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The enigmatic dollar-euro exchange rate and the world's biggest forex market: Performance, causes, consequences

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STUDY

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THE ENIGMATIC DOLLAR-EURO EXCHANGE RATE AND THE WORLD'S BIGGEST FOREX MARKET – PERFORMANCE, CAUSES, CONSEQUENCES

Jan Priewe¹

ABSTRACT

Foreign exchange markets are the biggest financial markets on the globe, the dollar-euro market is the biggest among them with a daily turnover of \$1.3 trillion. This market is the interface of the euro bloc and the dollar bloc which use mainly one of the major currencies, comprising 45-60% and 25% of global GDP, respectively. Hence the dollar-euro exchange rate is the prime exchange rate among thousands of others. After reviewing the exchange rate performance and the dismal state of exchange rate theories, the paper analyses in the first part the following questions: what determines the large and long swings and the turning points of the exchange rate super-cycle; what is the role of “fundamentals” and what are the non-fundamental determinants of the dollar-euro exchange rate. In the second part we analyse the consequences of high volatility and frequent misalignment of the dollar-euro rate: in what way is this exchange rate relevant for the real economies, as both the majority of the euro area's and the trade of the U.S. is denominated in own currency; what are the interdependencies between the dollar-euro exchange rate and internal imbalances in the current accounts of the euro area; has the relationship between exchange rates and trade changed, due to reduced elasticities; what is the impact of dollar-euro exchange rate on international financial markets.

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July 2016

The enigmatic dollar-euro exchange rate and the world's biggest forex market – performance, causes, consequences

Jan Priewe¹

Abstract

Foreign exchange markets are the biggest financial markets on the globe, the dollar-euro market is the biggest among them with a daily turnover of \$1.3 trillion. This market is the interface of the euro bloc and the dollar bloc which use mainly one of the major currencies, comprising 45-60% and 25% of global GDP, respectively. Hence the dollar-euro exchange rate is the prime exchange rate among thousands of others. After reviewing the exchange rate performance and the dismal state of exchange rate theories, the paper analyses in the first part the following questions: what determines the large and long swings and the turning points of the exchange rate super-cycle; what is the role of “fundamentals” and what are the non-fundamental determinants of the dollar-euro exchange rate. In the second part we analyse the consequences of high volatility and frequent misalignment of the dollar-euro rate: in what way is this exchange rate relevant for the real economies, as both the majority of the euro area's and the trade of the U.S. is denominated in own currency; what are the interdependencies between the dollar-euro exchange rate and internal imbalances in the current accounts of the euro area; has the relationship between exchange rates and trade changed, due to reduced elasticities; what is the impact of dollar-euro exchange rate on international financial markets.

Keywords: Foreign Exchange, Current Account Adjustment, International Monetary Arrangements, Financial Aspects of Economic Integration, Behavioural Finance

JEL codes: F31, F32, F33, F36, G01

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List of acronyms

AMECO annual macro-economic database of the European Commission

BIS Bank for international settlements

bp basis points

CA current account balance

CPI consumer inflation

DM Deutsche Mark

EA euro area

EBA External Balance Assessment

ECB European Central Bank

ECU European Currency Unit

EMU European Monetary Union

ERM European Exchange Rate Mechanism

EU European Union

FEER Fundamental equilibrium exchange rate

FX foreign exchange

GDP gross domestic product

HCPI harmonized consumer price index

IMF International Monetary Fund

IRP Interest rate parity

NEER nominal effective exchange rate

OTC over the counter

PP percentage points

PPP purchasing power parity

REER real effective exchange rate

RER bilateral real exchange rate

RMB Renminbi

SDR Special drawing rights

SVR Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung (German council of economic advisers)

ULC unit labour costs

UK United Kingdom

U.S. United States

WB World Bank

WTO World Trade Organisation

XR exchange rate

Contents

1. Exchange rate puzzles
2. Performance of the dollar-euro rate 1999-2015
3. What drives exchange rates – or the role of (non) fundamentals
 - 3.1 A short review of standard exchange rate theories
 - 3.2 Paradigm shift: exchange rates in behavioural finance
 - 3.3 Purchasing power parity and interest rate parity reconsidered
 - 3.4 Summing up
4. The determinants of the dollar-euro exchange rate 1999-2015
 - 4.1 A new look at eight fundamentals – and why they signal different messages
 - 4.2 Three narratives on the dollar-euro exchange rate performance
 - 4.2.1 Mussa and Salvatore
 - 4.2.2 An alternative narrative
 - 4.3 Summing up
5. Consequences of the fickle dollar-euro exchange rate - can we cope with it?
 - 5.1 Trade of EA mainly denominated in euro
 - 5.2 How do enterprises cope with the volatile dollar-euro exchange rate?
 - 5.3 Elasticity pessimism - disconnect of exchange rates and trade?
 - 5.4 Interdependency of the dollar-euro exchange rates and EA imbalances
 - 5.5 Impact of the dollar-euro rate on financial assets and capital flows
 - 5.6 Summing up
6. Summary and conclusions

Literature

The enigmatic dollar-euro exchange rate and the world's biggest forex market – performance, causes, consequences

1. Exchange rate puzzles

We have become accustomed to the fact that the dollar-euro exchange rate is fickle und seemingly unforecastable. Since its inception, it bottomed out at 0.82 dollar per euro, and peaked at 1,60. Many economists and policy makers take it as the fate of modern time, unchangeable like the tides of the ocean, that the exchange rate is most of the time in contrast, even in opposition, to the real economies on both sides of the Atlantic. The common notion is that this “fact of modern life” has no severe repercussions on trade, capital flows, and the global monetary system at large. This paper shows that the misalignment and volatility of the most important exchange rate on the globe does not come without costs. There is no reason to keep the problems of chronic disequilibrium exchange rates unheeded.

Foreign exchange (FX) markets are the biggest financial markets on the globe with high growth rates. Among them the dollar-euro market is the biggest and most important one. It has a daily turnover of almost \$1.3 trillion with a market share of 24% of all FX markets (2013), outpacing the second biggest FX market, the dollar-yen market with 18% (2013, BIS 2013, see chart below), Of all FX transactions – 5.3 trillion dollars daily – the US-dollar is involved in \$4.6 trillion or 87% of worldwide transactions². The share of the dollar-euro market in all markets in which the dollar is involved is 28%. Of all transactions in which the euro is involved (33.4% of global transactions), the share of the dollar-euro market is 72%. The dollar's stance on global FX markets is majestic – it is the only true global currency. Since many other currencies are pegged tightly or by crawling pegs or tentatively with managed floating to either the euro or the dollar, and since many prices on goods and financial markets are denominated in dollar or euro, the dollar-euro exchange rate impacts all other ca. 16,110 exchange rates (with 180 currencies on the globe, there are $(180 \times 179)/2$ exchange rates). As we show in chapter 5.5, the dollar bloc accounts for 45-60% of global GDP, the euro bloc for around 25%. Hence, the dollar-euro exchange rate is the interface of the two currency blocs.

FX market comprise spot and forward markets (38.2 and 12.7%, respectively), swaps (42.7%), options and others (6.3%) (global averages). The annual \$1.3 trillion turnover on the dollar-euro market is 34 times the euro area (EA) GDP (2013). Since this market is absolutely

² In each transaction two currencies are involved, hence percentages for countries/currencies add up to 200.

unregulated, mostly over the counter trade (OTC), let alone a few rare central bank interventions, it is *the* model of a FX market in a perfectly floating exchange rate regime. All FX transactions are highly concentrated regionally on the UK (40.5%) and the U.S. (18.9%), meaning the City of London³ and Wallstreet, predominantly in the hands of not many large financial institutions.

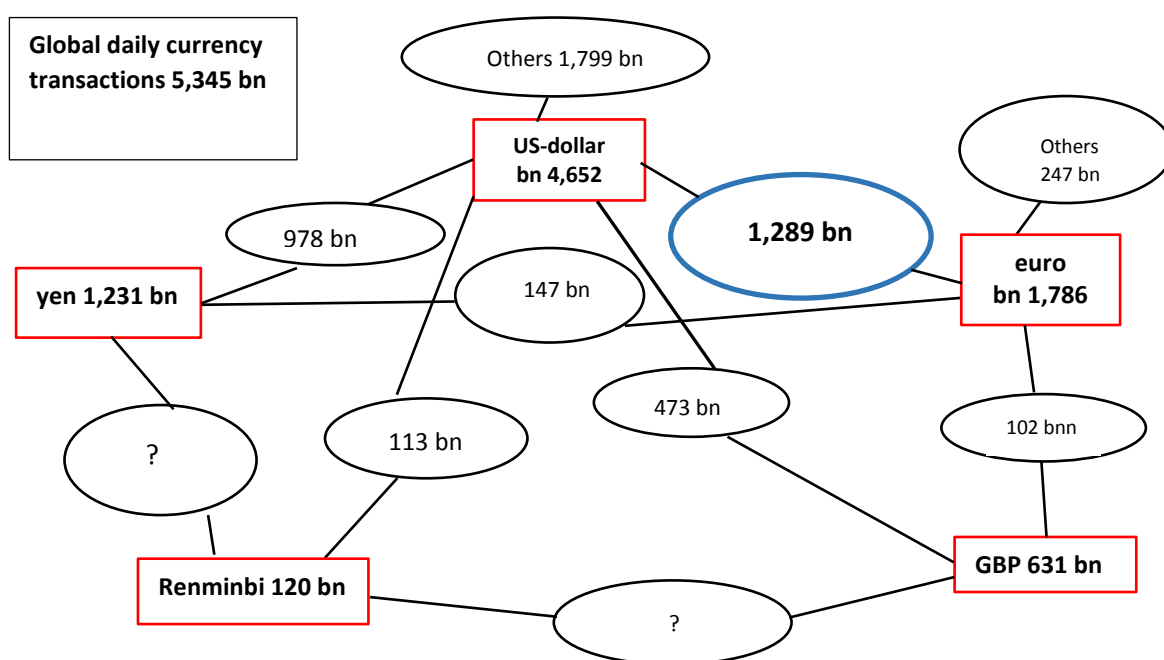
The dollar-euro market is probably the biggest casino on the globe even if one deducts pure non-speculative transactions. However, the distinction between non-speculative and speculative transactions is blurred; risk-free arbitrage and risky speculation are often linked (cp. Krüger 1995, Williams 2006). The huge market is opaque, we know little about its composition and structure. Most transactions are between money dealers and between banks, but also hedge funds and other non-banks are involved (BIS 2013).

The mammoth size of the market has a number of reasons: First, what is traded here are not flows (like FX for exports or GDP) but *stocks* of money and assets which are redeployed by wealth owners and their agents day by day. Second, there is little direct exchange between the 178 currencies (without dollar and euro) so that transactions have to use the dollar as a vehicle currency, to a smaller extent the euro. Third, due to the FX volatility, many real and financial transactions need hedging which itself requires several transactions. Fourth, the dollar and the euro are also vehicles for the majority of dollar or euro denominated financial assets, especially bonds, stocks and real estate. Fifth and most important, since asset prices depend on expectations, which are variable and often short-lived, speculative trading of expectations has become a mega playing field after the demise of the Bretton Woods system, after global liberalization of finance and the reduction of transaction costs with modern technologies.

On the dollar-euro market, with a very peculiar microstructure of demand and supply, the dollar-euro exchange rate is “made”. The key characteristic of the exchange rate performance is the super-cycle. Long cycles have led to the appreciation of either one of the two currencies up to almost 100%, followed over several years by a long trip downward. This is in line with the pattern of the pre-euro European currencies, especially the Deutschmark (DM) and the dollar-yen market.

³ Media report that some 100,000 foreign exchange traders are employed by banks and other financial institutions in the City of London.

Chart 1: Key FX markets 2013 and their daily transaction volume in billion US-dollar



Source: BIS 2013, own calculations. Note: The figures in the boxes indicate all daily transactions in which the respective currency is involved. The figures in the ellipses show the volume of daily transactions in the specific FX market. ? means that BIS does not provide data.

Even though many authors have analysed this market, neither the exchange rates themselves nor the volatility and the dynamics could be explained satisfactorily with econometric methods. Despite many differences, most theories are united in arguing that the short and perhaps even the medium term performance cannot be explained, whereas “fundamentals” reign the long-run (see standard textbooks or SVR 2000). There is no explanation why the adjustment period takes so long and why the period during which the exchange rate is close to equilibrium is so ephemeral. This implicates that disequilibrium is the rule, equilibrium a rare exception, not worth the name. Next, it would be necessary to know what the consequences of this obvious market failure are – on the biggest financial market on the globe. One can conclude that these theories are in big crisis (Priewe 2015, Harvey 2012). It is amazing that the consequences of non-fundamental exchange rates on the real economy are sparsely researched.

In this study, we will investigate the dynamics of the dollar-euro market in continuation of the DM-dollar market and the European Currency Unit (ECU), the predecessor of the euro . We will focus on the following questions:

- (i) What explains the strong and long swings and the turning points of the exchange rate movement?
- (ii) What is the role of the so-called fundamentals in explaining the turning points in the super-cycle of the exchange rate movement?
- (iii) What is the role of fundamentals and non-fundamentals in the long upswings and downswings of the exchange rate cycle? Which fundamentals are most important?

