



DIRECTORATE GENERAL FOR INTERNAL POLICIES
POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

The euro-dollar exchange rate

IN-DEPTH ANALYSIS

Abstract

In the short term, exchange rates tend to move to equalize their nominal interest rate differentials until the expected investment returns in both currencies is the same (interest rate parity condition). In the medium term, exchange rates tend to move to equalize their current account differentials (current account position). In the long term, exchange rates tend to move to equalize their inflation differentials (purchasing power parity condition).

Since its birth, the euro has tended to appreciate versus the dollar because euro area interest rates have been lower than those in the US; euro area current account has been mostly in surplus; and, finally, euro area inflation rate has been, on average, lower. Movements among both currencies have become faster and more pronounced over time, mirroring the speed of financial markets reaction vis-a-vis actual and expected movements in interest rates, current account positions and inflation rates. In assessing exchange rate developments, financial markets take increasingly into account also government and foreign debt positions as well terms of trade developments.

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AUTHORS

Guillermo DE LA DEHESA, Chairman of the Centre for Economic Policy Research (CEPR), London

RESPONSIBLE ADMINISTRATOR

Dario PATERNOSTER
Policy Department A: Economic and Scientific Policy
European Parliament
B-1047 Brussels
E-mail: Poldep-Economy-Science@ep.europa.eu

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ABOUT THE EDITOR

To contact the Policy Department or to subscribe to its newsletter please write to:
Poldep-Economy-Science@ep.europa.eu

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EXECUTIVE SUMMARY

The euro and the dollar are the two leading global currencies. Because of that, most investors, including central banks and sovereign wealth funds, heavily invest in these two currencies and closely follow their exchange rate determinants. Investors tend to look, in the short-term, at the interest rate differentials between the US and the euro area; in the medium term, at the US and euro area current account position differentials and, in the long-term, at their inflation rate differentials. These three measures tend to determine the relative strength of the euro versus the dollar.

The US banking crisis (2008-2009) and ensuing euro-area crisis have created large swings in both currencies. The underlying trend shows, however, that since its birth in 1999, the euro has strengthened against the dollar. The empirical evidence is based on the following facts:

Short-term effects: relative interest rates levels tend to predominate.

As US interest rates react mainly to developments in the US volatile equity markets, short-term US rates tend to have a large influence on euro area interest rates. Historically, an increase of 100 basis points in the domestic short-term interest rates leads to a fall in US equity prices by 0.75% compared to more than 2% in the euro area equity prices.

In the euro area, short-term interest rates tend to have a higher impact on the euro exchange rate than US short-term rates have on the US dollar. Historically, an increase of 100 basis points in euro area short-term interest rates leads to an appreciation of the euro of 5.7% compared to only 1.7% appreciation of the US dollar, on average. A reason may be that the euro area is a more open economy than the US.

Medium-term effects: relative current accounts positions tend to predominate.

In 2013, US exports accounted for 13.5% of GDP and US imports for 16.2% of GDP, resulting in a current account deficit of 2.7% of GDP. The euro-area exports accounted for 13.2% of GDP and euro-area imports for 12.6% of GDP, resulting in a current account surplus of 0.6% of GDP. Since its birth, the euro area economy has exhibited a current account surplus, the US economy a current account deficit and this matters to investors. Moreover, the price deflator of exports of goods and services of the euro area has been systematically lower: 1.13% against 1.87%, on average, since 1999.

Long-term effects: inflation differentials tend to predominate.

Since the birth of the euro, the overall GDP deflator of the euro area has been 1.4% compared to 2.2% in the US.

Finally, the euro and the dollar being the two leading currencies in the world, they attract investors and therefore tend to appreciate beyond and above the level justified by underlying competitiveness indicators.

Against this background, the euro may weaken vis-a-vis the US dollar due to:

In short to medium term: an increase in the FED policy rates, with the ECB maintaining its very accommodative monetary policy, perhaps not even sterilizing its €165 billion of Securities Market Programme (SMP).

