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EURO-DOLLAR: FACE-TO-FACE

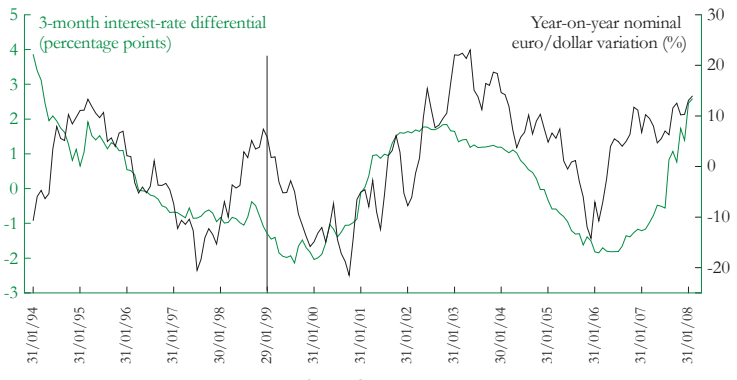
The financial crisis that began during the summer of 2007 accelerated the depreciation of the dollar. Has the dollar now fallen far enough for global disequilibria to be reabsorbed and for a reappreciation to take place? What do the two methods commonly used to determine medium- or long-term equilibrium exchange rates tell us? The results they give differ, but they both indicate that the dollar and the euro are overvalued in real effective terms. The two currencies should therefore depreciate in relation to other currencies. The abruptness of the dollar's depreciation since summer 2007 might mean that the U.S. *currency's current weakness will be relatively short-lived. As for the euro, its depreciation against other currencies is countered by the fact that it forms the main alternative to the dollar.*

The depreciation of the dollar since 2002 has been of no surprise to economists. It was its strength prior to that date that came as more of a shock. Since the beginning of the 1990s, the deepening of U.S. foreign deficits had caused questions to be asked about the level of the dollar. Most economists at the time thought that a considerable drop in the dollar would be necessary to bring the U.S. current account down to a 'sustainable' level. This current account was to react to the drop in the dollar in two ways: an improvement in price competitiveness for goods and services produced in the USA, and a shift in U.S. consumption away from goods 'exposed' to international competition (clothing, household goods, *etc.*) towards goods and services 'shaded' from competition (local services, *etc.*), the relative price of which would drop automatically with the depreciation of the dollar[1]. There was thus little doubt that an adjustment of the dollar would take place. Nevertheless, the position of the dollar as the key currency of the international monetary system was liable to delay this adjustment, since international investors retained their appetite for U.S. assets, deemed very liquid and not especially risky. Thus, it was not until 2002 that the dollar began to depreciate, when low U.S. interest rates and the prospects of the dollar convinced investors to diversify their portfolios outside of the dollar.

The increase in U.S. interest rates between 2004 and 2007 halted the fall of the greenback only temporarily, in 2005, a year in which U.S. interest rates rose to exceed European rates (Graph 1). The subprime crisis that began in August 2007 accelerated the dollar's depreciation via the reversal of U.S. monetary policy anticipated by the markets and subsequently vigorously enforced by the Federal Reserve.

Today, the weakness of the dollar can be attributed to two facts: an external disequilibrium that has not yet been reabsorbed (the U.S. current account deficit reduced by one point of GDP between 2006 and 2007 but the International Monetary Fund is still forecasting a deficit of 4.3% of GDP for 2008[2]); and a Fed Funds rate of only 1.85% against 4% for the ECB's minimum tender rate. Nevertheless, the question remains as to whether the dollar has already reached a sufficiently low level (around 1.55 dollars to the euro) for the disequilibria to be progressively reabsorbed,

Graph 1 – Interest-rate differentials and variations in euro/dollar exchange rates



Source: Datastream.

