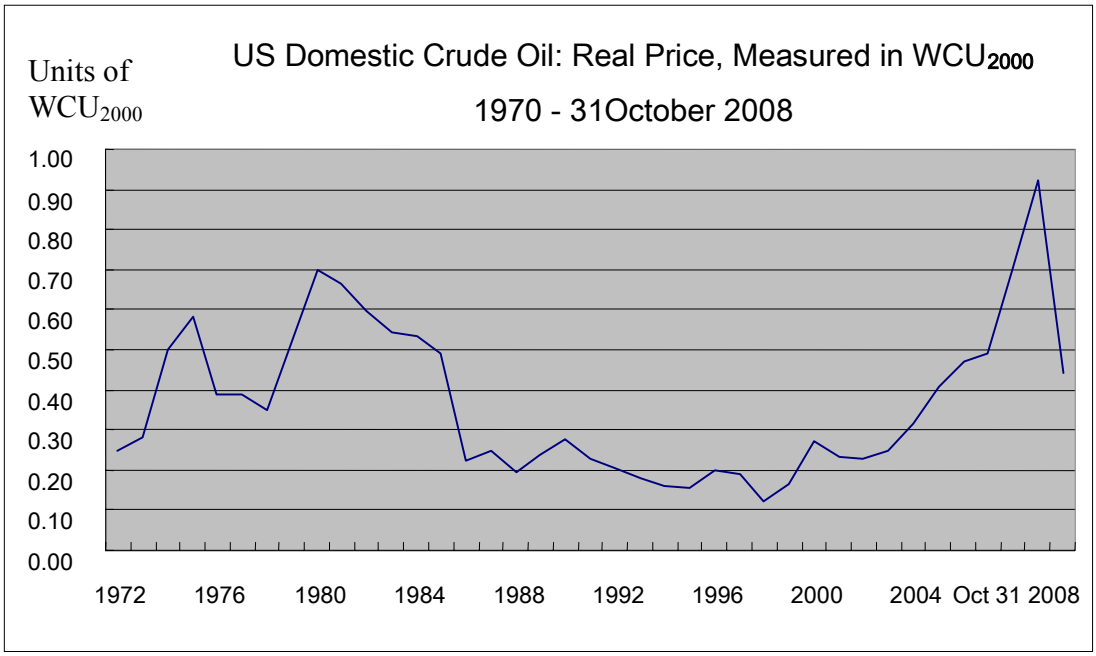

Figure 4: Real Oil Price per Barrel in WCU_{2000}, 1 WCU_{2000} =US$100 in 2000

The surge of commodity prices was clearly related to the weakness of the US dollar in much of 2007 moving into the first half of 2008. When the US dollar weakened, speculators bought commodities. **Table 2** shows that that the real price of oil in WCU_{2000} is cointegrated with the value of the benchmark currency basket in US dollars and the G7 output index. The value of the benchmark currency basket, e_w, is the reciprocal of the value of the US dollar. So US dollar depreciation, which is equivalent to a rise in the value of the benchmark currency basket in terms of US dollars, is found to raise the real price of oil.

The variables are integrated of order one I (1) and the length of the lag was determined to be 3 using the AIC. With one cointegrating vector (r = 1) among the three variables as determined by λmax and trace statistics (see Table 2), the normalized cointegrating relationship, the ECM (-1) term and R^2 in the VEC model are shown in **Table 3**. All variables carry the expected signs. The long run coefficient of lnBB is the elasticity of the real oil price (in WCU_{2000}) with respect to the value of the benchmark currency basket. The results suggest that the real oil price would roughly decrease by 4.4% with a 1% appreciation in the USD against the benchmark currency basket.

Table 2. Testing Cointegration between LnROP, Log of Benchmark Basket and LnGDP 1986-2007

Null Hypothesis	Alternative Hypothesis	Test Statistics	p-value
Trace tests:		Trace Value	
r = 0	r > 0	27.13***	0.0986*
r≦ 1	r > 1	4.65**	0.8447
λ max tests:		λ max Value	
r = 0	r = 1	22.48***	0.0322**
r = 1	r = 2	4.09	0.8502

1. Lag length of the VAR is determined by Akaike's Information Criterion
2. *** denotes significance at 1% level and r indicates the number of cointegrating vectors.