Then we turn in the second part to several questions pertaining to the consequences of volatile and often misaligned (or disequilibrium) exchange rates for the real economy, especially for international trade, investment, wages and other costs and also on the prices of financial assets which indirectly impact the real economy. Here we focus on the following questions:

- (iv) What is the impact of the fickle dollar-euro exchange rate on the trade of the two big currency blocs, when large parts of trade are denominated either in dollar or in euro? Did the hope materialize that the launch of the EMU has insulated its trade from the vagaries of the dollar-euro FX markets?
- (v) What is the relationship between the dollar-euro exchange rate and the intra-monetary union imbalances?
- (vi) Has the relationship between exchange rates and trade changed, due to the behavior of multinational enterprises and changed trade elasticities?
- (vii) How does the dollar-euro exchange rate influence cross-border flows of finance and the valuation of financial assets on global financial markets?

The paper is organized as follows. The next chapter (2.) describes the performance of the dollar-euro exchange rates over the long-run, including partly the predecessor currencies of the euro, comparisons with other exchange rates and the performance of trade-weighted effective exchange rates. Chapter three discusses the state of exchange rate theories which have a strong focus on so-called fundamental determinants. We distinguish between traditional theories and a heterodox approach which we follow in the subsequent empirical analysis in chapter four. Here we investigate the role of a set of fundamentals in the determination of the dollar-euro rate with a focus on the turning points. We also review narratives for explaining the dollar-euro rate 1999-2015, and add our own narrative based on heterodox theory and the empirical findings. Chapter five turns to the second set of research questions. Some authors like Obstfeld/Rogoff (2000) hold that there is a “disconnect” between exchange rates and real variables, as if exchange rates were neutral. We question this view and look at the complex consequences of the exchange rate gyrations for trade, GDP growth and the current account - and

for capital flows and the valuation of financial assets. Chapter six concludes with a number of key messages from our analysis.

The bottom lines of this paper are as follows:

- the prevailing theories cannot explain exchange rates and their dynamics, thus corroborating other empirical findings;
- even the turning points can only partially be explained by fundamentals;
- heterodox approaches have much better explanatory power if the understanding of “fundamentals” is improved and the non-fundamental factors are detected;
- the present post-Bretton-Woods system of fully fledged floating exchange rates has severe negative consequences for the real economy and the world economy at large, especially regarding trade distortions and current account imbalances;
- the dollar-euro exchange rate has strong effects on prices of financial assets and capital flows (“financialisation”) which backfire on the real economy.

2. Performance of the dollar-euro exchange rate 1999-2015

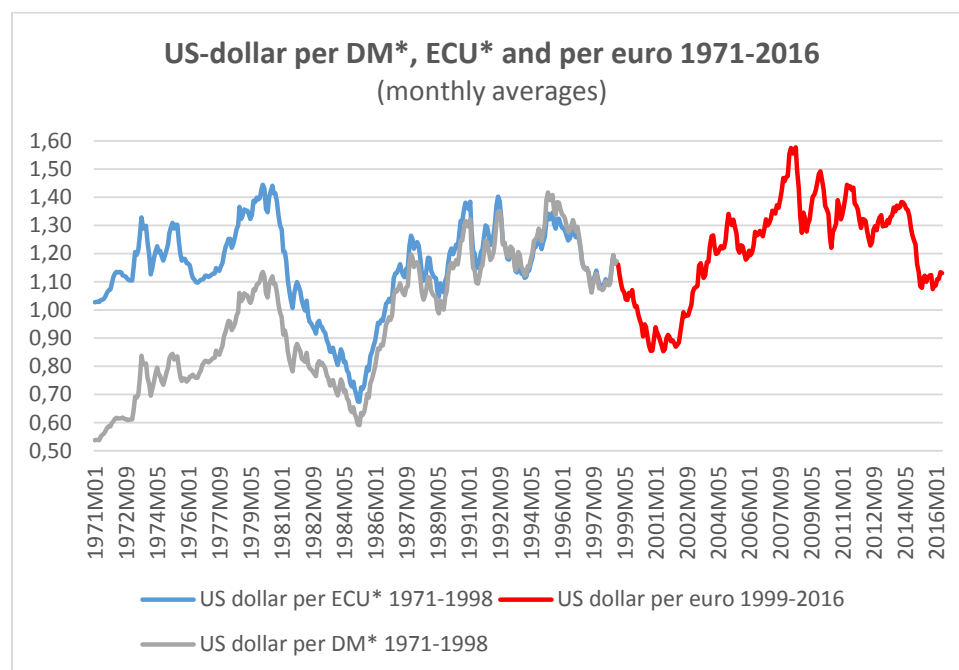
Graph 1 shows the monthly dollar-euro exchange rate for the period 1971 until 2016. For the period 1971-1998, the European Currency Unit (ECU) and also the Deutschmark (DM) is recalculated in euro with the conversion rate used in the transit to the euro on January 1 1999.⁴ The DM started to appreciate even before the demise of the Bretton-Woods-system in 1973 and continued so until its peak in 1980, by around 114% (using daily rates). The rate collapsed until 1985, rose again steeply over four peaks until reaching its climax 1995, after the crisis of the European Exchange Mechanism (ERM). The rise 1985-1995 lifted the DM by striking 155%, then the rates turned into a steep fall, especially after the introduction of the euro on January 1, 1999. The volatility is a bit less when one focuses on monthly rates, and a bit lesser when taking annual rates (see graph 2). The general pattern does not change.

For the period 1971-1985, the performance of the ECU differs somewhat from the DM since a number of currencies were included in the ECU-basket with higher inflation. Hence the ECU-appreciation in the 1970 after the demise of the Bretton-Woods-system was less pronounced than for the DM, but the subsequent fall 1980 to the trough in 1985 was steeper (minus 52%, using monthly rates). After 1985 ECU and DM rose in parallel.

⁴ We use the indirect quote for the euro throughout the paper (US-dollar per 1 euro). Therefore, an increase of the indirect quote shows appreciation of the euro and implies depreciation of the dollar.

The somewhat enigmatic weakness of the euro immediately after the debut was averted 2002, giving rise to an appreciation by around 95% until mid-2008, shortly before the Lehman-crisis. Over three steep zig-zag-cycles the euro fell below 1.10 in early 2016. The first super-cycle took 15 years, began around 1970 and ran until the trough 1985. The second cycle lasted from 1985 until 2001, 14 years. The third cycle embraced again 15 years from around 2001 until early 2016, with still an open end. Of course, each long cycle falls into an upward and a long downward stream, often interrupted by shorter sub-cycles. The cycles do not follow strictly the business cycles on both sides of the Atlantic, even though at times the peaks and troughs of the exchange rate coincide with recessions or crises (most pronounced 1980, 2001, 2008). Neither does the XR cycle follow the cycle of policy interest rates of the leading central banks (see details in chapter 4).

Graph 1

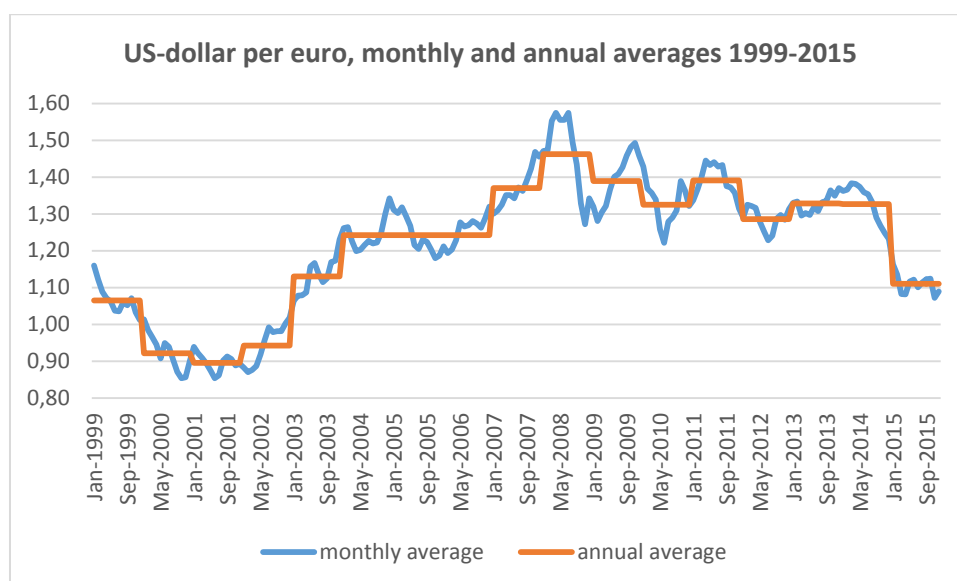


Note: *recalculated in euro for DM and ECU with conversion rate of 1 January 1999

Source: Eurostat 2016 [ert_bil_eur_m]

Graph 2 shows the annual and monthly averages of the dollar-euro exchange rate. The volatility is less pronounced as the monthly and even more the annual averages flatten the daily swings. Still, the amplitude of the annual low in 2001 (0.90) to the high in 2008 (1.46) is a range of 62%.

Graph 2



Source: OECD.Stat, own calculations

What needs to be explained (i) are the long spells of strong rise and fall, with many short and very short ups and downs but clear trends, and (ii) the upward and downward turning points, the seven main ones being 1980, 1985, 1995, 1999, 2002, 2008 and 2014 apart from the three teeth before 1995 and in the phase 2008-2014. Volatility, spikes and troughs between the ECU/DM era and the euro era seem very similar.

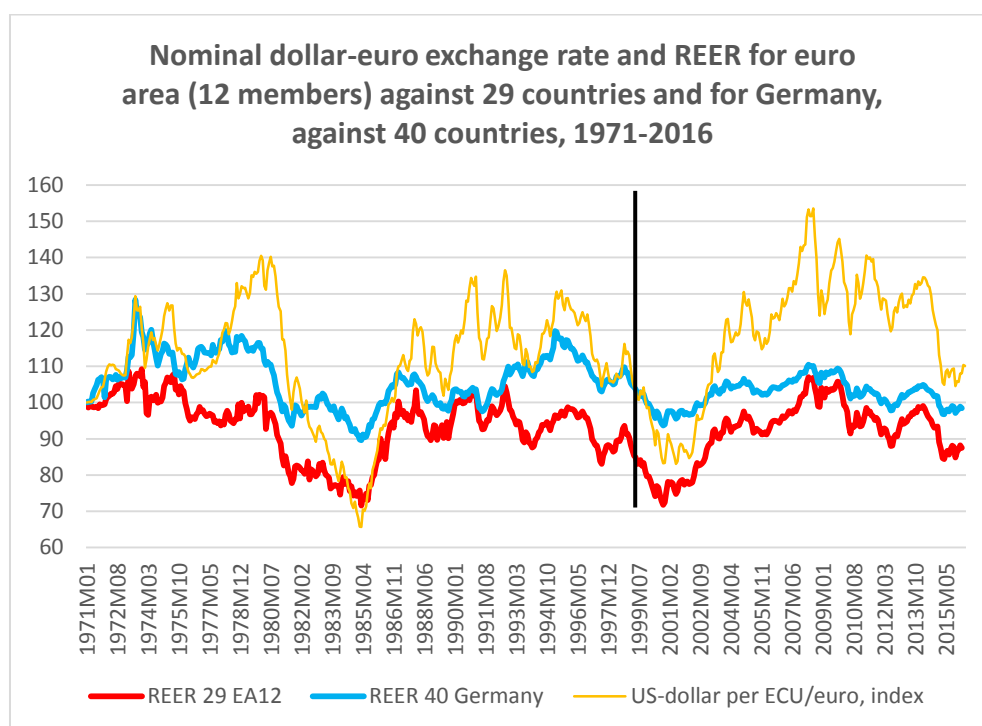
Exchange rates signify the price competitiveness of economies if they are adjusted for inflation differentials between the respective countries. Other things equal, real appreciation makes domestic products of same quality as well as the same financial products more expensive relative to the rest of the world. Controlling for the inflation differential between the U.S. and Germany or EA, respectively, shows clearly less inflation in the DM-era in Germany, so that the bilateral real exchange rate (RER: dollar per DM, inflation adjusted) rose 1973-1980 “only” by 23%, fell from then until 1985 by 46% and rose again until 1995 by 107% (data from AMECO and OECD.Stat). Roughly one third to one half of the nominal exchange rate swings can go along with the the inflation differential between Germany, respectively, and the U.S. Although the DM was considered strongly undervalued at the end of the Bretton Woods era, the record trough of the DM 1985, the inflation-adjusted bilateral real exchange rate (RER) was one third below the level of 1980 – the lowest ever reached in postwar Germany. The level of 1970 in terms of the RER was reached in the late 1980s and again when Germany entered the EA. Either the DM was not so undervalued in 1970 as most observers believed, or the DM was over very long stretches afterwards as undervalued as it was in 1970.

Since the debut of the euro, the inflation differential between the EA and the U.S. was somewhat smaller. Hence the euro plummeted in real terms (RER) by 16% 1999-2001 and gained by ca 60% 2001-2008 (data on inflation differential EA-U.S. from OECD.stat). The pattern of ups and downs of the inflation adjusted exchange rate is similar to the pattern of the nominal rate, but somewhat attenuated.

The swings of the *real effective* exchange rates (REER: trade-weighted inflation-adjusted exchange rates vis à vis 29 non EA-trading partners) of the euro area are much less extreme than nominal or bilateral real ones (cp. graph 3). The euro area is here defined as the aggregate of the first 12 EU members, called EA12. Graph 3 shows also the REER for Germany against 40 trading partners, including those within the euro area.

Yet, the REER for the EA12 fell from the peak 1974 to the trough in 1985 by 36% (or 40 pp), and rose by 45% (or 33 pp) until the peak 1992 (using monthly data). The REER of the DM appreciated by 28% (or 28 pp) 1971-1973, and fell thereafter until 1985 by 30% (or 38 pp). Again, the DM-REER appreciated 1985-95 by 33% (or 30 pp).