1. M. Obstfeld & K. Rogoff (2004), "The unsustainable current account position revisited", NBER *Working paper* No 10869, October.
2. IMF, *World Economic Outlook*, April 2008.

which would authorise a reappreciation of the dollar. Such an anticipation would be consistent with the discrepancy in interest rates observed between the USA and the Eurozone: the fact that the international markets agree to hold assets in dollars with a low rate of return is partially because they anticipate that the dollar will rise, and thus that their holdings will be revalued, which would compensate for their current low remuneration. Unfortunately, predicting exchange rates is a very risky task, particularly in the short term, since rates react to all sorts of information and are prone to mimetic effects and speculative bubbles. Paradoxically, it is less difficult to predict exchange rates over the long term, especially where no specific timeline is required.

Equilibrium exchange rates

Two methods are commonly used to calculate medium- or long-term equilibrium exchange rates. The first method, initiated by John Williamson (1985), is the Fundamental Equilibrium Exchange Rate, or FEER[3]. The FEER is the effective real exchange rate[4] that would be compatible with maintaining the current account at a 'sustainable' level ("external equilibrium"), where production is at a level corresponding to its full potential ("internal equilibrium"). Thus, a country with a current account deemed too low in comparison to the level considered to be sustainable will see its currency depreciate in real effective terms, especially if it is in the low phase of its economic cycle.

The second method, introduced by Faruqee (1995) and MacDonald (1997), is known as the Behavioural Equilibrium Exchange Rate, or BEER[5]. This latter concept is based on the estimated long-term relationship between the real effective exchange rate and its structural determinants. In particular, long term stability of the net external position (assets minus debts) implies that net interest payments (proportional to the net external position) are being compensated by a trade balance of the opposite sign. In other words, a country that has accumulated assets in net terms from the rest of the world can afford to have a trade deficit (and thus a strong currency) over the long term since that deficit will be compensated by the interest received on its assets abroad: the real exchange rate rises in accordance with the net external position.

The advantage of this second approach lies in the fact that, by construction, the BEER is a genuine long-term reference (there is a mean reversal towards it). However, this method of calculating the equilibrium exchange rate relies on a relationship that is estimated on the basis of past data, and which thus by definition does not take account of any potential institutional upheavals (the opening of any capital markets, for example) or structural upheavals (diversification of portfolios, changes in the perception of hedge values, *etc.*). Moreover, the BEER is generated by a reduced-form equation that does not explicitly incorporate the reabsorption of external disequilibria. It is a long-term standard that does not concern itself with exchange rate volatility in the medium term. The FEER approach, on the other hand, expressly concentrates on adjusting the current account. The disadvantages of this approach are its frequently arbitrary definition of what constitutes a 'sustainable' current account, the extremely imprecise nature of its estimates due to uncertainty as to price elasticities, and its focus on a single channel of adjustment – price competitiveness – without taking account of valuation effects on the balance of payments.

BEERs and FEERs

Here, we will use both approaches to set out estimates for the equilibrium exchange rates for a sample of 15 countries belonging to the G20[6]. The BEER model, inspired by Alberola *et al.* (1999)[7] is presented in Box 1. The real effective exchange rate of each country is regressed on the net foreign asset

Box 1 – A PARSIMONIOUS BEER MODEL

The logarithm for the real effective exchange rate of country i for year t, q_{it}, defined as the relative price of foreign goods compared with domestic ones, is explained by the logarithm of terms of trade expressed in effective terms, $rtot_{it}^{*}$, the logarithm for relative productivity in the non-traded goods sector compared with that in the traded-goods sector (relative to the other countries in the sample), $rprod_{it}$, and the net external position in percentage of GDP at the end of period t, nfa_{it}. The cointegrating relationship is estimated on the panel for the period 1980-2005** :

$$q_{it} = \underset{(-3,37)}{-0,283}\, nfa_{it} - \underset{(-8,73)}{0,419}\, rtot_{it} - \underset{(-15,14)}{0,878}\, rprod_{it} + \beta_i$$

The signs obtained are consistent with the theory: the real exchange rate appreciates (q decreases) over the long term if the net external position (*nfa*) increases, if the terms of trade (*rtot*) grow or if relative productivity for traded goods as against non-traded ones (*rprod*) increases in comparison with the rest of the world.