Table 3. Long Run Cointegrating Relation and VECM results

	Cointegrating Vector			VECM Result	
Exchange Rate	LnROP	LnBB	LnGDP	ECM (-1)	R^2
LnROP	1	-4.4003 (-3.2681)***	-3.0526 (-5.0821)***	-0.1346 (-3.5599)***	0.2873

*** denotes significance at 1%.
BB : Benchmark Basket in US dollars (BB=$1 in 2000)
LnGDP : Log of G7 Real GDP Index 2000=100
LnROP : Log of real price of oil defined as Crude Oil Price per Barrel in current USD divided by WCU in current USD.
Note: In this representation a negative sign signals positive effect on Real Oil Price.

It appears that whenever the US dollar weakens, investors and speculators take flight into commodities and real assets. This is why a weak dollar causes real commodity prices to rise. On the other hand, if commodity prices are quoted in US dollars and nominal commodity prices did not rise when the US dollar depreciated, then a country that exports commodities would suffer. Quoting commodity prices in the WCU is therefore fairer to both consumers and producers, and will help foster a more stable world economy.

During the 1980s, without a better alternative investment vehicle, Japanese savers bought stocks and houses, amplifying the asset price bubble that eventually burst.

Japanese savers who bought stocks and houses overseas were no better off because the subsequent rapid appreciation of the yen means their overseas investment suffered huge exchange losses. The availability of WCU-denominated bonds will provide the much needed alternative investment vehicle and may help create a more stable global economy with lower chances of creating bubbles.

At the same time, bonds that are denominated in the WCU will offer savers a reliable inflation hedge. If WCU-denominated bonds become more common, the global bond market will become more integrated and efficient. The Centre for Public Policy Studies at Lingnan University now provides daily quotations of the WCU_{2000}. The CPPS WCU website (http://www.ln.edu.hk/cpps/wcu/wcu.htm) demonstrates how daily quotations can be computed. These daily quotations are updated daily using the mid-night exchange rates as made available to the Centre by a vendor. Price data is updated every month, while GDP weights are revised every five years. The project is for demonstration only. It is hoped that in time some international organization will take up the task and provide authoritative quotations.

With the daily quotations available, it will be straightforward for commodities to be quoted in the WCU. Payment may then be made in any currency according to the quoted WCU price times the exchange rate between the payment currency and the WCU. With the possibility of international transactions to be settled in any major international currency, the unique position of the US dollar will be history, and a "flight to liquidity" would then not cause the US dollar to appreciate against economic fundamentals, as happened in the second half of 2008. Such unwarranted appreciation of the US dollar is itself disruptive of the global economy and hampers needed adjustments. It will also eliminate the arbitrary redistribution between buyers and sellers of commodities caused by swings in exchange rates, and will remove a cause of speculation.

4. A New Approach to Calculating Effective Exchange Rate Indices

A recent survey of alternative real effective exchange rates concluded: "The choices [over the deflator and the weighting] depend upon the economic issue at hand, constrained by the availability of data. One important conclusion is that the commonly used indices may be inadequate for the task at hand. In such cases, one

may have to generate an effective exchange rate index specific to the task at hand." (Chinn, 2006, p.137).

As Chinn's survey article shows, the computation of effective exchange rates has become extremely complex. For example, the BIS now calculates effective exchange rate (EER) indices using time-varying trade weights to reflect the rapid changes in world trade (Klau and Fung, 2006). The weights are derived from manufacturing trade flows and capture both direct bilateral trade and third-market competition by double-weighting. The IMF indices use a similar methodology. For any country i, trading partner j's weight is based on:

$$w_j = (\text{imports of } i/\text{imports and exports of } i) \times (\text{share of } i \text{ imports from } j) + (\text{exports of } i/\text{imports and exports of } i) \times (\text{overall export weight})$$

where

$$\text{overall export weight} = \beta \times (\text{share of exports of } i \text{ to } j \text{ out of i's total exports}) + (1-\beta) \times (\text{third market weight})$$

According to Chinn (Chinn, 2006, p.123), the IMF methodology implicitly assumes a constant elasticity of substitution between goods originating from different countries.