In the medium term: the planned €400 billion of ABS purchase to revive credit, increase internal demand, reduce both the current euro account surplus (or even generate a deficit) and the US current account deficit.

In the longer term: an increase in euro area inflation rate, to get it closer to ECB price stability target of (close to) 2%.

1. EXCHANGE RATE DETERMINATION

According to standard macroeconomic theory, the relative equilibrium level of two currencies is the result of short, medium and long factors as follows:

In the short term, under perfect substitutability between domestic and foreign assets and excluding the risk factor, the relative value of two countries moves in tandem with the relative interest rate differentials until the expected investment returns in both countries is the same. This is called the “interest rate parity” (IP) condition (Jacob Frenkel and Richard Levich (1981)).

The “interest rate parity” condition implies that the expected return on domestic assets will equal the exchange rate-adjusted expected return on foreign currency assets. In such a situation, investors cannot earn arbitrage profits by borrowing in the country with the lower interest rate, convert the outstanding amount in a foreign currency and invest it in the country with the higher interest rate.

There are two forms of “interest rate parity”: the “uncovered interest rate parity” (UIP) refers to the parity condition in which exposure to foreign exchange risk (unanticipated changes in exchange rates) is unconstrained. The “covered interest rate parity” (CIP) refers to the condition in which forward contracts have been used to cover the exposure to exchange rate risk.

In the medium term, the relative value of two countries currencies move in tandem with the respective current account balance positions (CAP). The country with a weaker current account position tends to have a weaker currency (Edwards, 1989). The country with a current account deficit and with limited foreign currency reserves at its disposal may be forced by financial markets to depreciate its currency or, alternatively, to have a sharp reduction in its domestic demand, through an internal devaluation. By contrast, the country with a current account surplus will tend to experiment an appreciation of its currency (Krugman, (1979 and 1999)).

In the long term, the relative value of two countries tends to reflect their inflation differentials. That is, a bundle of goods in one country should cost the same in another country after exchange rates differentials have been accounted for. This is known as the absolute or relative Purchasing Power Parity condition (PPP). The country with the higher inflation will see its currency to lose value and the country with the lower inflation will see its currency to appreciate. According to Rudiger Dornbusch (1985) “This theory has the same status in the history of economic thought as the Quantitative Theory of Money”.

The Absolute Purchasing Power Parity (APPP) is derived from the basic idea of the “law of one price”, which states that the “real” price of a good, i.e. once inflation has been taken into account, must be the same across all countries. APPP maintains that the exchange rate between two currencies should be identical to the ratio of the two countries’ price levels, provided that the goods in each country are freely tradable and the price index in both countries refers to the same basket of goods.

The Relative Purchasing Power Parity (RPPP) relates the change in the two countries’ expected inflation rates to the change in their exchange rates as inflation reduces the real purchasing power of a currency. The higher the inflation rate, the lower the RPPP of the currency.

The Interest Rate Parity (IP) and the Purchasing Power Parity (PPP) are similar: The IP is expected to hold when there is no arbitrage opportunity in financial markets, while the PPP is expected to hold when there is no arbitrage opportunity in the goods markets. As financial assets prices adjust to new information more quickly than goods prices do, IP theory works well in the short run and PPP works well in the long run. Irving Fisher (1933) was the first economist to establish the theoretical relationship between inflation and the real interest rate. One problem with the PPP theory is that the quality of goods is hard to measure, but significant progress of this matter has been made recently (Horn, 2008).

Besides these three key drivers of exchange rate determination, there are at least 3 other factors that investors look at. First, the levels of public debt matter. Countries with very large levels of public debt relative to GDP are less attractive to foreign investors, because large accumulated debts are often paid either through either higher inflation and or financial repression, often socially painful. This is why the rating agencies keep a permanent eye on countries' debt levels. In 2013, the general government consolidated debt in the euro area was 95% of GDP versus 104.5% of GDP in the US. Second, the "terms of trade", that is, the ratio between export prices and import prices matters as well. In a nutshell, the currency value falls when imports keep growing faster than exports and vice versa, i.e. when the current account position deteriorates (mentioned in the previous section). Finally, the relative economic growth of a country is also an important factor to decide whether to invest or not in (the currency of) a country.