Graph 3



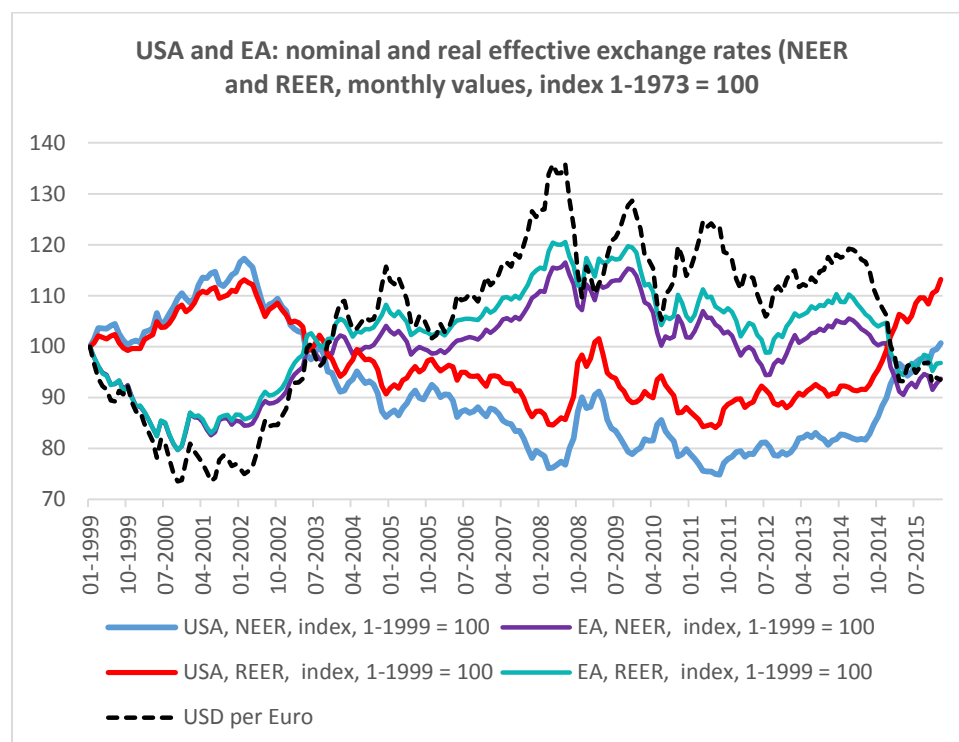
Source: Bruegel 2016, Series REER41.

Note: CPI based. REER 29 EA12 includes the first 12 members of the euro area and 29 trade partners outside the euro area. The REER for Germany includes 40 trade partners, 11 inside the EA12 and 29 outside EA12.

The REER for the EA12 dropped after the inception of the euro 1999 by 20% (18pp), then the rate recovered until mid 2008 by 43% (or 32 pp). While this was a huge challenge for the European economies, Germany appreciated its REER by only 15% (14.5 pp). The bottom line of the REER performance is that the amplitude of ups and downs since the end of the Bretton Woods system is 20-40 pp, based on monthly data (more on daily basis, less on annual rates). The euro era has not changed the volatility compared to the previous currencies.

Graph 4 shows the nominal dollar-euro exchange rate and the nominal and real effective rates for both the U.S. and the EA, now with BIS-data against 26 trading partners. While the euro appreciated 2001-2008 from trough to peak by 95%, the REER of the EA appreciated “only” by some 54% against the trading partners, while the US-REER dropped from its peak 2002 until its trough in mid-2008 by 25%. After a sharp rise and fall of the dollar after the Lehman Bros. failure 2008-9, the dollar started again to soar until early 2016, intermitted by several ups and downs, The US-REER appreciated from its low 2008 until early 2016 by one third, the nominal dollar-euro exchange rate fell from 1.60 to a low of 1.06 in early 2016, below the level of the euro at its inception when the new currency stood at 1.17.

Graph 4

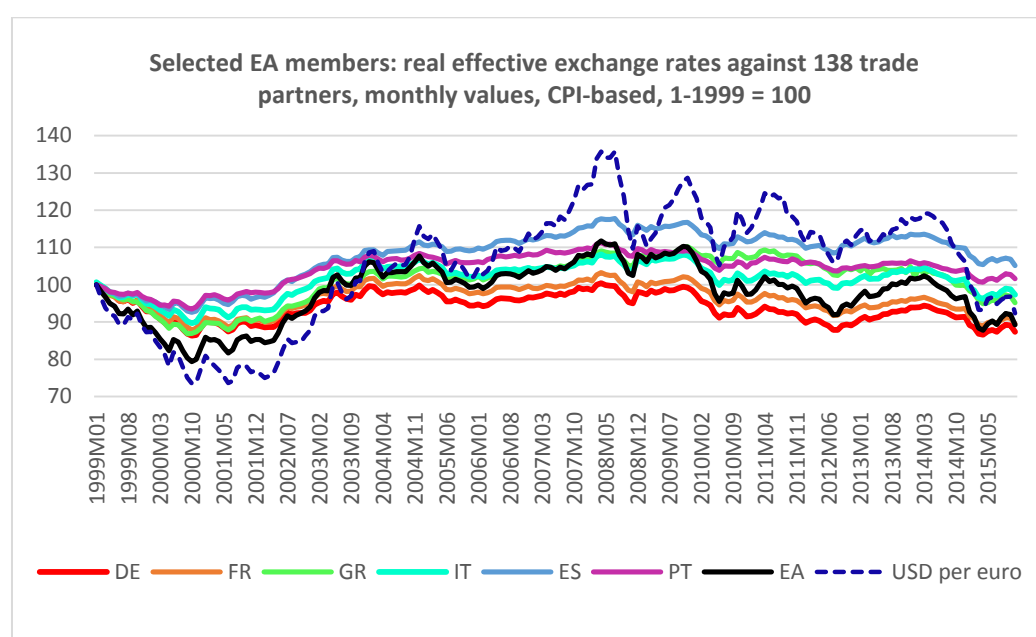


Source: BIS, OECD.Stat

Note: REER calculated by BIS for 26 trading partners, CPI-based

Thus we see that the REER of the U.S. as well as the REER of the EA swung heavily up and down, although less strong than the nominal dollar-euro exchange rate. Overall, real effective appreciations and depreciations between Europe and the U.S. seem to match each other symmetrically. For the EA it is an artefact, since the major share of trade is not included in the EA's REER, namely the intra-euro area trade.⁵ Nonetheless, the symmetry demonstrates that both the U.S. and the EA trade occurs with the trade partners which more or less co-move with either the dollar or the euro so that we see the two broader currency blocs mentioned in the introduction.

Graph 5



Source: Bruegel, OECD.Stat, own calculations.

Note: REER calculated by Bruegel for 138 trading partners, CPI-based.

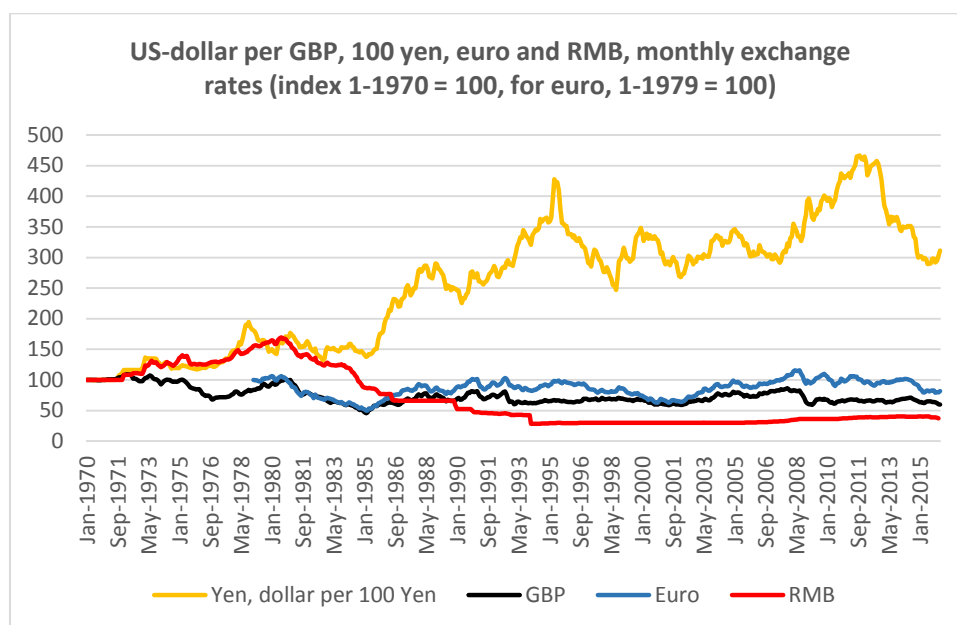
Disentangling the real effective exchange rates for the EA-members shows a pattern of chronic divergence of the levels, but a clear co-movement (graph 5). The level of REER between the EA-members differs by up to 20 percentage points. Over the whole period, Germany had the lowest REER-level, indicating superior price competitiveness, Spain has the worst on the upper margin, while the REER of the EA as a whole, now solely based on extra-euro area trade, flies somewhat below the middle. Despite strong euro appreciation against the dollar

⁵ It could be argued that this applies also to „intra trade“ of the U.S. or domestic „trade“ within Germany in the DM-era. However, intra trade of EA is still considered as part of international trade of the member states; the latter still have of a balance of payments, regions within a nation state or within a federation of states do not have regional balances of payment. The EA is not (yet?) a federation of states. Hence intra-U.S. trade is quite different from intra EA trade.

2002-2008, Germany managed to keep her REER almost constant in this period, and was able devalue in real effective terms heavily after the crisis without shrinking the differential vis à vis the other EMU-members shown in the graph⁶. Cost and price divergence within the EA was maintained. In other words, relative to Germany the other EMU-members could not regain price competitiveness.

For a better evaluation of the dollar-euro long-run exchange rate performance, we look briefly at the currencies presently in the basket of Special Drawing Rights (SDR), namely US-dollar, GBP, yen, euro and RMB. Graph 6 shows the extreme gyrations of the yen after the demise of the Bretton Woods system in the age of floating, strongly in contrast to the European currencies. After 1970 until 1985, the Yen appreciated mildly against the dollar, but more than other European currencies. When the dollar got overly strong 1985, the leading central banks agreed to intervene in order to weaken the dollar (Plaza Accord). This led to a storm of capital flows on the yen and the Japanese economy. This mega-appreciation could – for whatever reasons – not be stopped.

Graph 6



Source: OECD.Stat, own calculations – Note: Euro 19 recalculated for 1979-98 by OECD.

In nominal terms, the yen appreciated until its peak in April 1995 by not less than 320% compared to January 1970 and by ca 210% compared to 1985. An appreciation of 27% was justi-

⁶ The fact that in 1999 the differential in the REER between EMU looks like zero, is of course a deception. The graph shows indices, January 1999 with 100, for all countries. In chapter 5.4 we show Germany's REER based on ULC (and not CPI) which shows even a marked reduction of the REER 2000-2008.

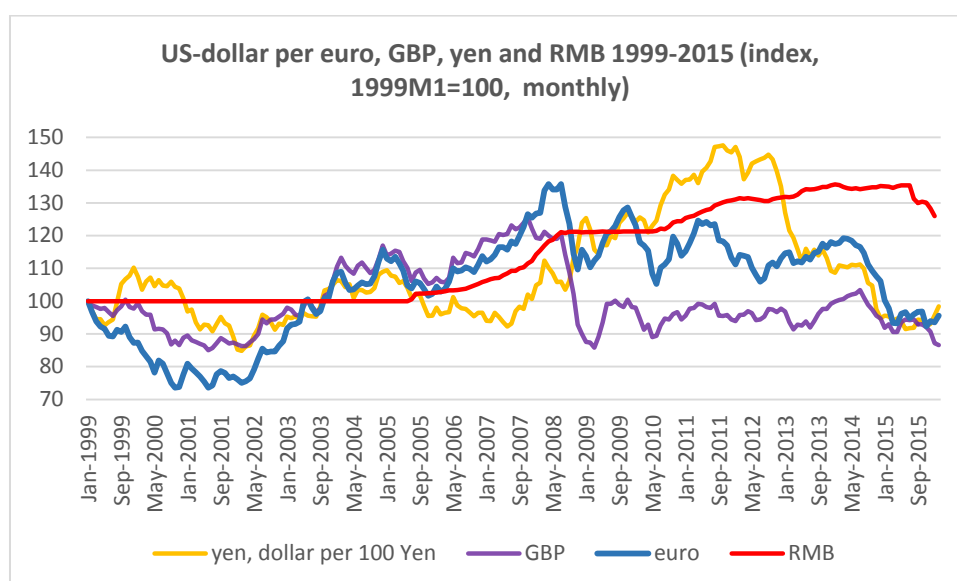
fied by lower inflation in Japan in this period (1985-1995). This episode resembles the appreciation of the DM in the same period, but the DM appreciated “only” by 86% compared to the level of 1970 and by 106% compared to 1985. From 1970 until 1985 Japan’s inflation was almost the same as US-inflation (6.85:7.0%).⁷ Hence, the excessive yen-appreciation, the prelude for the bursting asset bubble 1990, remains one of the big riddles – and tragedies – of the history of floating exchange rates – and certainly the biggest failure of the Post- Bretton-Woods-system. The appreciation rendered large parts of the Japanese industries uncompetitive but helped to trigger an asset inflation of hitherto unknown magnitude. It is very likely that the extreme yen-appreciation alleviated the appreciation of the DM and other European currencies in this period.