In contrast, our methods of calculating nominal and real effective exchange rates based on equations [3] and [4] are quite simple. We do not consider the trade weights of different countries at all. Instead we simply compare the exchange rate of the currency in question vis-à-vis US dollars with the exchange value of the benchmark currency basket vis-à-vis US dollars. We multiply the relative exchange rate index of any country by the ratio of its CPI to the world implicit price index to obtain our measure of real effective exchange rate. In what follows, we will estimate standard exports functions for the US., Japan, and the UK, using our proposed real effective exchange rate ("real relative exchange rate" RRE), and comparing with results based on alternative published real effective exchange rate indices. In all the estimation equations, we use the G7 GDP volume index to proxy world GDP as the other key variable driving real exports. Since our real effective exchange rate indices are CPI-based, in our comparative study we look only at those published real effective exchange rate indices that are based on consumer price indices and ignore the unit labor cost based real exchange rates.

Empirical Results

Test results for cointegration: LnEX, LnRRE and LnGDP

Since all the variables under consideration are integrated of order one I(1) (unit root test results available upon request), the next step is to carry out cointegration analyses of the variables. We first try to identify the long-run relationship among the key variables by using the Johansen procedure (1988). The length of the lag is based on the Akaike Information Criterion (AIC) and was found to be 1. The cointegration test results are presented in **Table 4**. The number of co-integrating vectors r is determined by λmax and trace statistics. As can be seen, both statistics indicates that there is one cointegrating vector (r = 1) among LnEx, LnGDP and LnRRE for UK and Japan. For US, the trace statistics suggest up to 2 cointegrating vectors while the λmax statistics indicate one only.

The normalized cointegrating relations are shown in **Table 5**. All variables carry the expected signs. The ECM (-1) term and R^2 in VEC model are also reported in **Table 5**. The ECM (-1) statistics all indicate a stable long-run relationship among the variables and the coefficients associated with the error correction term indicate the direction and speed of adjustment of each variable in the system towards its long-rum equilibrium. For US, RRE as an explanatory variable for the expect gives the highest R^2 in the VECM model while the real effective exchange rate index from OECD carries the most significant coefficient among all the exchange rate measures. For UK, RRE as an explanatory variable for exports gives the highest R^2 in the VECM model and carries the most significant coefficient among all the exchange rate measures. For Japan, tests with alternative exchange rate measures produce very similar results with similar significance and goodness-of-fit statistics.

Table 4. Testing Cointegration between LnEX, LnRRE and LnGDP 1983-2007, US, UK and Japan

Null Hypothesis	Alternative Hypothesis	Test Statistics	p-value
US			
Trace tests:		Trace Value	
r = 0	r > 0	54.51***	0.0000***
r≦ 1	r > 1	15.98**	0.0423**
λ max tests:		λ max Value	
r = 0	r = 1	38.53***	0.0001***
r = 1	r = 2	10.9	0.1936
UK			
Trace tests:		Trace Value	
r = 0	r > 0	38.96***	0.0034***
r≦ 1	r > 1	13.29	0.1047
λ max tests:		λ max Value	
r = 0	r = 1	25.67***	0.0107***
r = 1	r = 2	10.95	0.1569
Japan			
Trace tests:		Trace Value	
r = 0	r > 0	35.94***	0.0086***
r≦ 1	r > 1	4.05	0.8992
λ max tests:		λ max Value	
r = 0	r = 1	31.89***	0.0011***
r = 1	r = 2	4.00	0.8594

1. Lag length of the VAR is determined by Akaike's Information Criterion
2. *** denotes significance at 1% level and r indicates the number of cointegrating vectors.