2. THE EURO-DOLLAR EXCHANGE RATE SINCE THE BIRTH OF THE EURO

According to the ECB's euro-dollar statistical series, the level of the euro started at USD 1.18 (for 1 Euro) in 1999, reached its historical minimum in October 2000 (USD 0.825) and its historical maximum in July 2008 (USD 1.599), when the US banking crisis started.

During the financial crisis, the euro-dollar exchange rate has displayed large swings¹. In spite of these swings, the euro-dollar exchange rate has averaged USD 1.22 between its inception in 1999 and the start of the financial crisis (October 2008) and USD 1.34 between October 2008 and today. Overall, the euro has experienced a relative appreciation versus the dollar since its birth and, in particular, over the last 6 years.

3. EMPIRICAL EVIDENCE ON THE INTEREST RATE PARITY CONDITION

Meese and Rogoff (2003) have tested the forecasting accuracy of various structural and time series exchange rate models and found that "random walk" models perform as well as any estimated model at one to twelve month horizons for different exchange rates: the dollar-mark exchange rate, the dollar-pound exchange rate, dollar-yen exchange rate as well as the trade-weighted dollar exchange rate.

¹ At the end of October 2008, the euro-dollar exchange rate came down to USD 1.246 and, in December 2008, went up to USD 1.461 to come down again to USD 1.261 in March 2009, rebounding to USD 1.509 in December 2009. It went down again to USD 1.201 in May 2010, up to USD 1.40 in November 2010, down to USD 1.290 in January 2011 and up again in May 2011 to USD 1.484 and then down to USD 1.332 at the beginning of October 2011 but then reaching the level of USD 1.416 at the end of October 2011. It went down again in July 2012 to USD 1.214 and up again to USD 1.364 in February 2013, down in March 2013 to USD 1.280, up again in June to USD 1.340, down to USD 1.281 in July 2013, up to USD 1.378 in October 2013 and up again in May 2014 to USD 1.395 and has come down to USD 1.353 after the ECB measures of 5 June 2014.

Chinn and Frankel (2005) have tried to find out, first, if a “world interest rate” exists and second, if the European Monetary Union (EMU) has influenced the traditional links between US and euro area policy interest rates. They did find that US nominal interest rates tend to drive euro area rates both at the short term and at the long term and the relationship is still far from symmetric, despite the creation of EMU. They also find that real US interest rates have a large influence on euro area rates and that neither German bond rates nor euro area rates appear to have a similar effect upon US rates. However, this US dominance is attenuating as EMU becomes deeper and stronger.

Another research on the same topic by Ehrmann, Fratzscher and Rigobon (2005) looks also at the financial transmission mechanism between the two largest economies and the two largest financial markets in the world: the US and the euro area.

The authors find that US short-term rates react mainly to developments in the US equity markets, with an increase in equity returns leading to higher short-term interest rates. In the euro area, by contrast, there is no significant relationship between equity markets and short-term interest rates. According to the authors this reflects the fact that US monetary policy is more responsive to financial market developments than the ECB monetary policy.

Furthermore, they find evidence of a much larger response of stock markets prices to changes in monetary policy in the euro area than in the US. Their evidence shows that a 100 basis points increase in domestic short rates leads to a fall in equity prices by around 0.75 percent in the US and by more than 2.0 percent in the euro area.

They find also evidence that a 100 basis points increase in US short term rates leads to 1.7 percent appreciation of the US dollar, whereas an equal increase in euro area short term rates produces a much larger appreciation, 5.7 per cent, in the euro-dollar exchange rate. One possible explanation is that the euro area is a more open economy compared to the US. Still, the difference in the point estimate is striking.