In graph 6 we see also the strong depreciation of the RMB after the inflation episodes in the late 1980s and early 1990s which led to a very stable RMB-dollar exchange rate, functioning as a nominal anchor, until 2005.

Now we look at the real effective exchange rates of the five SDR-currencies since 1999, the start of the euro. Graph 7 and 8 show the nominal and real effective exchange rates for the SDR-basket currencies. In graph 8, again the REER for the U.S. and the EA with their symmetric interdependence are visible. The REER of the Pound Sterling seems to creep first in the middle between euro and dollar but plummeted by more than 25 percentage points during the drama of the subprime crisis 2007-9. Capital flocked back from the London City to the U.S., the hoped for safe haven. The fall of the Sterling was much stronger, in real terms, than the fall of the euro. After 2009 the Sterling recovers but did not reach the height of 2007.

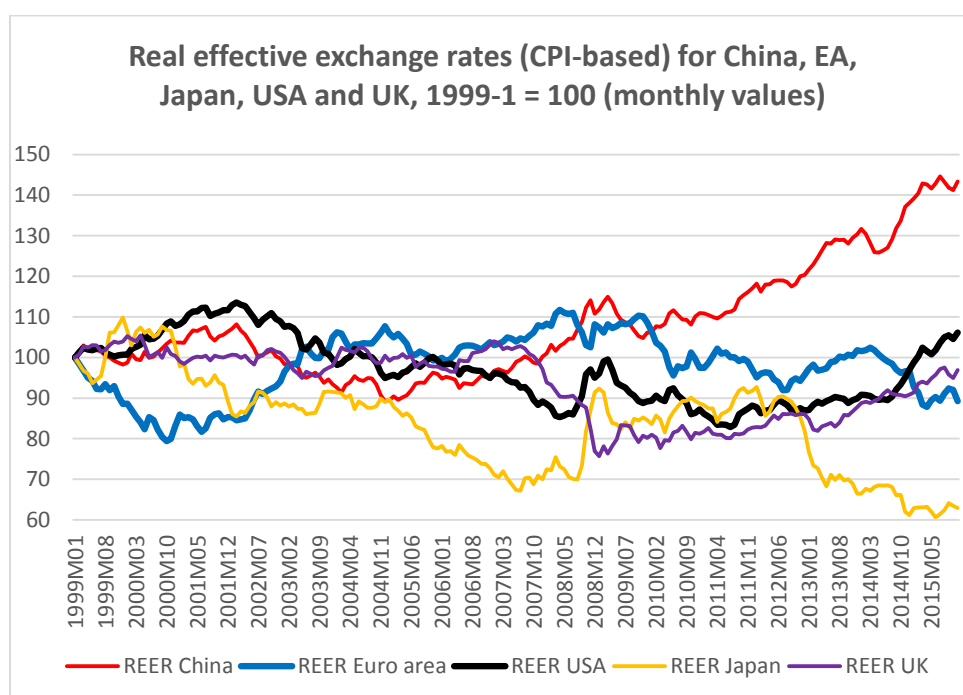
⁷ Calculated with annual consumer price indices from OECD.Stat.

Graph 7



Source: OECD.Stat, own calculations

Graph 8



Source: Bruegel. own calculations. – Note: REER for 138 trading partners, CPI-based

The yen follows a more peculiar pattern after 1999 when its value was still high compared to the earlier highs. The yen depreciated, in real effective terms after the year 2000, similar to the US-dollar until the financial crisis during which the yen appreciated abruptly, similar to the dollar, mainly by repatriation of assets held abroad. Since 2012 the yen devalued against

trading partner currencies strongly to reinvigorate growth, pushed by “Abenomics”. The exchange rate was used as a weapon in a currency war.

Finally, the RMB started to climb the appreciation ladder, in real effective terms, after the end of the strict dollar-peg 2005. But the real appreciation is much stronger than the nominal appreciation against the dollar. The RMB appreciated also against the currencies of neighbouring countries whose production is included in international value chains, and against the euro. Similar to the euro and Sterling, the RMB depreciated during the financial crisis but returned to continuous strengthening after 2009. The nominal depreciation against the dollar since 2013 was not strong enough to lower the real effective exchange rate until early 2016. It seems that the Chinese authorities refrain from engaging in currency wars, despite Japan and the EA instigating marked devaluations.

In this broad overview we have seen that the gyrations of the nominal exchange rates of the dollar-euro rate are the engine of the volatility in the real effective rates although the latter’s volatility is diminished through diversification of trade against many trading partners currencies. The REER can be considered as a rough indicator for the average price competitiveness of the suppliers of goods and services, also of financial products, vis à vis the most important trading partners. They likely have a bearing on exports and imports, on trade and current account balances as well as on output and employment. Before we investigate the direction and strengths of these relationships, we try to detect the drivers for the changing exchange rates, with a focus on the dollar-euro exchange rate. We start with what has been coined the “fundamentals”.

3. What really drives exchange rate changes - or the role of (non) fundamentals

In this chapter we discuss first standard orthodox exchange rate theories, turn then to new approaches stemming from behavioural finance with some Keynesian ingredients, and turn finally to discussing some of the alleged fundamentals, mainly purchasing power parity and interest rate parity theories with some empirical illustrations. This review of theories is necessary to clarify the search for fundamentals which determine exchange rates.

3.2 Short review of standard exchange rate theories

The classical theory of exchange rates is the purchasing power parity (PPP) theory, first developed by Gustav Cassel (1918), implicitly incorporated in Ricardo's trade theory under the assumption of international immobility of capital. PPP theory relies on the law of one price which is enforced by arbitrage on goods markets if free trade and no or low transaction costs prevail. As the law of price is valid only for tradables, meaning that there are very high transaction costs for other goods and service so that they can be considered nontradables, the absolute variant of PPP may not apply, but the relative one. The absolute variant expects adjustment of the price level, the relative one contends that the change rate of nominal exchange rates adjusts to the differential of the inflation rates for tradables. If the latter are close to the overall inflation rates then one would have to assume that inflation adjusted exchange rates, i.e. real rates, remain stable. When the price levels and their change rates are considered to be rooted in money supply and its change rate, the monetary theory of exchange rates coincides with PPP theory.

Deviations from PPP may be caused, under free cross-border capital flows, by capital flows attracted by interest rate differentials. The latter compensates for expected devaluation or revaluation. If these expectations materialise, interest rate parity and PPP would coincide, assuming perfect competition and homogenous financial assets. If there are no other disturbing factors, real interest rates, both short and long run rates, should tend to equalize so that the yield for assets would converge across borders. If interest rates and profit rates would tend to converge, risk adjusted, then international profit rate equalization materializes. If rational expectations exist, allowing only stochastic errors which offset each other and if the FX markets are efficient in the sense that all publicly available information is priced in, then there would be no room for destabilizing speculation whereas stabilizing speculation would be a market force that accelerates the speed toward equilibrium exchange rates. An appendix of standard exchange rate theory is that if net international capital flows are sustainable, PPP leads close to balanced current accounts. Then the brunt of balance of payment adjustments would rest on exchange rates. However, there is less consensus on this part of the theory as it might be questionable what sustainable capital flows are. At this moment we will not delve deeper into balance of payment adjustment theory.

What we have summarized roughly is standard exchange rate theory. It is equilibrium theory, with gravitation to stable equilibrium, if market forces can work in a perfectly competitive environment undisturbed by governments or central banks which might try be tempted to

bend exchange rates for domestic political reasons. Although there is broad consensus on this theory, there is also broad empirical consensus that the consensus theory cannot explain floating exchange rates in the short and medium run. This is the schism or, put differently, the crisis of exchange rate theory (cp. Harvey 2012, Priewe 2015, Priewe 2016).⁸

The consensus view is nicely summarized by the German Council of Economic Advisers (SVR 2000, numbers 350ff.). The equilibrium exchange rate is determined by fundamental factors that are not overlain by other factors. Deviations are explained by disturbing factors which are considered exogenous, such as (destabilizing) speculation. Among fundamental determinants, the SVR highlights PPP, which however is only subject to goods markets adjustments, ignoring capital flows. The long-term fundamental is equilibrium of real interest rates. They admit that the half-life period⁹ for adjustment towards equilibrium is very long with 4 to 11 years (no. 351). This finding renders fundamental factors more or less irrelevant. Unexplained, hardly mentioned, are the reasons for so long and strong deviations or the faintness, almost absence, of equilibrating market forces.

The consensus view on the empirical evidence was established by a seminal paper of Meese/Rogoff (1983). They found for the short run, i.e. one to two years, fundamental explanations of exchange rates are not better than random walk. For the medium and long run they assumed that PPP holds, but the evidence here was less clear and later questioned.

Several attempts to explain deviations from fundamentals focus on transaction costs for arbitrage. Nontradables are not subject to arbitrage and when goods as well as financial assets have differentiated quality, including home bias for goods, services and assets. However, since transaction costs, the influence of nontradables and home biases or other idiosyncratic preferences are unlikely to change quickly, the deviation from fundamental determinants should be expected to be rather stable. Hence, without long-standing stable net capital flows balances of trade with goods and services should tend to balance. Conversely, stable long-standing net capital flows may allow sustainable trade imbalances, reflecting intertemporal differential preferences. Some theorists, like Krugman/Obstfeld/Melitz (2015, chapter 16), presume that positive GDP growth differentials awards a currency with a bonus, as higher

⁸ An amazing example of the crisis of exchange rate theory is the standard textbook from Krugman/Obstfeld/Melitz (2015). On 250 pages all details of standard exchange rate theories are demonstrated. The authors stick to interest rate parity theory for the short run and PPP with a modification for the long-run. While this is done without referring to empirical tests, it is mentioned some 200 pages onward on just one page that vast econometric analyses have shown that none of theories can explain exchange rates. Then they defy the odds and hope for new research.

⁹ The time span needed to halve the initial deviation.

growth may attract financial resources of all kind from abroad. For the long-run, all fundamentals mentioned should send signal in the same direction.

The basic propositions of the literature on the dollar-euro exchange rate (including dollar-DM-rate) is that they are not explainable and forecastable since they are not determined by fundamentals. Seldom is spelt out what this positively means: that exchange rates are determined, most of the time, by non-fundamentals, i.e. either irrational expectations, for instance in the form of simple adaptive expectations, or destabilizing speculation, over long spells, not only as a short-term error of some agents but as the driving force, or by shocks or other exogenous factors. Interestingly, Rogoff admitted frankly in 2002 when he was chief economist of the IMF that he could not understand the fickleness of the G3-exchange rates (yen and euro against the dollar) (cp. Rogoff 1999, 2002). He did not hesitate to add that he believed that non-fundamental exchange rates are disconnected from the real economy, in other words, false exchange rates don't really matter much since we can trust in the long term. In the meantime, many authors, including Rogoff, have cast doubts on the empirical validity of PPP for the long run, mainly due to the long spells of deviation.

For a long period the gyrations of the G3-exchange rates were seen through lens of the *Dornbusch overshooting model* (Dornbusch 1976), a variant of the IS-LM model and the Mundell-Fleming model, called sometime the Mundell-Fleming-Dornbusch model. Dornbusch's notion of temporarily overshooting exchange rates rests on the assumptions that central banks control money supply, that goods prices are sticky in the short run and money markets are highly flexible and sensitive to interest rate differences between countries. In brief, if a central banks increases money supply, for whatever reason, the interest rate falls strongly and capital flows out to the other country with a higher interest rate while the price level in both countries remain unchanged due to stickiness. The adjustment to the money supply shock comes only via the exchange rate response in the first phase because output and prices respond inertially. In the second phase of adjustment, the lower interest rate and the depreciation trigger gradually higher output and rising prices, so that now the overly strong exchange rate effect is reversed. In the end of the adjustment process the real exchange remains constant compared to the initial level, but the price level is elevated, reflected in a corresponding nominal depreciation.

Applied to the dollar-DM- or dollar-euro markets, volatility would be caused by strong monetary shocks initiated by the central banks, caused by too high inflation and policy shocks or similar. The model is deeply rooted in monetarism, presuming that central banks control money supply rather than setting short-term interest rates, and rational expectations theory. A

grain of truth is in this model with regard to the inflationary 1970s and the excessively tight monetary policy of the Fed in the late 1970s under Paul Volcker. Rogoff (2002) admits that the Dornbusch model fails to explain the G3-exchange rate fickleness, especially not after inflation has moderated since the 1990s.

Rogoff continued to re-examine his early Meese/Rogoff (1983) model with new methods and new data (cp. Rogoff 1999). In principle, he reconfirmed the early findings. Exchange rates are buffeted by a great many factors, which are hard to model altogether. He compared the volatility of exchange rates with the one of share markets and found parallels. He even admitted that monetary shocks (including those affecting exchange rates) can have non-neutral effects in the long run which casts doubts on the PPP as centre for long-run gravitation. Tides in risk aversion have to be included in the models. His main idea is that PPP might not hold in face of high transaction costs for arbitrage on goods markets which defy the law of one price (Rogoff 1996) which enlarges the half-life of deviations from PPP which he estimated as only 3-4 years (coined “purchasing-power-parity puzzle”). Further, excessive volatility may have been caused by monetary shocks, in the context of soaring inflation and very tight monetary policy. Politics may also play a role. Rogoff, one of the key exchange rate pundits in the economics profession, never explained positively what drives exchange rates if fundamentals of all kind seem irrelevant, even more or less in the long run, except vague hints to a universe of factors. Speculation and irrational behavior are never mentioned. The actual behavior of currency dealers was out of the focus of most econometric investigations.