LnEX : Log of US / UK /Japan total exports volume index 2000=100
RRE : Real Relative Exchange Rate Index 2000=100, CPI Based.
LnGDP : Log of G7 real GDP 2000=100

Table 5. Comparisons of Normalized Cointegrating Coefficients, ECM (-1) and R^2 : US, UK and Japan

	Cointegrating Vector			VECM Result	
Exchange Rate	**LnEX**	**Exchange Rate Index**	**LnGDP**	**ECM (-1)**	**R^2**
US					
LnRRE	1	2.4907 (6.4891)***	-2.7897 (-17.3424)***	-0.0524 (-4.7503)	**0.3042**
LnBIS	1	1.6164 (6.4871)***	-2.7575 (-20.2191)**	-0.0603 (-4.6108)	0.2874
LnIMFC	1	1.9049 (6.3485)***	-2.8399 (-19.8079)***	**-0.0599** **(-4.7672)**	0.2913
LnOECDC	1	**1.3037** **(6.8727)*** **	**-2.7659** **(-25.8398)*** **	-0.0732 (-4.4282)	0.2720
UK					
LnRRE	1	**1.0487** **(3.2468)*** **	**-2.7242** **(-15.8842)*** **	**-0.0585** **(-2.5362)** **	**0.0920**
LnBIS	1	1.3209 (2.6846)**	-2.6122 (-14.0025)***	-0.0352 (-1.9742)**	0.0598
LnIMFC	1	1.0587 (2.8567)**	-2.8982 (-13.5597)***	-0.0401 (-2.0605)**	0.0639
LnOECDC	1	1.3157 (2.9261)**	-2.5739 (-14.9396)***	-0.0366 (-2.0126)**	0.0613
Japan					
LnRRE	1	0.2810 (3.6751)***	**-1.3014** **(-25.4194)*** **	-0.3187 (-4.7495)***	0.3005
LnBIS	1	**0.2770** **(4.0017)** **	-1.3358 (-25.2823)***	-0.3202 (-4.8401)***	0.3050
LnIMFC	1	0.2215 (3.5309)***	-1.3577 (-23.9104)***	**-0.3997** **(-5.1423)*** **	**0.3108**
LnOECDC	1	0.2754 (3.7771)***	-1.3945 (-22.2702)***	-0.3227 (-4.8034)***	0.3071

*** & ** denote significance at 1% and 5% level respectively
RRE : Real Relative Exchange Rate Index 2000=100, CPI Based
BIS : Bank of International Settlement Real Effective Exchange Rate Index 2000=100, CPI Based
IMFC : IMF Real Effective Exchange Rate Index, 2000=100, CPI Based
OECDC : OECD Real Effective Exchange Rate Index, 2000=100, CPI Based
LnEX : Log of US / UK /Japan total exports volume index, 2000=100
LnGDP : Log of G7 real GDP, 2000=100
Figures in bold indicate the best performer among the four real effective exchange rate indices.

5. Conclusions

The WCU is not a world currency and is rather merely an international unit of account. As such it offers the prospect of international settlement in any currency, thus putting every fully convertible currency on equal footing. Transactions quoted in the WCU can be settled in any currency. The use of an international unit of account means that global capital can be priced using the same unit. As a result given the same risks borrowers will more likely pay the same global real interest rate. A common unit of account increases the transparency and comparability of prices and interest rates.

WCU-denominated bonds (Ho, 2000) offer an opportunity for savers to protect the purchasing power of their savings against a global basket of goods and services. Preserving global purchasing power is becoming more and more important as people are more widely traveled and as they source their supplies more and more globally. With WCU-denominated bonds available, savers can better avoid risks arising from exchange rate movements or from unexpected inflation. Savers are also less likely to add to the formation of asset price bubbles or currency bubbles (Miller and Weller, 1990), as WCU-denominated bonds offer an alternative to the purchase of real estate or securities denominated in specific currencies.

Because buyers of "global bonds" denominated in WCUs enjoy the protection from global inflation indexing and the benefit of exchange risk diversification, they are likely to accept lower yields on the bonds that they buy. This implies a lower borrowing cost for issuers of such global bonds.

For borrowers whose incomes are in a single currency issuing WCU-denominated bonds does pose some exchange risks. One can, however, make the case that in a globalized world, users of capital should compete in the same market and should pay the global cost of capital. Borrowers unable to pay the global cost of the capital should not borrow. This happens whenever their investment fails to generate the requisite returns to pay such costs. Before the advent of a single global currency, which is quite improbable and perhaps implausible in the foreseeable future, issuing WCU-denominated bonds appears to be the best option closest to a unified global capital market.