The authors also look at the international transmission of interest rates and find the importance of international spillovers, both within asset classes and across financial markets: shocks to US short-term interest rates exert a substantial influence on euro area bond yields and equity markets, affecting as much as 10% of overall euro area bond market. But the transmission of shocks also runs in the opposite direction, with short-term interest rates of the euro area having an impact, although not as large, on US bond and equity markets.

In sum, on average, about 26% of movements in the euro area financial assets are attributable to developments in the US financial markets, while only about 8% of US financial markets shifts are attributable to euro area financial market developments.

Short-term interest rates for the last 12 years have been, on average, the same in the euro area and the US (2.6%) but with some large yearly differences. Long-term interest rate for the same period have been, on average, slightly higher in the US than in the euro area (4.06% versus 3.87%).

4. EMPIRICAL EVIDENCE ON THE CURRENT ACCOUNT POSITION

Marcel Fratzscher (2007) has analyzed how US shocks are transmitted to the rest of the world and to Europe. His empirical findings show that the financial channel and the similarity in the business cycle are key factors, while the trade channel looks less important. Mainly, countries which hold, internationally, a relatively large size of portfolio

investment over GDP, both in equity and debt securities, see their exchange rates react more strongly to US shocks than those with little financial exposure.

There is a remarkably high degree of country-heterogeneity in the effects of US macroeconomic shocks on currencies. For instance, the Canadian dollar and the Mexican peso are found to be largely unresponsive to US shocks, while the euro and the Swiss franc are the currencies more affected by US shocks, showing the increasing importance of the euro. Due to its large size portfolio investment over GDP, both in equities and debt securities, the level of the euro is very sensitive to US shocks. According to Fratzscher, exchange rate movements may do little to adjust existing current account (im)balances, as about half of US trade is with countries which have inflexible exchange rate regimes (such as China) or are not highly integrated financially.

Marcel Fratzscher and Roland Straub (2010) analyze also the relationship between asset prices and current account positions estimating a Bayesian VAR for a set of 42 industrialized and emerging countries. They find that, after a 10% shock to domestic equity prices vis-à-vis the rest of the world, the US trade balance will worsen by only 1 percentage point, much less than most other economies, including the euro area.

The fact is that the US and the euro area are relatively closed economies: US (euro area) exports only account for 16% (13.2%) of GDP, while US (euro area) imports accounts for only 16.2% of US (euro area) GDP. By contrast, the US (non banking) financial market is much larger than that of the euro area: banks in the euro area account for almost 80% of the total financial market intermediation, compare to only 40% in the US.

Current account developments have generally favored the appreciation of the euro versus the dollar: Between 1995 until 2014 the euro area has displayed a current account surplus in all years except in 2000 and 2008. The euro area average surplus in the last 20 years has been 0.7% of GDP but the largest surpluses have taken place in the last three years with of 2.4% of GDP, mainly as a result of the large German current account surplus. By contrast, the US economy has displayed a current account deficit in every year since 1982, with particularly large current account deficits between 1995 to 2014, averaging 3.4% of GDP.

5. EMPIRICAL EVIDENCE ON THE PURCHASING POWER PARITY CONDITION

This historical increase in the value of euro-dollar exchange rate between 1999 and 2014 can be mostly explained in terms of purchasing power parity (PPP) relationship (Jean-Luc Proutat, 2013). Since 1999, the euro-dollar average value has tended to rise. At its introduction, the 1st of January 1999 the euro was worth 1.17 dollars and in May 2014 1.395 dollars. Since the first quarter of 1999, the US GDP deflator has been growing at an average pace of 1.9% per year, while the euro area GDP deflator has been growing at an average pace of 1.4% per year. Similarly, US consumer price index has risen 6.4 pps. faster than the euro area consumer price index. Accordingly, the PPP exchange rate equilibrium of the euro would be 1.21 dollars.