* The precise definition of these variables and the statistical sources are given in Bénassy-Quéré *et al.* (2008), *op. cit.*
** Student's statistics for coefficients are given in brackets.

3. J. Williamson (1985), *The Exchange Rate System, Institute for International Economics*, Washington D.C.
4. The weighted average of bilateral exchange rates against the main partner countries.
5. H. Faruqee (1995), "Long-Run Determinants of the Real Exchange Rate: a Stock-Flow Perspective", IMF *Staff Papers* 42(1), 80-107. R. MacDonald (1997), "What determines the real exchange rate? The long and the short of it", IMF *Working Paper* 97/21, January.
6. The sample contains Argentina, Australia, Brazil, Canada, China, the United Kingdom, Indonesia, India, Japan, Korea, Mexico, Turkey, the USA, South Africa and the Eurozone.
7. E. Alberola, S.G. Cervero, H. Lopez, & A. Ubide (1999), "Global equilibrium exchange rates: Euro, Dollar, "ins", "outs" and other major currencies in a panel cointegration framework", IMF *Working Paper* 99/175.

Table 1 – Underlying and current-accounts targets in 2005 (% of GDP)

	Underlying current account*	Targets** CC1	CC2	CC3
Eurozone	-1.4	-0.2	1.4	4.5
United States	-5.9	-3.0	2.7	-0.7
Canada	0.1	1.1	-2.1	-0.8
United Kingdom	-1.6	-2.6	2.6	8.1
Japan	4.3	1.1	-6,0	-4.3
China	10.0	2.6	-6.2	-5.6

* See Box 2.
** CC1 : Williamson (2006).
CC2 : current account permitting the net external position to be achieved within 5 years.
CC3 : same as CC2 but with a financial crash of 20% in the United States.
Source: Bénassy-Quéré *et al.* (2008).

position of the country, its relative productivity and its terms of trade. The equilibrium exchange rates are then calculated on the basis of this long-term relationship, assuming that the net external position for each country has itself achieved a level of equilibrium calculated via a long-term relationship[8].

To calculate equilibrium exchange rates using the FEER approach, we will use several sets of 'target' current accounts consecutively, set out in Table 1 for the main countries concerned. The first set (column CC1) represents the current account targets used by Williamson (2006) and the IMF (2006)[9]. The target used for the USA is a deficit of 3% of GDP; for Japan and China, the targets are surpluses of 1.1% and 2.6% respectively, whereas for the Eurozone the target is close to equilibrium.

The second set of targets (column CC2) represents the current accounts that will enable the net external position of each country to adjust to its 'equilibrium' value within five years. For example, if the net external position of a country in 2005 is lower than its equilibrium level, the current account target is a surplus, the amount of which accumulated over five years will enable the net external position to be raised to the amount necessary to achieve that level of equilibrium. The targets here are much more ambitious than those in column CC1, with a surplus of 2.7% of GDP for the USA, a deficit of 6% for Japan and China and a surplus of 1.4% for the Eurozone. It is however possible that these targets may have been overestimated, since they do not take account of the fact that an unanticipated depreciation of the dollar automatically boosts the U.S. net external position, since U.S. assets are chiefly denominated in foreign currencies whereas debts are in dollars[10]. This valuation effect reduces to the extent of the needed current-account adjustment. To illustrate the power of these valuation effects, a third set of targets (column CC3) is used: the convergence of net external positions with their structural levels over five years occurs following an initial devaluation of U.S. debts by 20% (drop in asset prices)[11]. The target for the U.S. current account reverts to -0.7% of GDP; the target for the Eurozone, on the other hand, increases, since this zone is seeing significant capital losses. The method used to calculate the FEERs based on the various current-account targets is set out in Box 2.