Many developing countries suffer the "original sin" in that their borrowers may not be able to issue bonds in their own currencies due to a lack of confidence among investors (Eichengreen *et.al*., 2003). For such countries, borrowing in US dollars, euros, or in yen are the only alternatives, making them very vulnerable when there is an attack on their currencies. Because the WCU represents a diversified portfolio, borrowers may reduce their exposure from the fluctuations of a single currency if they issue WCU-denominated bonds. Denominating bonds in the WCU also protects bond issuers against the risk of fluctuations in the real cost of repayment arising from unexpected movements in the inflation rate. [7]

The WCU can also serve as an anchor for national currencies for economies with relatively shallow financial markets. Used as such, it offers the prospect of avoiding damaging short term real exchange rate movements that may result from what Robert Mundell described as "lethal short term capital movements" [8] –a recognized phenomenon that had prompted the "Tobin tax." Economies that anchor their currencies to the WCU can expect to have very little inflation, as such anchoring implies very strict monetary discipline. It should be noted, however, that since in practice inflation is usually positive, [9] a country that anchors its currency against the WCU may lose competitiveness against other countries.

To avoid losing competitiveness a country may prefer to tie its currency to the unindexed benchmark currency basket e_w instead. The currency then will not appreciate or depreciate relative to the benchmark, but will lose purchasing power as a result of world inflation. If the benchmark basket is used generally across more and more countries, a side benefit of tying a currency to a common benchmark basket is some kind of quasi-currency integration, as the mutual exchange rates among countries that independently link their currencies to the benchmark basket become more or less fixed.

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[7] Eichengreen., *et. al.*, put it nicely: "The original-sin school traces the problem… to the structure of global portfolios and international financial markets. It suggests that emerging-market economies are volatile because they find it difficult to denominate their obligations in units that better track their capacity to pay, such as the domestic currency or the domestic consumption basket. It suggests that this constraint derives in part from the structure of international portfolios and the operation of international financial markets. It points to forces that concentrate international portfolios and markets in a few major currencies – the dollar, euro, yen, pound and Swiss franc – and to the evidently limited appetite of international investors for adding additional currencies to their portfolios."

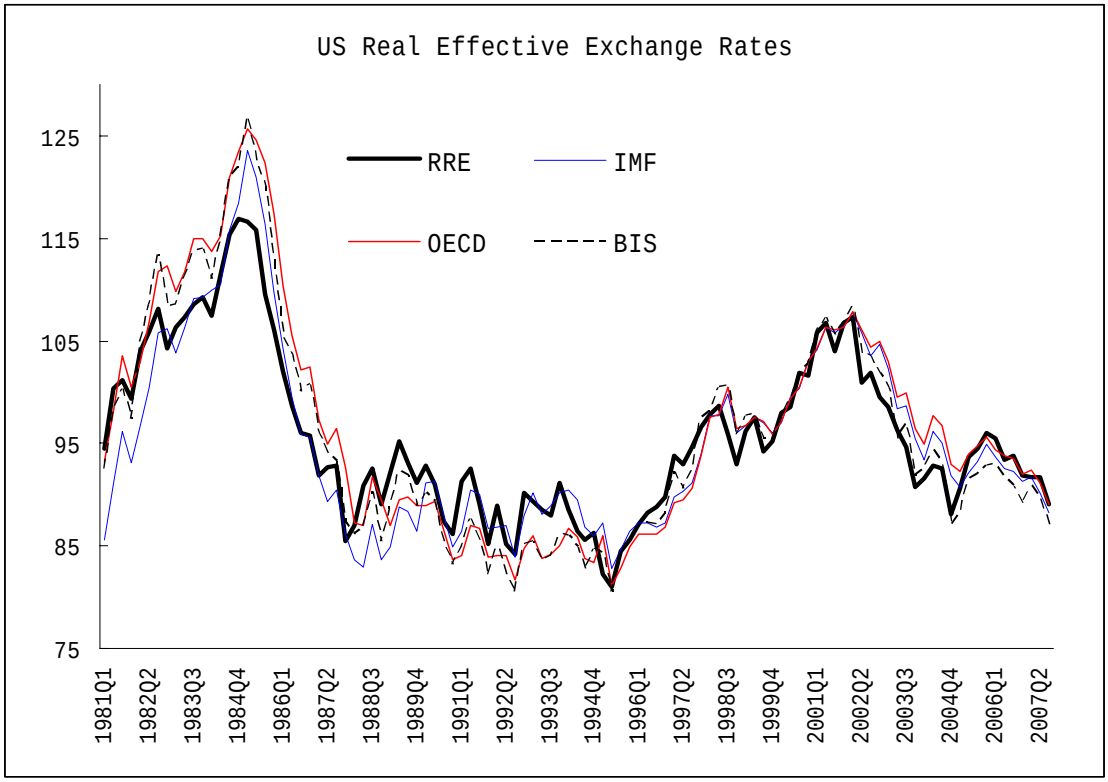
[8] Mundell made this remark at a conference on exchange rates organized by George M. Vonfurstenberg held in Bellagio in 2006.