In the meantime, a nearly endless amount of literature was published, especially on modelling and testing exchange rates, often using the G3- or former G7-rates as the rates to be explained (see the overviews from Baille 2013, Rossi 2013, Neely 1997 on technical trading, Melvin/Prins/Shand 2013, Chinn 2011 on macroeconomic models, and Engel/Mark/West 2007). Rossi in a vast overview over recent empirical research concludes that the early finding of Meese/Rogoff (1983) “does not seem to be entirely and convincingly overturned.” (2013, 1114), namely that standard models cannot predict exchange rates better than random walk for the short period. The second part of Meese/Rogoff (1983) that fundamentals, mainly PPP, hold in the long run, is not sufficiently endorsed.

A closer look on the great variety and diversity of models shows however that fundamentals are not irrelevant, but play variable roles changing over time (cp. Menkhoff/ Taylor 2007, Beckmann/Belke/Kühl 2011, among others). To mention just few selected findings: Even though PPP and traditional monetary predictors can be ruled out as short-term predictors,

Schnatz (2007) finds that strong deviations from PPP are relative quickly reversed, at least to a considerable extent. For the short-term, Rossi (2013) reports that Taylor rules for monetary policy have a limited predictive power; if Taylor-rules can explain the setting of interest rates of central banks in different countries, then the ratio of the interest rates and the underlying explanatory variables for the Taylor rules chip in for exchange rate determination. Beckmann/Belke/Kühl (2011) find that fundamentals play different roles in different sub-periods. Frömmel/MacDonald/Menkhoﬀ 2005 hold that some fundamentals have explanatory power in certain “regimes”, in others not. Their coefficients vary. Questionnaires with traders show a focus on short-term interest rates and inflation. Frenkel/Rülk/Stadtmann (2012) find changes between short-run and long-run expectations, the former following bandwagon behaviour, the latter showing stabilizing expectations. The twist of regimes occurs in periods of high volatility. Despite partial insights that may be gained from these analyses, their overall value is very limited. It seems that the more and ever more sophisticated forecasting models are used, the thinner is the theoretical content and the more diverse is the harvest of knowledge which then sparks further model innovations.

All in all, the standard theories suffer from understanding what drives the exchange rate gyrations if fundamentals, derived from traditional theories are considered irrelevant or of little impact. There is a lack of analysis of non-fundamentals. The micro-structure of FX markets is mostly excluded from the analysis. If fundamentals are said to be relevant in the long run, then the question remains unanswered why deviations are so long and why the turnaround is eventually happening. Finally, the notion of a stable equilibrium exchange rate, relevant for the long run, must be questioned.

The typical fundamentals, connecting exchange rates to the real economy, are from the perspective of traditional exchange rate theories interest rate differentials, expected exchange rates, normally perceived as being derived from rational forward-looking expectations, anchored in other fundamentals, inflation differentials and hence differential growth of money supply, hence real interest rate differentials and PPP for tradables, connected to trade and current account balances. There may be noise traders who speculate or trade currencies arbitrarily, but they will be loss making, thus having marginal influence on exchange rates. Behind interest rate and inflation differentials, monetary policy may be included as a key driver for some fundamentals mentioned. Efficient forex markets will feed in all publicly information, capable to identify fundamental news and sort out all non-fundamental news.

3.2 Paradigm shift – behavioural finance

A different “family” of theories emerged from the analysis of the behaviour of currency traders. These theories have their roots in the behavioural theory of finance (cp. Shleifer 2000), applied to foreign exchange markets. Foreign exchange is seen as a special financial asset. The origins of these theories date back to Frankel/Froot (1986, 1990), the most advanced ones are from De Grauwe/Grimaldi (2006) and from Schulmeister (2009). Many ideas stem from (or resemble) Minsky (1985) and Kindleberger (2000). Post-Keynesian exchange rate theories focus on cross-border capital flows and expectations, the latter governed by various behavioural patterns developed by Keynes (Harvey 2012, 2012a). Basic ideas of Keynes are explicitly or implicitly used and applied in the “General Theory” (e.g. the beauty contest, the role of adaptive expectations and the role of uncertainty). The efficient market proposition is rejected by all heterodox approaches, also rational expectations theory. The main proposition is that heterogeneous agents on FX markets, the dealers, are separated in two camps, the technical analysts, also called Chartists, following trending with mostly adaptive expectations, and the minority of the Fundamentalists. The first camp behaves rationally in the sense of following past experience for short steps in an environment of great uncertainty, a form of “bounded rationality”. They go beyond arbitrage, speculate or they follow blindly the speculators like a herd – and make more profits than losses in doing so. They seem to be aware of neglecting fundamental determinants, but as long as the second camp cannot convince or predominate them, they continue heading forward unidirectionally. The sequence of many short steps, perhaps at times interrupted by short setbacks or stalemates, can lead to long trending phases. If nobody stops the music they continue dancing.

The role of speculation on FX markets is a long-debated issue. The traditional view, based on Friedman (1953), denies that so-called destabilizing speculation, considered irrational, can play a major role on asset markets since rational stabilizing speculators would drive them out of the market. Also Keynes (1923/1971, 91), in his “Tract on Monetary Reform”, believed that speculation occurs seldom or is washed-out quickly and that its impact is overstated in public opinion. But in the “General Theory” he had changed his mind. Although these old opinions seem outdated in the 21st century, speculative activities are a complex phenomenon. Speculators need counterparts, hence heterogeneous expectations have to prevail. Under strong uniform expectations, prices may leap strongly, but with few transactions. There is ample literature on speculative attacks under fixed exchange rates, but less on floating exchange rate regimes. Some authors argue that there is a lack of stabilizing speculators on flex-

ible FX markets, but this would not vindicate the old beliefs. It would rather enlarge the opportunities for destabilizing speculators. It seems that the old opinion rests on the notion of clear and stable fundamental equilibrium exchange rates. If this notion is a myth, the distinction between de- and stabilizing speculation collapses. Here is not the space to delve deeper in the nature of speculation on FX markets (cp. Krüger 1995, Heine/Herr 2013, 679 ff., Osler 1998, Dieci/Westerhoff 2010)¹⁰.

Through the behavioural finance lens, foreign exchange is a financial asset, perfectly suited – under flexible exchange rate regimes – for building up speculative bubbles. The dealers using their own capital as well as borrowed funds may have small profit margins, but dealing with a huge volume of transactions enables them to make sizable profits. They bet on rising (or falling) rates, and find counterparts who may do the same but may have a stronger or weaker risk orientation, apart from counterparts who pay more attention to the fundamental criteria. Hence, heterogeneous expectations are exchanged on the various FX markets. Another group of agents is involved too, namely agents of banks and nonfinancial institutions which purchase and sell securities across different countries and currencies. Currency for trade of goods and services is almost negligible on FX markets. Capital flows, chiefly short-term, dwarf trade-related transactions. The two main camps on FX markets are not totally separated and antagonistic. The Fundamentalists may prefer to behave opportunistically if they recognise that herding is more profitable than calling for a change in the direction of trading. The Chartist are cognizant of the fundamentals, but have difficulties to select them among the millions of information which they process in very short decision-making intervals (cp. De Grauwe/Grimaldi 2006, Menkhoff 1997, 1998, Schulmeister 2009). As long as fundamentals do not speak with one voice, due to their heterogeneity pointing often in different directions, traders opt for other criteria for their bets.

There is important evidence for the micro-setting of players at FX markets which corroborate the opinions of the behavioural finance economists. To mention just one: Ehrmann/Fratzscher (2005) found that news perceived by FX dealers included to some extent fundamental data, but in most periods they received little attention. Unexpected news, i.e. “new news” were more important; bad news as well as news on the U.S. rather than on Europe had a heavier weight. News from central banks were often not clear in their consequence, but subject to different interpretations. Under extreme time pressure news were sorted mainly by “good” or

¹⁰ Repudiating the impact or even possibility of speculation on FX markets coincides with the denial or belittling of speculation on other asset markets in mainstream economic theory. In economic history speculation is abundant and hard to ignore (cp. Kindleberger 2000).

“bad” relative to economic growth. In episodes of great uncertainty, dealers tend to listen more to the Fundamentalists.

If the microeconomic structure of FX agents is similar to this picture, Fundamentalists indeed have a hard time. We add here to the behavioural approach that fundamentals themselves are heterogeneous and require interpretation, see below. The most important group of Fundamentalists, central banks and perhaps also ministries of finance, are largely absent – according to the *laissez-faire* imperative on floating exchange rate regimes.

The outcome of this micro structure is that long phases of appreciation or depreciation of a currency can occur, as long as the voices of the fundamentalists are silent or absent. The dealer might attempt to forecast the behaviour of the potential key agents, the central bank, be it the ECB alone or the Fed alone or their collaboration, but the latter’s main orientation is following the markets and avoiding interventions. However, exchange rates cannot appreciate/depreciate forever, as trees cannot grow into the sky. Hence, there is great certainty that a point of deviation exists where a return will be precipitated, in most cases after extreme peaks or troughs, often in the form of sudden turnarounds similar to other bursting bubbles on asset markets. Here is not the place to delve deeper in this theory. The gist of the matter is, firstly, that fundamental criteria play a minor role in the making of floating exchange rates, except in episodes where cyclical turnarounds happen at a high degree of deviation from fundamentals; secondly, Chartists predominate most of the time the behaviour of agents, and they speculate or follow speculators as a herd. Hence this theory can be seen as a speculation or asset price theory of exchange rates (Priewe 2015).

Authors following this approach have not been able to explain the gyrations of the dollar-euro exchange rate and the crashes of the exchange rate bubbles. The question arises whether some or all fundamentals play a major role when it comes to strong deviations from what could be seen as normal or equilibrium rates. Furthermore, maybe the understanding of fundamentals is also too limited or systematically biased in the mindset of traders. Another open issue could be that the role and predictability of central bank actions have to be included as an important interface between fundamentals and non-fundamentals. We explore these issues in more detail in chapter 4.

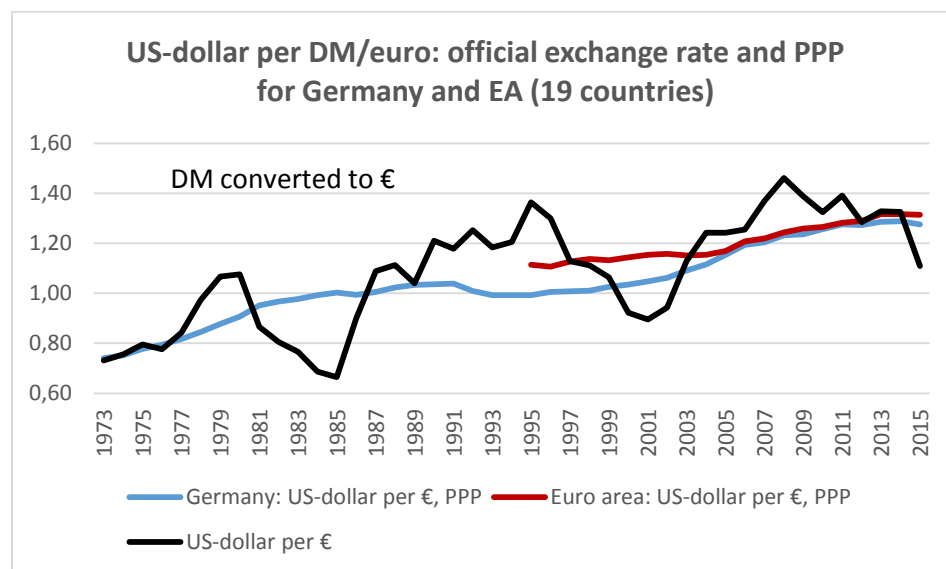
3.3 Purchasing power parity and interest rate parity reconsidered

Before we turn to our empirical analysis of a set of eight suspected fundamentals for the dollar-euro-exchange rate, derived from conventional exchange rate theories, we briefly comment on some of the fundamentals, following long debates in the literature (see also Priewe 2015, 2016). We focus in this section mainly on PPP and the role of interest rate parity theories.

PPP theories

Regarding PPP, Keynes (1923) and others argued that it can only apply to the prices of tradables, meaning nontradables would have to be excluded. Keynes mentioned that the PPP is thus not more than the law of one price and therefore a truism. Empirically, the issues involved are much less clear cut. Graph 9 shows the PPP for Germany and the EA vis à vis the U.S. for the period 1973-2015, with strong and long-lasting but heavily varying divergences. For end-2015 the PPP stands at \$1.31 for the EA and at \$1.27 for Germany, compared to \$1.06 when the euro was launched (annual averages).