If US prices go up faster than euro area prices, euro area demand for US goods and services, i.e. the demand for dollars against euros, will tend to fall (in relative terms), leading to a fall in the relative value of the dollar vis-à-vis the euro.

That notwithstanding, the euro rebound in the last two years has much less to do with inflation differentials and more with investors realizing that the euro crisis was being dealt effectively, in particular that the ECB was successfully acting to avoid a Euro break up chiefly with the announcement of its Outright Monetary Transactions (OMT) programme.

Accordingly, euro-area government bonds returns have been falling steadily, mainly in the peripheral member states, while foreigners have started to buy euro area securities again. The reduction of risk aversion has then made possible the return of portfolio investment.

By contrast, the US Fed has not done much to prevent the fall in the dollar, maintaining interest rates close to zero lower bound and continuing its Quantitative Easing (QE) policy. Moreover, over the long term, the PPP argues for further increases in the euro-dollar exchange rates, because the monetary and fiscal-policy mix of the US is more inflationary-prone than that of the euro area.

6. THE RECENT ECB'S BAZOOKA

The recent important decisions taken by the ECB on June 5 2014 have contributed to weaken the Euro, from 1.395 to 1.353, as expected. The Main Refinancing Operation (MRO) rate has been lowered from 0.25% to 0.15% and the ECB has confirmed its "full allotment" procedure until 2016. Through the "interest rate corridor", the effect of the lower MRO rate has brought down the Deposit Facility (DF) from 0% to a negative -0.1%. The Marginal Lending Facility (MLF) rate has been cut from 0.75% to 0.40%. The end of the SMP sterilization programme is going to free as much as €165 billion of liquidity.

The creation of a Targeted Longer-Term Refinancing Operations (TLTROs) will inject another €400 billion into the financial market through an "Asset-Backed Securities (ABS) purchases program" to support lending to non-financial corporations and households.

The reaction to these ECB decisions had been anticipated by financial markets. However, financial markets did not expect the move to negative deposit rate and an ABS programme of that large size.

Illes and Lombardi (2013) have shown that, after all unconventional and exceptionally accommodative policy measures taken by the US, the euro area and Japan, the lower policy rates have not been fully transmitted to lending rates for households and non-financial firms. That is, the "interest rate pass-through" has been (still is?) largely impaired in the aftermath of the Great Recession: they show that in 2013 the difference between lending rates to the non-financial corporate sector and policy rates was close to pre-crisis levels in the United States and Germany, but remained much higher in peripheral euro area member states.

Hopefully, the new massive TLTRO will succeed in reducing lending rates further and boosting credit to SME's, in particular in the euro area periphery, thereby spurring growth. The combined effect of extremely low policy rates and massive liquidity injections are likely to weaken the euro and, therefore, also help the recovery via the export channel.

7. THE DOLLAR AND THE EURO ARE THE WORLD'S DOMINANT CURRENCIES, BUT THE DOLLAR LEADS

Another important factor driving the exchange rate of the euro and the dollar is their international role. Investors, including central banks and sovereign wealth funds (SWF), not surprisingly hold large shares of their assets in world-leading currencies, to be used also currency hedges during financial crises.

While this strengthens the relative value of a currency, at the same time it hampers the country's competitiveness. According to Menzie Chinn and Jeffery Frankel (2008), the euro shall have overtaken the dollar as a leading international reserve currency as early as 2015. While this did not happen (mainly because of the financial crisis), dollar's role as an

international currency has been declining since 1976: In 2013, the role of the dollar as a currency to hold foreign exchange reserves, to be used in financial transactions and as a vehicle for foreign exchange transactions was significantly lower than during the heyday of the Bretton Woods conference.

According to Frankel, this stems mainly from US large budget deficit and current account deficits and ensuing money creation since the Vietnam War. As a result the dollar has lost value in terms of other major currencies. Between 1992 and 2000 the downward trend was resumed and the dollar recovered to account for about 70% of foreign exchange reserves of central banks (up from 46%). But during the last decade, the share of international reserves held by central banks in dollars has come down from about 70% to 60%. In the foreign exchange market, the dollar share has also declined from 90% to 85%.