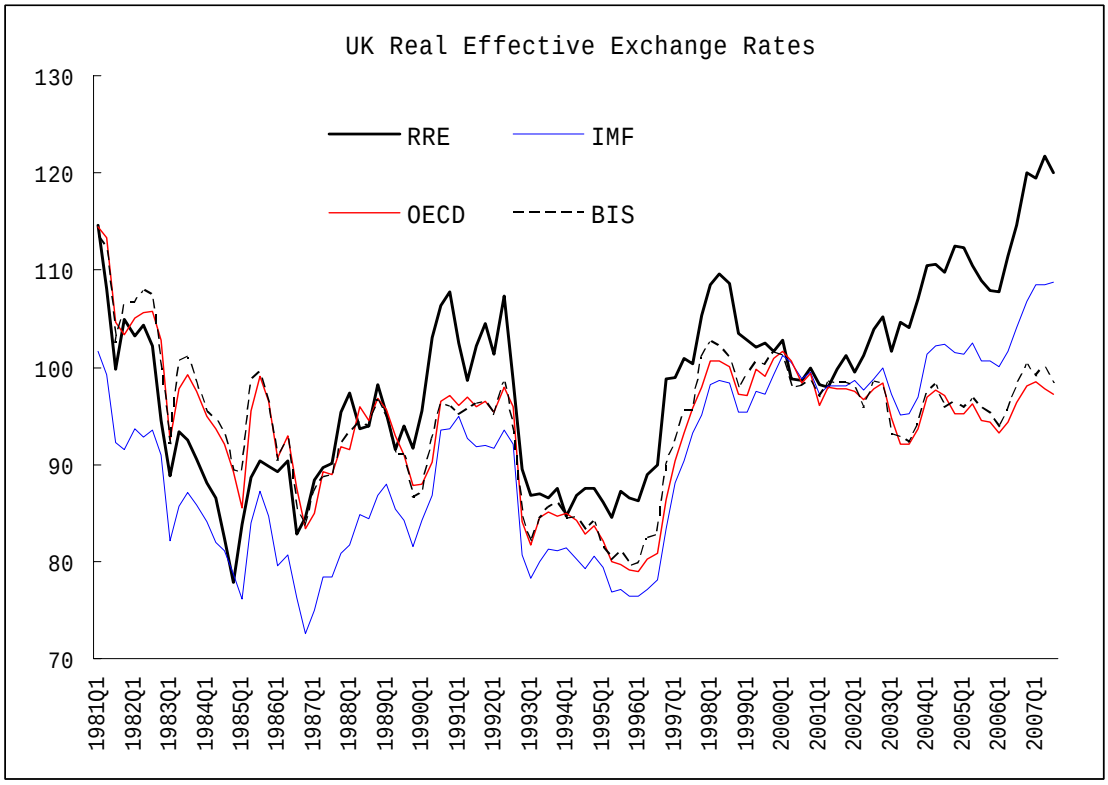
[9] No inflation targeting country targets at 0 inflation, for example.