Table 2 reports the real effective misalignments for each country obtained using different methods for 2005, which is the final observation from our sample. Columns FEER1 to FEER3 provide the real effective misalignments corresponding to the targets in columns CC1 to CC3 of Table 1. Regardless of the method used, the euro and the dollar both appear overvalued in real effective terms in 2005. However, disadjustment is limited under the BEER approach, whereas it is significant or even very significant under the FEER approach. The dollar is particularly heavily overvalued in the extreme case where the U.S. current account must be raised by 8.6 points of GDP using only price competitiveness (FEER2). It is less marked where an improvement in price competitiveness is combined with a devaluation of U.S. debts (FEER3).

Box 2 — EQUILIBRIUM EXCHANGE RATE ACCORDING TO THE FEER APPROACH

The FEER is calculated using logarithms as follows:

$$feer_t = q_t + \frac{c\tilde{a} - uca_t}{m\beta_m + x\beta_x - m}$$

where q_t is the logarithm for the real effective exchange rate observed, uca_t is the underlying current account (the current account that would have been observed if production had been at its potential level) and $c\tilde{a}_t$ the current account target (the level of current account judged 'sustainable'). The coefficients in the fraction represent price elasticities of exports ($ß_x$) and imports ($ß_m$), and the exports-to-GDP ratios (x) and imports-to-GDP ratios (m)*.

The underlying current account is calculated as follows** :

$$uca_t = ca_t + (m\beta_m + x\beta_x)(0{,}5dq_t + 0{,}15dq_{t-1}) + m\Psi_m og_t - x\Psi_x og_t^*$$

where og_t, og_t^* refer respectively to the output gap in the country in question and in the rest of the world on date t (these output gaps are calculated using a Hodrick-Prescott filter), and dq_t, dq_{t-1} rrepresent the variations in the real effective exchange rate between dates *t-1* and *t* on the one hand and between *t*-2 and *t*-1 on the other hand. Import and export price elasticities are set to 1.5, as in the Multimod model:

$$\Psi_x = \Psi_m = 1{,}5$$

* We use the IMF's Multimod model elasticities: for developed countries, $ß_x$ = 0.71 and $ß_m$ = 0,92; for developing countries, $ß_x$ = 0.53 and $ß_m$ = 0.69. *Cf.* D. Laxton, P. Isard, H. Faruqee, P. Eswar & B. Turtelboom (1998), "MULTIMOD Mark III the core dynamic and steady-state models", IMF Occasional Paper no. 164, May.

** *Cf.* H. Faruqee & P. Isard (1998), "Exchange Rate Assessment: Extension of the Macroeconomic Balance Approach", IMF Occasional Papers 167.

8. See A. Bénassy-Quéré, S. Béreau & V. Mignon (2008), "Equilibrium exchange rates: a guidebook for the euro/dollar", *CEPII Working Paper* no. 2008-02.
9. J. Williamson (2006), "The target current account outcomes", *mimeo*, Peterson Institute for International Economics, prepared for the seminar on *Global Imbalances: Time for Action*, Washington D.C,. February 2007. IMF (2006), "Methodology for CGER exchange rate assessment", Research Department, 8 November.
10. See P.R. Lane & G.M. Milesi-Ferretti (2007), "The external wealth of nations mark II: Revised and extended estimates of foreign assets and liabilities, 1970-2004", *Journal of International Economics*, 73(2), 223-250.
11. Capital losses are spread between the other countries in proportion to their gross external liabilities.

Table 2 – Real effective misalignments in 2005 in %

	BEER	FEER 1	FEER 2	FEER 3	FEER 2'
Eurozone	-5	-9	-22	-47	-6
United States	-2	-49	-143	-86	-31
Canada	6	-4	9	4	3
United Kingdom	-12	6	-25	-58	-7
Japan	2	33	108	90	32
China	22	74	162	156	31

Note: a positive number indicates that the currency is undervalued in real effective terms.
Source: Bénassy-Quéré *et al.* (2008).