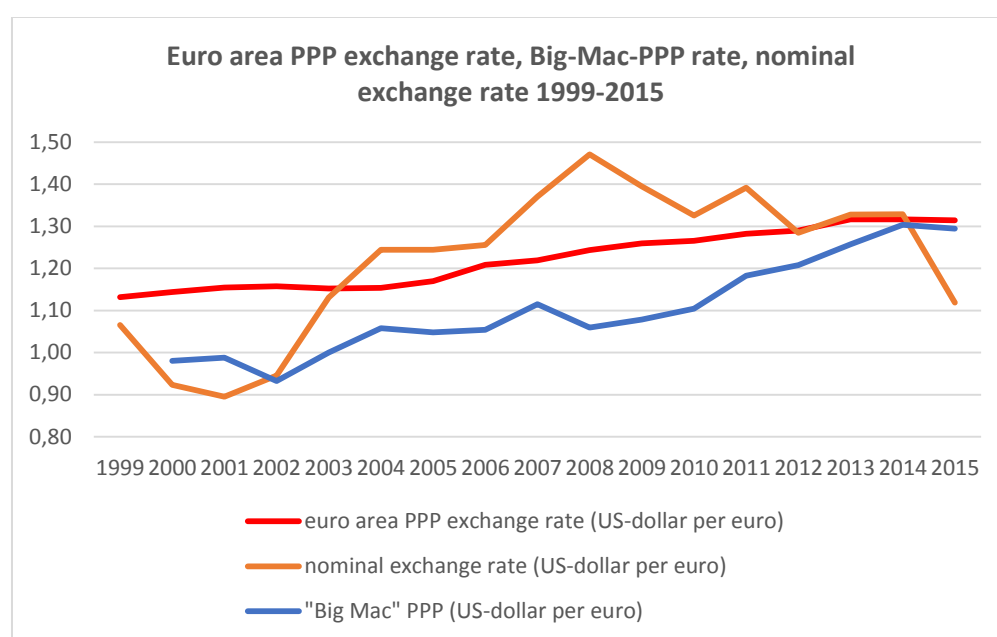
Graph 9



Source: OECD.Stat, own calculations

The PPP moved upward, mainly due to the somewhat lower inflation in Germany and the EA. Balassa-Samuelson effects may have contributed also to rising PPP¹¹. The market exchange rate over- and undershoots strongly. For Germany, the undershooting helped to overcome the recession in the early 1980s and the slump in the early 2000s. By contrast, the three phases of overshooting market exchange rates, i.e. overvaluation, until the peak of deviation from PPP, namely 1976-80, 1985-1992 and 2002-2008 were fairly strong growth phases in the business cycle, similarly for the EA. Growth came despite the strong DM or euro, respectively.

Graph 10



Sources: OECD.Stat, The Economist (<http://www.economist.com/content/big-mac-index>), own calculations

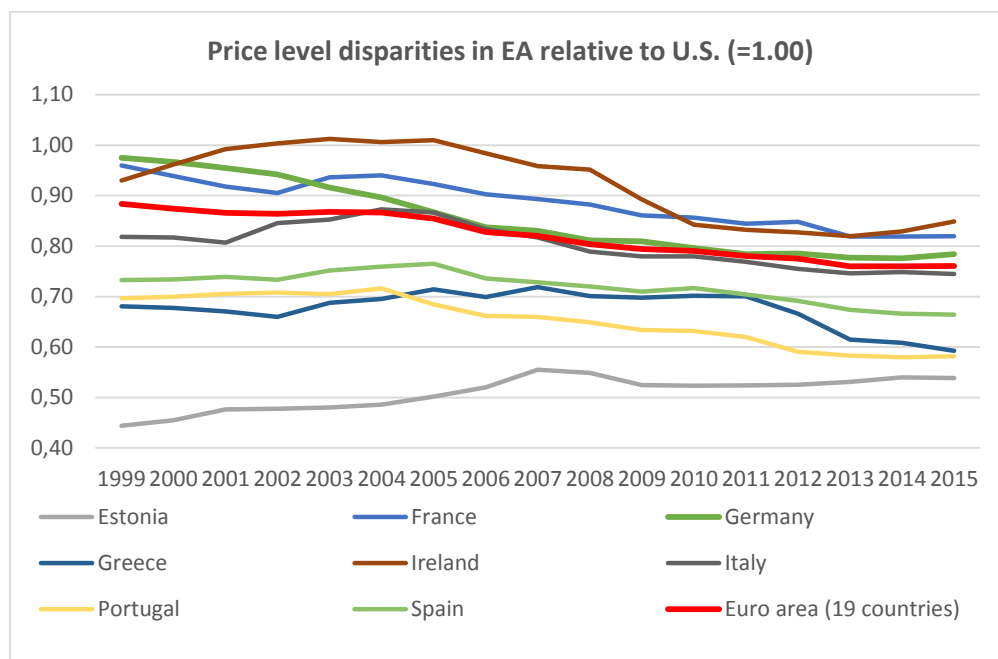
Note: The Big Mac Index is shown here for the values of the middle of the year, mostly July, sometimes April, May or June.

For comparison, we show in graph 10 also the well-known “Big Mac” PPP, based on the prices of MacDonald’s “Big Mac” in dollar in the U.S. and local prices, here in euro in the EA (average). Whereas the OECD PPP data (in graph 10) use a broad basket of goods and services, the “Big Mac” index is narrowed on one identical product. The latter index hints to an

¹¹ Balassa and Samuelson believed that less developed countries encounter rising prices for non-tradables which can lead to higher growth (catching-up) and real appreciation. This effect may also apply to less advanced countries in the EA which could have a bearing on the EA average.

over-valuation of the euro at its inception (although the time series starts not before the year 2000) and displays a much more pronounced overvaluation of almost 50% in 2008¹².

Graph 11

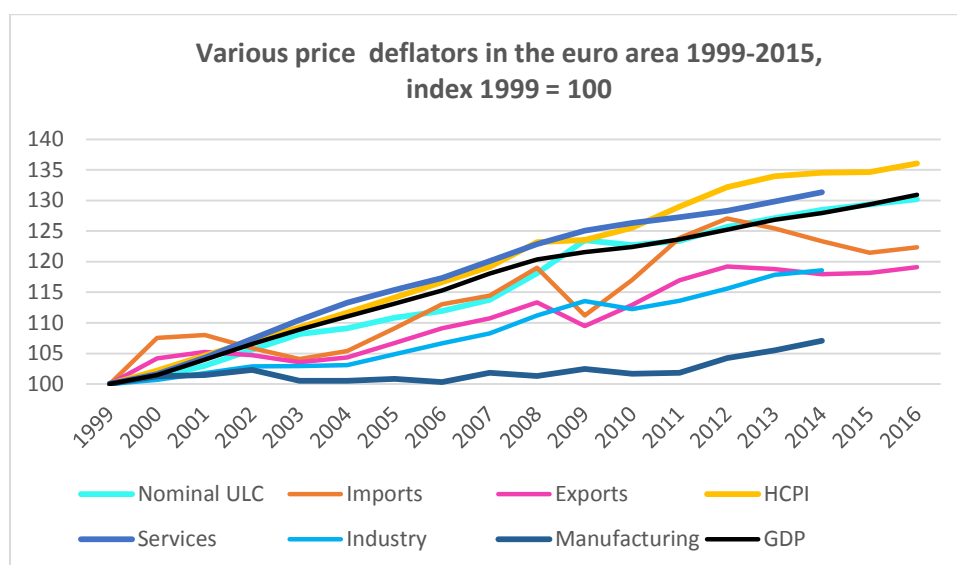


Source: OECD.Stat

There are sparse empirical data which separate tradables and nontradables. Hence the PPP shown in graph 10 could be misleading since it is well-known that prices of non-tradable often differ across countries, irrespective of the exchange rate, especially prices for accommodation and prices that vary strongly according to the level of mass incomes. Graph 11 shows the strong differentials in the price levels within the EA. Nonetheless, in many countries the inflation rates for tradables and nontradables do not differ so much (cp. Sarno/Passari 2011), with some exceptions (see graph 12). Particularly prices for manufactured goods and exports rose weaker than often discussed unit labour costs or the consumer price index (HCPI). The difference in annual inflation rates between the lowest and the highest price index is 0.4% to 1.8%. The differential likely shows that prices for nontradables are rising faster than prices for tradables. Since this finding is likely to apply similarly for the U.S., we use the PPP data from OECD.Stat as a rough proxy for the growth of the price level of tradables.

¹² In 2011 "The Economist" started to calculate adjusted PPP rates for many countries in order to adjust to the Balassa-Samuelson effect, since prices of non-tradables like the "Big Mac" are lower in countries with lower average income. By ignoring this adjustment, the index might therefore be more appropriate for the prices of tradables. The adjusted value for the EA – average per capita incomes are lower in the EA in the U.S. – shows a stronger over-valuation of the euro in 2011 and less under-valuation in 2015/2016.

Graph 12



Source: AMECO. Note: values for 2016 are forecasts of the EU Commission.

Some authors argue that the law of one price and hence exchange rates in line with PPP are distorted because of very high transaction costs for which microeconomic empirical evidence exists (Obstfeld/Rogoff 2000). This may be so, but is irrelevant – what counts is the *average* price level of goods in the basket, and the change rates of the price level. There is no evidence that transaction costs change heavily year by year. The bottom line is that PPP-indicators can be used for the PPP theory of exchange rates in its *relative* form, i.e. keeping the real, inflation adjusted, exchange rate fairly stable, no matter whether the price levels converge in absolute terms.

A flaw in PPP theory needs mention (see also Priewe 2015). The theory holds that exchange rates adjust, with a time lag, to the real economy, so that the baskets of goods in different countries have the same average price, although expressed in local currencies. This causality means that the real economy is stable and adjustment comes from the exchange rate. However, if the deviation of the market exchange rate from PPP holds on for long, firms from countries with over-valued currency lose their market shares or make losses if they follow the prices in the country with undervalued currency. Firms and entire industries might not be able to survive as they cannot wait for the prospective adjustment of the exchange rates to PPP. In order to survive, firms might also change their location, migrating either to the country with a lower price level or to countries with low unit labour costs. All these adjustments mean that the real economy adjusts to the stubbornly long distorted exchange rates. When eventually the exchange rate reversal comes, the production structure has already changed thoroughly. Note that this is not a normal structural change in the course of growth and technical innova-

tions. Rather it is perverse structural change that will most likely not be reversible after rectification of market exchange rates. A return to PPP after years of aberrations is therefore the opposite of what Gustav Cassel and many others had in mind. This means that it is a fallacy to believe that the statistical adjustment of market exchange rates to PPP vindicates the PPP theory in the long run, as stated again and again from econometric analyses. De facto the causality underlying PPP theory is reversed – the real economy is forced to adjust to distorted exchange rates.

Now we turn to the relationship of exchange rates and the balance of payments. Comparing PPP and trade balances between the trading partners does not imply that a PPP-based exchange rate for the dollar-euro-rate has the capacity to balance trade balances or even the current accounts. Bilateral exchange rates can never balance current accounts. Here the *real effective exchange rates* are relevant, including all trading partners. Although the EA is large and an important trading partner of the U.S., the bilateral trade balance is just one slice (yet an important one) among many others in the overall trade balance of both blocs.

Interest rate parity theories

Maybe the *interest rate parity theory* (IRP) is more relevant for the short and medium run than the PPP theory as highly flexible capital flows are involved. The uncovered interest rate parity theory holds that in the short term risk-adjusted interest rate differentials induce capital flows which trigger exchange rate changes. The rationale is that nominal interest rates of different countries should equilibrate via arbitrage on asset markets (mainly money and bonds markets) if there are no expected exchange rate changes. If the latter exist and are given, the positive (negative) interest rate differential in a country should compensate for expected depreciation (appreciation), absent non-fundamental factors. Only if interest rate differentials go beyond this level (above or below), capital flows lead to real appreciation or depreciation.

In the following we mention a few points of theoretical criticism, without going in more detail in this paper.

- (1) The IRP holds a comparatively higher interest rate of a country signals expected depreciation. If the efficient market hypothesis applies, this expectation should feed immediately into the spot market, so that the depreciation materializes instantly and arbitrage would then equilibrate interest rates for the same or similar financial assets. Obviously, the exchange rate depreciation is expected to occur later, at a specific date in the future without

any relevance for the present. Then expectations for the future periods $t+1$, $t+2$, $t+3$ etc. should exist. Then one should know what determines such lagged expectations. If the suspected reason for expected depreciation in the future is inflation, then low nominal or low real interest rates should signal future inflation and depreciation, not higher interest rates. In reality, inflation maybe linked to high or to low real interest rates. Among advanced countries, e.g. the EA and the U.S., inflation differentials are normally small, even though interest rate differentials maybe bigger than justified by differential inflation, depending on the type of monetary policy or the broader policy mix.

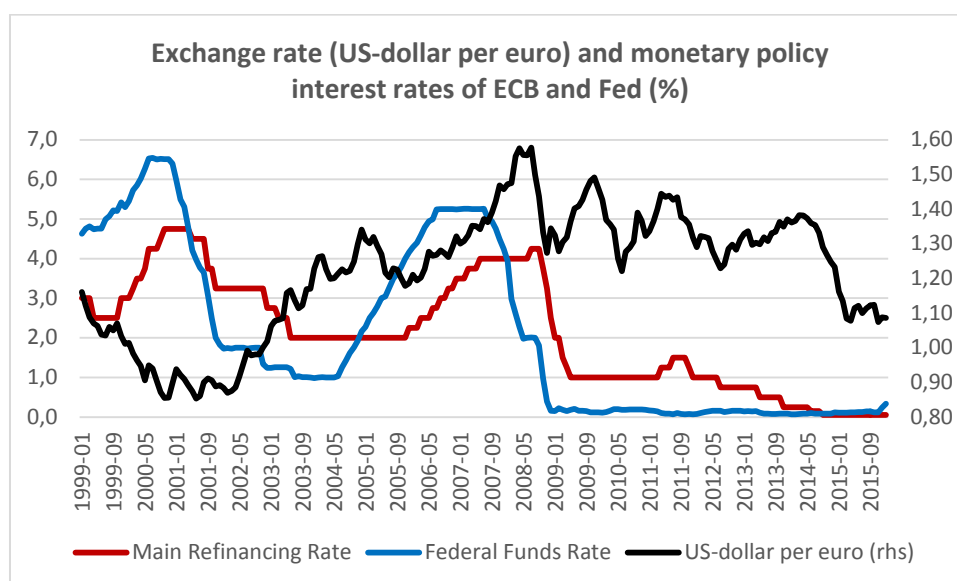
- (2) IRP theories presumes that clear and uniform exchange rate expectations exist for future exchange rates. Why should all market participants have uniform expectations on future events? If not, there are possibilities to trade expectations under uncertainty, involving risk. This is called normally speculation rather than arbitrage.
- (3) When it is presumed that not present interest rate differentials, but future differentials determine exchange rates, then exchange rates would be determined by interest rate forecasts, involving a high degree of uncertainty. Again, it is very unlikely that all dealers on FX markets have the same interest rate forecasts. So there is an incentive to swap expectations and forecasts. Again, what appears as arbitrage involves risks. It is speculation.
- (4) Uncertainty on future exchange and interest rates can induce backward looking expectations as a rational method of avoiding too much risk. Such dealers will engage in technical trading or herding.
- (5) Often higher nominal interest rates in one country induces capital inflows and then appreciation of the country's currency with higher interest rates. If this continues, higher interest rates lead to further appreciation. Whether or not in an uncertain future a depreciation occurs is irrelevant. This fairly realistic "interest rate differential theory" is the opposite of IRP in which an increase in the interest rate heralds future depreciation. Nevertheless, this does not rule out the case which IRP has in mind. But this is a special, not a general case.
- (6) Traditional exchange rate theory often focuses more on real interest rate differentials. Yet, financial investors pay more attention to nominal interest rates if they do not intend to spend the revenues from assets in a foreign country (home bias). This is for instance at the roots of carry trade.
- (7) Finally, assets in the home country and abroad are always heterogeneous. There are country-specific risk premiums and home bias, as mentioned, which limit interest rate arbitrage.