By contrast, the euro accounted for 28% of central bank reserves in 2009. Since then, the euro-share came down to about 24%. Nevertheless, the euro increased its weight in total foreign exchange reserves from 0 in 1999 to 37.9% in 2011 and currently stands at 33.4% (2013).

Attaining sound fiscal positions, making progress towards a political union and expanding the EU further both towards north and the east seem essential ingredients for the euro to increase its role as key currency in the world, going forward. In order to become a world leading currency, size and stability remain the dominant forces (de la Dehesa, 2008).

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REFERENCES

- Brender, Anton; Emile Gagna and Florence Pisani (2009) "Can we understand the recent moves of the euro exchange rate? Vox, 21 July 2009
- Chinn, Menzie and Jeffrey Frankel (2005) "The euro area and world interest rates", NBER Working Paper
- Chinn, Menzie and Jeffrey A. Frankel (2005) "Will the Euro eventually surpass the dollar as leading international reserve currency?" NBER Working paper 11510, August
- Chinn, Menzie and Jeffrey Frankel (2008) "The Euro may, over the next 15 years, surpass the Dollar as Leading International Currency", NBER Working Paper 13909
- Chudik, Alexander and Marcel Fratzscher (2011) "Identifying the global transmission of the 2007-09 financial crises, in a GVAR model", ECB Working Paper Series No. 1285,
- Clostermann, Jorg and Bernd Schnatz (2000) "The determinants of the euro-dollar exchange rate", Deutsche Bundesbank Discussion Paper 2-2000 May
- De la Dehesa, Guillermo (2003) "The international role of the euro" Briefing Paper to the ECON Committee of the European Parliament, Fourth Quarter
- Dornbusch, Rudiger (1985) "Purchasing Power Parity" National Bureau of Economic Research NBER Working Paper Series 1591
- Dornbusch, Rudiger and Stanley Fischer (1978) "Macroeconomics" NY McGraw Hill
- Edwards, Sebastian (1989) "Exchange rates, devaluation and adjustment" MIT Press Cambridge MA
- Ehrman, Michael and Marcel Fratzscher (2004) "Equal size, equal role? Interest rate interdependence between the euro area and the United States", International Finance Discussion Papers No. 800, April, Washington, Board of Governors of the Federal Reserve System
- Ehrman, Michael, Marcel Fratzscher and Roberto Rigobon (2005) NBER Working Paper 11166
- Frankel, Jeffrey (2013) "The latest dollar's International currency status", Jeffrey Frankel's Web Blog, November 26
- Fratzscher, Marcel (2007) "Us shocks and global exchange rate configurations", European Central Bank Working Paper Series 835, November
- Fratzscher, Marcel and Roland Straub (2010) "Asset prices, new shocks and the current account", CEPR Discussion Paper 8080, October
- Frenkel, Jacob A. and Levich, Richard M. (1981) "Covered interest parity arbitrage in the 70's" Economic Letters, Vol.8, N.3
- Horn, Michael (2008) "The Fisher effect" (1933), Essex University Term paper EC 247
- Illes, Anamaria and Marco Lombardi (2013) "Interest rate pass-through since the financial crisis", BIS Quarterly Review, September

- Krugman, Paul (1979) "A model of balance of payments crisis" *Journal of Money Credit and Banking*, Vol. 11, N. 3 August
- Krugman, Paul (1999) "Balance sheets: the transfer problem and financial crisis" *International Tax and Public Finance* No. 6
- Meese, Richard A. and Kenneth Rogoff (1983) "Empirical exchange rate models of the seventies. Do they fit out of sample?" *Journal of International Economics* No.14, North Holland
- Proutat, Jean-Luc (2013) "Euro-Dollar, what does PPP say?" BNP Paribas, February 8

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