Numerous authors have stressed the sensitivity of FEER calculations to price elasticities in external trade. These elasticities are very difficult to estimate, however. Recent research based on disaggregated data or firm data puts forward an aggregation bias: price elasticities on imports and exports appear to be much greater than the estimate based on aggregated data suggests. In this regard, some authors have deliberately chosen to use higher substitution values for elasticity between national and foreign goods[12]. The last column in Table 2 (FEER2') depicts the same scenario as CC2 but applies elasticities twice as large. All exchange disadjustments are significantly reduced and the dollar appears to be overvalued by 'only' 30% in 2005.

Euro overvalued in real effective terms

In bilateral terms against the dollar, the euro still appeared undervalued in 2005, but overvalued as early as late 2007, according to the FEER2' and FEER3 approaches, which place the equilibrium rate for that date at around 1.35 (Table 3)[13]. Williamson's targets place the equilibrium exchange rate at around 1.50, whereas the extreme FEER2 approach implies a euro worth over two dollars. At the opposite end, the BEER approach, which assumes that the net external positions have stabilised at their equilibrium levels, places the equilibrium level at around 1.10, *i.e.* more or less at its level of purchasing power parity (the level that renders the purchasing power of the two currencies in the two respective countries equal).

The variety of these estimates reveals the great fragility inherent in calculating equilibrium exchange rates. Nevertheless, these estimates suggest that the dollar's weakness is transitory: once the external positions have stabilised at their 'equilibrium' levels, the euro/dollar exchange rate could return to a level close to purchasing power parity. The question then is thus to determine how long the dollar's weakness may last. The rapid depreciation of the dollar, particularly since the beginning of 2007 (the dollar depreciated by 34% against the euro between the end of 2006 and the end of March 2008), poses obvious problems of adaptation for companies within the zone. Nonetheless, such an abrupt progression enables the net external positions to adjust immediately through valuation effects, which reduces the need to adjust current accounts. It is thus possible that a heavy drop in the dollar could replace a less marked but longer-lasting weakness in the dollar.

Table 3 – Euro/dollar equilibrium exchange rate

	Misalignment 2005 (%)	Real exchange rate variation 2005-2007(%)	Misalignment 2007 (%)	EUR/USD Dec. 2007	EUR/USD equilibrium exchange rate Dec. 2007
BEER	-5.9	-21	-26.9	1.457	1.07
FEER 1	25	-21	4	1.457	1.52
FEER 2	*67.9*	*-21*	*46.9*	*1.457*	*2.14*
FEER 3	13.3	-21	-7.7	1.457	1.34
FEER 2'	14.8	-21	-6.2	1.457	1.37

Note: a positive number indicates that the euro is undervalued against the dollar.
Source: Bénassy-Quéré *et al.* (2008), OECD, ECB.

The estimates set out above also show that the euro-dollar exchange rate is not merely a transatlantic affair: the fact that the dollar and the euro are both overvalued in real terms means that both currencies should depreciate as against other currencies. From this point of view, the euro is being penalised for being perceived as the main alternative to the dollar. An acceleration of financial integration (Asian Bond Initiative) and monetary integration (Asian Currency Unit) in Asia, which also assumes that exchange rate controls will be abandoned in China, would enable the equilibrium in the international monetary system to be restored without reverting to a target area system that has now become unrealistic.

Agnès Bénassy-Quéré, Sophie Béreau & Valérie Mignon
beatrice.postec@cepii.fr

12. See P.R. Lane & G.M. Milesi-Ferretti (2007a), "Europe and global imbalances", *Economic Policy*, 519-573, July.
13. Following Alberola *et al.* (1999), the equilibrium bilateral rate is calculated by inverting the weighting matrix of effective rates. Since there are only 14 independent bilateral rates between 15 currencies, one equilibrium effective rate needs to be dropped. Here we drop that of the USD. Note that the obtained results were very similar when using other numeraires. The real euro/dollar equilibrium exchange is supposed to be constant between 2005 and 2007.

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EDITORIAL OFFICES

Centre d'études prospectives
et d'informations internationales,
9, rue Georges-Pitard
75015 Paris.
Tél. : 33 (0)1 53 68 55 14
Fax : 33 (0)1 53 68 55 03

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