Of course, these few points of critique do not at all mean that interest rate differentials are irrelevant for exchange rates. But non-fundamental forces are always at work. What is also important is how sensitive capital flows respond to interest rate changes and what exchange rate expectations agents have. This is more a matter of speculation than of arbitrage. Empirically, arbitrage and speculation are hard to disentangle since forward looking expectations (and underlying expected data) feed into present interest rates and spot exchange rates. The empirical evidence for short or long-term uncovered (nominal or real) interest rate parity is weak.

The theory of covered interest rate parity contends that the spread between the forward and the spot rate of the exchange rate equals the present interest rate spread between the two countries considered. The theory is by definition true, but the causality runs in reality from the present interest rate spread to the forward rate. The forward rate is not the expected future exchange rate, since all expectations regarding the future are already priced in in the spot rate. Hence the forward rate has proven to be a poor predictor of the future spot rate.

The consequence points of criticism is that the interest rate imparities tend to lead to short-term “interest rate differential theory” and to speculation rather than arbitrage. Traders know that forward rates are poor predictors for future spot rates. Hence the doors are open for traders using *prospective* interest and *prospective* exchange rates in their rationale; since the latter are uncertain, and prospective inflation differentials do not indicate compellingly exchange rate change, speculative expectations emerge. Hence exchange rate parity theory changes from arbitrage to speculation. Traders take on risks, in contrast to plain arbitrageurs, and make profits (and losses). But similar to other asset markets, profits hold sway over losses. If such behaviour becomes common, traditional interest rate parity theory is turned upside down.

Graph 13



Source: Deutsche Bundesbank, Federal Reserves St. Louis

To illustrate the relationship between the short-term interest rate, we take the policy rates of the Fed and the ECB, the Federal Funds Rate and the Main Refinancing Rate, and compare them with the market exchange rate (cp. graph 13). We see all combinations of rising/falling exchange rates and U.S. interest rates above or below ECB rates. There is no uniform pattern as stipulated by interest rate parity theory.

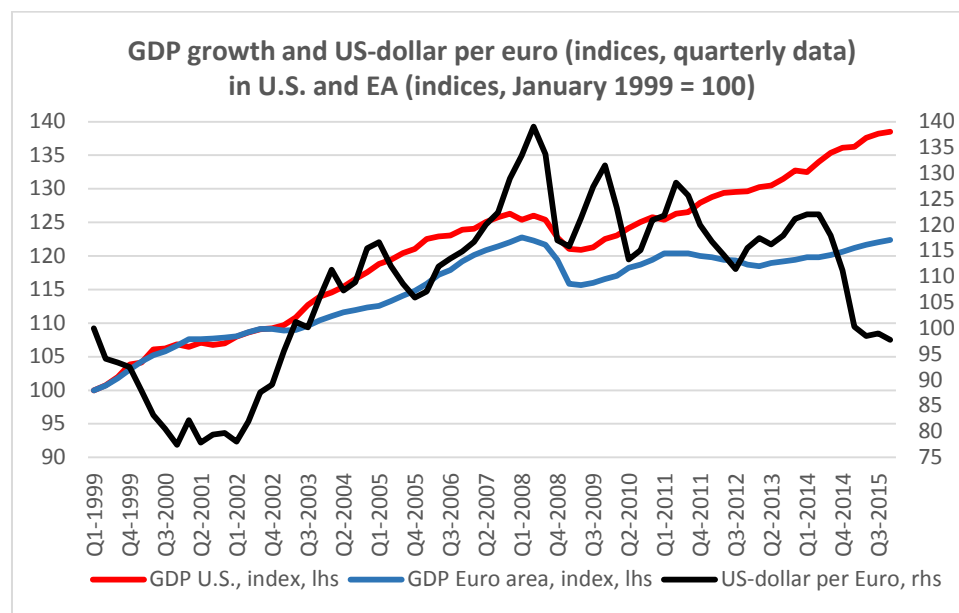
GDP growth and exchange rates

Finally, let us compare the growth rates in the U.S. and the EA and the exchange rate performance. The underlying presumption is that higher expected growth in one country triggers appreciation of this country's currency. The simple idea is that growth is connected to buoyant financial markets with rising asset prices, be it real estate, bond or stock markets. Even though this may be in line with lower real interest rates or even lower effective nominal rates, higher asset prices promise better returns. This could be called a fundamental, although it does not originate from neoclassical or similar orthodox theories. Krugman/Obstfeld/Melitz (2015) follow this concept, but only for the long-run. Nevertheless, many FX traders include this in their rationale, according to surveys.

Applying this presumed additional fundamental to the dollar-euro rate shows no clear connect (see graph 14). Apart from the years 1999-2002, output growth since 2002 was always higher

in the U.S. than in the EA. There is no indication, however, for a long-standing appreciation of the dollar for the whole period 2003-2016.

Graph 14



Source: OECD.Stat

In our review of three key fundamentals we have left out current accounts for a number of reasons. First, there is no direct relationship between bilateral exchange rates and the current account, because it is the real effective exchange rate that is relevant here. If there is a co-movement of the dollar-euro rate and trade partners' rates, which is to some extent the case, only then will the bilateral rate impact the REER. Second, most likely causality runs from the REER to the current account, not the other way round, since trade and primary and secondary income flows are tiny compared to gross cross-border capital flows. Normally, FX traders do not care much for current accounts when dealing on the dollar-euro market. Only if central banks are concerned about the current account and they intervene in some way, we have a causal link from current account to central bank to exchange rates. Third, if current accounts were governed by prices, money, interest rates, saving and investment, etc., then we return to the other suspected fundamentals addressed in PPP, interest rate parity and other exchange rate theories and should not consider the current account as an explanatory variable for bilateral exchange rates. Fourth, if we believe that current account equilibrium should be arranged by appropriate, hence equilibrium REER, then we think about *normative* exchange rates. This is a normative concept for fundamental exchange rates, followed, more or less, by the IMF and the Peterson Institute for International Economics since a couple of years (see IMF 2006,

2013, 2015; Cline/Williamson 2012, Cline 2008, 2011, 2014, 2015). These are interesting attempts to overcome the crisis of traditional exchange rate theory.

So far, one might conclude again, that the fundamentals reviewed above are by and large irrelevant for the actual exchange rate performance. To avoid rash conclusions, we look now at a set of eight suspected fundamental indicators (built on differentials between EA and U.S. in interest rates, inflation, growth rates, current accounts and PPP) and check for isolated and combined effects on the dollar-euro exchange rate. Afterwards we tell different narratives that might help to explain the dollar-euro performance.

3.4 Summing up

Traditional exchange rate theories believe that rates gravitate toward a stable equilibrium which equalizes prices of tradables (law of one price) and to some extent also the purchasing power of one dollar across nations. It is assumed that prices of tradables and non-tradables develop similarly, but levels of non-tradable prices can differ persistently (relative PPP). At the same time risk-adjusted real interest rates for assets of the same kind equilibrate. There is broad consensus that such an equilibrium does not exist in the short and medium run, neither the interest parity nor the PPP nor both. Some authors still believe in the long-run relative PPP, others question it, for instance because there is widespread deviation from the law of one price. Large deviations from PPP and interest parity exist in varying form over longer spells. Traditional theories do not explain which non-fundamental factors are at work in the short and medium term and why the medium term is stretched to long periods and how eventually occurring turnarounds lead to deviation in the other direction. These theories rest on the quantity theory of money, on rational expectations theory and on the theory of efficient markets.

Obviously the non-fundamental factors that govern exchange rates are speculation and its counterpart, trending and herding, as contended by behavioural finance and Keynesian theorists. They question the validity of rational expectations and of the efficient market hypothesis (cp. De Grauwe/Grimaldi 2006). Foreign exchange is a special asset, usable for destabilizing, profitable speculation, susceptible to asset price bubbles in the form of long cycles of exchange rate swings. Besides this, short-term capital flows of huge amounts determine nominal exchange rates. Foreign exchange markets are run by heterogeneous traders; the majority are technical traders, the others “Fundamentalists” who sometime come out on top. The behaviour and interaction of both groups determine exchange rates and make them non-forecastable

in the short, medium and long run. At times central banks chip in by interventions, interest rate setting or simply announcements.

We have criticized traditional PPP theory which disregards that long spells of deviation from PPP jeopardise either the law of one price or the equalization of profit rates and thus change the production structure. Return of exchange rates to measured PPP may imply that enterprises or complete sectors have not survived misaligned overvalued exchange rates. Interest rate parity theories must be adjusted for home bias and country risk premiums, besides the fact that nominal rather than real interest rate differentials are relevant for most financial investors. Moreover, not actual interest rate differentials matter but expected ones. Since short-term interest rates depend on central bank policy and expected broad macroeconomic conditions, growth expectations feed into expectations as far as fundamentals enter the radar system of FX traders. As traders trade with expectations on exchange and interest rates, they depart from pure arbitrage and turn to speculation with risks and profits.

The bottom line is that often backward-looking expectations determine the behaviour of technical traders, which is rational in periods of high uncertainty, and at times forward looking expectations regarding mainly nominal short-term interest rates and growth differentials. This implies that PPP and current accounts are largely disregarded even by fundamentalist traders. However, the strong gyrations of exchange rates cannot be explained by any of the fundamentals mentioned. It is continued trending in many very short steps.

In the next chapter we try to explain the exchange rate performance on the dollar-euro market through the lens of the exchange rate theory based on behavioural finance and Keynesian thinking.

4 Determinants of the dollar-euro exchange rate 1999-2015

4.1 A new look at eight fundamentals – and why they signal different messages

Now we look at eight suspected fundamentals for the dollar-euro exchange rates in the period 1999-2015 with annual data¹³, always regarding the *differentials* between the EA and the U.S.: (1) GDP growth, (2) growth forecasts in autumn for the year ahead, (3) consumer inflation, (4) the current account balance (% of GDP), (5 and 6) short- and long-term interest rates (the former close to the policy rates of Fed and ECB), (7) the real long-term interest rates and (8) the deviation of the actual exchange rate from the notional PPP-rate, as calculated by

¹³ Data from OECD.Stat, IMF, World Development Indicators, Eurostat, computations by the author.

OECD. In table 1, the differentials are chosen as the difference of the respective indicators for the U.S. and the EA such that a positive sign signals the need for appreciation of the euro against the dollar.

Of course, we could have added other candidates for suspected determinants of exchange rates, such as oil and commodity prices in general, stock market prices, net international investment positions, gross or net capital flows, other exchange rates (such as other SDR-currencies which might impact the dollar-euro rate). As the daily transaction volume of US-dollar 1.3 trillion is chiefly driven by financial transactions, one should indeed give a focus on cross-border capital flows, driven not only by interest rate differentials, but also by expected asset prices and changing degrees of liquidity preference for domestic currency. Also FX markets have a momentum of its own, since FX is a special asset. This asset price is driven by arbitrage and speculation, in addition to trade with goods and with other financial assets.

Our focus on the eight indicators listed above stems from traditional exchange rate theories (except GDP growth and partly interest rate differentials as explained in the review on IRP theories). The usual term “fundamentals” has a double meaning: as main determinants of exchange rates, and as being linked to the real economy, i.e. contrasting money and finance. Further research should include or even focus on the other factors, but a first look shows lack of specific data (e.g. regionalized gross capital flows) or obviously little explanatory power (stock market prices, net international investment position) for the dollar-euro exchange rate, with the exception of the dollar-RMB rate. Commodity prices are considered here being influenced by exchange rates in which the dollar is included, rather than a cause of the dollar-euro rate or other rates.

Three of the eight indicators deal with interest rates, three with inflation, PPP and the current account balance as related subjects, and two with growth differentials. The last two columns show the mean for each fundamental over the 17 years from 1999 until 2015 and the mean of the absolute value (irrespective of plus or minus) to indicate the upward and downward deviations and to avoid that they neutralize each other statistically. The second to last line shows the exchange rate changes against the previous year's average, and the last line lists how many of the eight indicators signal an under- or overvaluation and hence a need for appreciation (+) or a depreciation (-) whereby all indicators have the same weight, for simplicity.