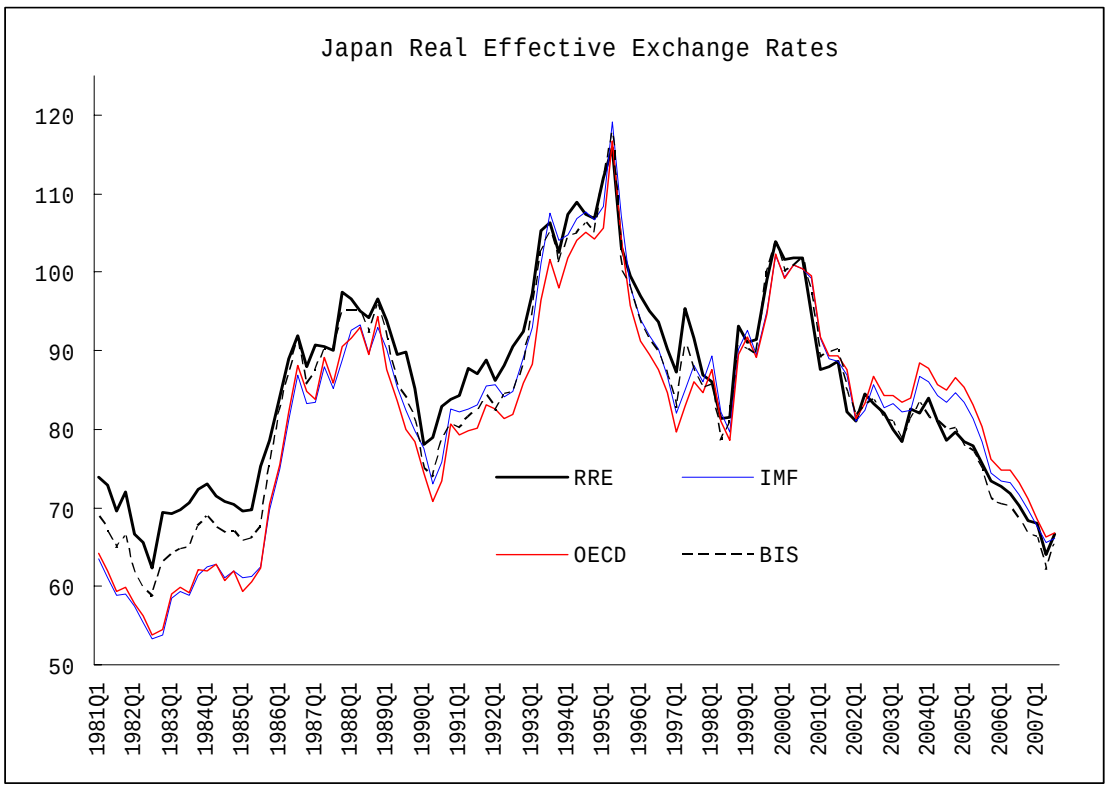
Logically, not every country can anchor its currency to the benchmark basket or the WCU. It has been implicitly assumed that the US, the Euro Zone, and Japan will continue to conduct their monetary policy independently, with more or less flexible exchange rates. In all likelihood, the bigger economies will continue to do so, while smaller economies may choose to tie their currencies to the BB or the WCU.

Finally, we have demonstrated that the benchmark currency basket based on GDP weights is a convenient and viable tool for computing a highly functional and often superior measure of effective exchange rates. The nominal effective exchange rate is approximated by the ratio of the exchange value of a currency to the exchange value of the benchmark currency basket. The real effective exchange rate is approximated by multiplying this with the ratio of the country CPI to the implicit world CPI. Our proposed approach stands in contrast to currently available effective exchange rate indices which use trade weights. With globalization and increasing fragmentation of production, we argue, trade weights are becoming more and more unreliable. Fragmentation of production means that even "domestic exports" to a destination typically includes an element of re-exports that may even be quite significant in percentage terms. A top destination in terms of gross exports value may actually be considerably less significant than another destination that ranks below it in terms of value-added content exported. On the other hand, the bigger the GDP of a country, the more imports will it suck in from the rest of the world. The exporters to such big countries may in turn suck in more imports from other countries. Thus a country that does not physically export much to a big country may still export more overall on account of its size. This lends support to the practice of giving a bigger country larger weight.

Appendix. Alternative Real Effective Exchange Rate Measures for US, UK, and Japan







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