If the sign of the differential for each indicator is positive, it signals euro appreciation, and vice versa. For instance, if inflation is higher in the U.S. than in EA, the sign of the differential is positive (U.S. inflation minus EA inflation), potentially inducing appreciation of the

euro, other factors given. If the U.S. interest rate is higher than the one in EA, the differential rate EA minus U.S. is negative, signaling depreciation of the euro, and so on.

First we comment on the performance of each single fundamental indicator:

- *GDP growth* is on average 0.83 percentage points (PP) higher in the U.S., similarly in growth forecasts with 0.7 PP. The absolute growth difference is higher, namely 1.3 PP; the maximum growth differential was 1.8 PP. In nine years, the growth differential calls for appreciation which indeed occurred, in 8 years the signs of exchange rate change and the signal differ. For *growth forecasts*, the signs are in seven years in line with the exchange rate change, in 10 not.
- For *headline inflation* the signs are aligned in 9 years, not aligned in eight years. The inflation differential was fairly small, on average 0.7 PP higher inflation in the US. Maximum inflation differential was 1 PP.
- The *current account balance* is in all years markedly more in deficit in the U.S. than in the EA. In four years the difference (Euro area minus U.S.) was above 6 PP, minimum 3.3 PP. This hinted every year to euro-appreciation, which occurred however only in seven of the 17 years. However, one should have in mind that the bilateral current account balance (similarly the bilateral trade balance) between the two regions is only a thin slice in the total current account balance, especially for the U.S.
- The average *spread of long-term interest rates* was almost zero, but in absolute numbers 63 basis points. The signs signaled appreciation of the Euro, only in eight years in line with actual appreciation. Maximum spread was 152 basis points. The spread for the *real long-term rates* was similar, the mean difference slightly less. The average spread (in absolute terms) was 61 basis points higher in the EA, despite less inflation.
- By contrast, the spread of the *short-term interest rate* was higher, on average (in absolute terms) 101 basis points, maximum 237. Similar to the long-term rates, the spread indicated appreciation of the Euro in only seven years in line with factual appreciation.
- Finally, the average deviation from PPP was nearly 10%, maximum almost 29% and minimum around 15%. Only in five years were the signs aligned.

The results convey a striking message. In all years, some of the eight fundamentals signal the need for appreciation, others for depreciation. There was never a year with an unequivocal sign of all fundamentals for one direction. Only in nine of the 17 years the majority of the fundamentals show in the direction of the actual annual change of the exchange rate – in the other eight years the majority of fundamentals would call for a change of the exchange rate in

the opposite direction than the actual one. Let alone the *strength* of appreciation and depreciation, not even the direction, the sign, of fundamentals was in line with the actual changes of the exchange rate. There is not one fundamental indicator out of the set of eight which is better than showing in 10 of 17 years in the direction of the actual exchange rate. A few fundamental indicators, in particular the current account balance, the spread of real long-term interest rates and the deviation from PPP, call for 10-12 years of the total of 17 years in the opposite direction to where the actual exchange rate was moving. Current account and real long-term interest rates were obviously almost ignored by traders on FX markets.

Even in two of the five years of the crucial turning points or crashes of the exchange rate – 1999, 2002, 2008, 2012 and 2014 – the fundamental indicators signaled the wrong messages to the FX markets, namely 2008 and 2012. In the year 2008, the year of the grand financial crisis and the sudden fall of the euro after July, ending a long phase of enormous euro-appreciation, the fundamentals “voted” 7:1 for further appreciation which did occur (on average in this year), but only until July. Apparently, the correction of the over-valued euro came as an unforeseen shock. Even 2009, when the euro continued to fall, the fundamentals signaled 5:3 the need for appreciation. One may question the results due to using rough annual data rather than quarterly or monthly data, for not weighing fundamentals and for not controlling for time lags and for neglecting indicators for expectations (except growth forecasts). A quick look at quarterly data for some fundamentals does not change the overall picture. Giving more weight to some indicators, say short-term interest rates, does not improve forecasts. Besides, most fundamentals do not change quickly, except short-term interest rates, although the interpretation of indicators may change suddenly. If there were strong time lags, one would have to ask why these were not anticipated and priced in early on. Long time lags, as e.g. for the deviation of the exchange rate from PPP, show that corrections from strong aberration – up to almost 29% as in the year 2001 – take several years, and once PPP is reached it triggers a new wave of strong and lasting deviations in the other direction.

We consider the short-term interest rate differential (triggering short-term capital flows) and the growth differential (impact on asset prices and yields) the most important fundamentals in this set of eight determinants, complemented by deviation to PPP which might contribute to explaining the turnarounds 2002 and 2008. It is quite clear that the deviation from PPP cannot grow infinitely. Even if the analysis were focused on these three fundamentals, the incoherence of the signs remains (see also graphs 12 and 13).

The most important result of this simple exercise is that fundamentals are heterogeneous. THE “fundamentals” do not exist. They do not tend toward a broad-based equilibrium in which real interest rate parity and PPP and close-to-balance current accounts coexist, let alone a stable equilibrium. However, some fundamentals seem to conform with the actual exchange rate changes. What these fundamentals cannot explain is the varying – mostly exuberant – strength of the responses of the exchange rate. At times even small differentials may have caused or at least contributed to landslide capital flows.

Table 1: Dollar-euro exchange rate changes and eight fundamentals 1999-2015

Exchange rate changes and eight fundamental indicators																		Mean of absolute values	Mean of values
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015		
1 GDP growth, EA minus U.S. (PP)	-1.82	-0.10	1.13	-0.85	-2.15	-1.79	-1.59	0.66	1.23	0.64	-1.67	-0.52	0.03	-3.05	-1.77	-1.55	-0.93	1.26	-0.83
2 Growth forecast IMF, differential EA minus U.S. (PP)	0.37 ^b	0.1 ^c	0.04	0.73	-0.28	-2.04	-1.36	-1.47	-0.92	0.17	0.14	-1.19	-0.83	-0.69	-1.96	-1.63	-1.74	0.92	-0.74
3 Headline inflation, U.S. minus EA (PP)	1.03	1.19	0.42	-0.68	0.20	0.49	1.19	1.02	0.73	0.53	-0.61	0.02	0.43	-0.40	0.12	1.19	-0.06	0.60	0.40
4 Current account balance, % of GDP, EA minus U.S. (PP)	3.31	3.24	3.57	4.73	4.82	6.18	6.05	6.17	5.26	4.05	3.08	3.43	3.79	5.02	5.09	5.50	6.31	4.68	4.68
5 Spread long-term interest rates, EA minus U.S. (bp)	-98	-59	1	31	14	-13	-85	-93	-30	69	77	57	152	125	66	-26	-87	63	6
6 Spread short-term interest rates, EA minus U.S. (bp)	-237	-207	57	159	118	55	-133	-207	-99	166	67	50	109	29	5	9	-25	1.01	-5
7 Spread real long-term interest rate, EA minus U.S. (bp)	5	60	43	-37	34	36	34	9	43	122	16	59	195	85	78	93	-93	61	46
8 Deviation of XR from PPP, in % (+ undervaluation)(PP)	6.2	23.9	28.9	22.4	1.8	-7.3	-6.0	-3.8	-11.0	-15.4	-9.7	-4.6	-7.9	0.4	-0.9	-0.9	17.5	9.91	1.98
Change of exchange rate (US-dollar per euro), %	-13.8 ^a	-14.0	-2.2	5.6	18.9	9.7	0.0	1.6	8.7	7.3	-5.4	-4.3	4.5	-7.2	3.1	0.0	-15.8	7.18	-0.2
Signs of 8 fundamentals (+ appreciation of euro)	-3/+5	-4/+4	+6/+2	-3/+5	-2/+6	-4/+4	-5/+3	-4/+4	-4/+4	-1/+7	-3/+5	-3/+5	-2/+6	-3/+5	-3/+5	-4/+4	-6/+2		
Direction: 9x yes, 8x no	no	yes	no!	yes	yes	no	no	yes	no	yes!	no	no!	yes!	no!	yes	yes	yes		

a Change rate 1 January 1999 –1 January 2000 b Forecast European Commission from fall 1999 for E15 c Forecast European Commission from spring 1999 for EU15 EA EA

PP percentage points bp basis points

Source: OECD.Stat, ECB, Federal Reserves of St. Louis; own calculations

Misleading would be a predominant focus on policy interest rates of the Fed and the ECB. From the launching of the euro onward until April 2001, the US-policy rate was up to 200 basis points above the European level - the Euro plunged heavily, seemingly in line with intuition.¹⁴ However, from November 2004 until December 2007, the Fed raised the policy rate 200 basis points above the ECB's, but the euro soared in value. After end-2007 until 2014 the ECB kept its policy rate above the Federal Funds rate, and the euro fell, interrupted by short ups. What is also striking is the fact that the current account balance seems almost irrelevant for the exchange rate gyrations, although imbalances were at times large. It is also amazing that most fundamental indicators differ only slightly across the two sides of the Atlantic over long spells, with the exception of the current account and the deviation from PPP and a few years with marked interest rate differentials of around 200 basis points. It might be that small differences can trigger strong exchange rate changes - in some occasions, in others not.

However, the conjecture that seemingly fundamentals play a minor or even negligible role in explaining the dollar-euro-rate comes too hastily. What is more important than the numerical values of the indicators is their peculiar contextual interpretation, including a basket of some fundamentals and also other indicators, which had formed expectations of agents. For instance, the initial weakness of the euro 1999-2002 might have been influenced by higher interest rates in the U.S. coupled with much higher U.S. growth 1999-2000. But we don't know precisely what drove the expectations of bears and bulls at FX markets. One might infer that expectations are always exogenous. But this implies that exchange rates and their gyrations are totally exogenous as well, also over long periods like 17 years analysed here. We contend that fundamentals and their varying interpretations feed into expectations, sometimes more, sometimes less. Further, when fundamentals convey in many phases unclear signals, then adaptive expectations might predominate, and they are by definition endogenous.

Furthermore, most interpreters, also those with behavioural finance background, seem to disregard PPP. Following the empirical studies, indeed, PPP seems to play hardly any role in the mindset of dealers. However, two of the great turning points, 2001-2 and 2008, signaled the points of the strongest under- and overvaluation of the euro and conversely of the dollar in term of deviation from PPP. The same picture can be seen at some turning point of the dollar-DM rate (and other rates), namely 1985 and 1995, with extrema of under- and overshooting PPP. The fact that central banks have intervened at crucial deviations of the market rates from

¹⁴ One should keep in mind higher inflation in a country should lead in conventional theory to depreciation. Higher policy rates signal inflation risks, hence depreciation pressure. In reality, higher interest rates tend to trigger net capital inflows in most cases, not in line with conventional theory.

PPP (1985, 1987, 2000), making them also nervous about trade balances, may infer more weight of this classic fundamental into the authorities' consideration for their policy decisions.

If fundamentals are involved in the formation of expectations and the behavior of traders, in varying intensity and changing interpretations, we have to ask now what then determines exchange rate changes, both their sign and their magnitude and duration? Of course, the answer is clear: non-fundamental factors, such as speculation and herding, pushed by profit seeking technical traders, accompanied by opportunistic fundamentalists among the traders. Trending on adaptive expectations, in infinite sequences of very short trials and errors lead to long changes in the same direction. It should be added that mostly passive central banks facilitate this performance. Exogenous shocks, recessions and financial crises caused by a multiplicity of factors might also have had severe side effects on foreign exchange markets. Also, the degree of risk orientation of wealth owners to purchase assets in other currency than the prime currency plays a crucial role (see below). Eventually, it should be mentioned that cross-rate determinants of exchange rates must not be disregarded. For instance, the dollar-yen rate or the dollar-RMB rate may have an impact on the dollar-euro-rate.

Now we turn to discussing the explanations of other authors for the dollar-euro-exchange rate and also the dollar-DM rate before we conclude with our own story. Using the form narratives allows to interpret data rather than following mechanical cause-effect dependency.

4.4 Three narratives on the dollar-euro-exchange rate

By narratives we mean a storyline that uses statistical and econometric information, but goes beyond this. Additional events and central bank monetary policy are included. Such stories include idiosyncratic events that cannot be captured properly in regressions or models. Of course, such narratives are assailable since they do not contain “proofs”; but they should be plausible, coherent and in line with facts. First we review the narrative of Michael Mussa and Dominique Salvatore for the period 1999-2005, then we present our own for the period 1999-2015.

4.2.1 Mussa and Salvatore

Michael Mussa from IMF (later Peterson Institute for International Economics) reviewed the euro performance five years after its debut (Mussa 2005/2012). He argues from a policy-

makers point of view, especially from the perspective of US-authorities. According to him the volatility of the euro was overall not higher than for the predecessor currencies, reconstructed as a synthetic euro before 1999. Compared to the heavy volatility 1980-87, which he assigns mainly to fundamental factors regarding inflation and monetary/fiscal policy in the U.S. with its extreme swings, the euro had experienced until 2005 less volatility. Mussa cares not much for short-term fluctuations, up to a year, because of unpredictability but has concerns for the longer and – in his judgement - too heavy swings. In general, he believes that fundamentals have played a role, among other factors, in driving these longer swings, similarly to the era before the euro. He describes the exchange rate changes from the perspective of the macroeconomic policy interest of the U.S. government.

To stem inflationary pressure, the U.S. had an interest in 1999 to import more from abroad, be it from Europe or from Asia. Then the dollar got overvalued and the current account deficit too big, and the U.S. authorities had an interest in appreciating the euro and weakening the dollar. Since the ECB was not willing to aggressively pursue expansionary monetary policy to maintain growth 2000-2002, a depreciated euro against the dollar (and also the RMB) was acceptable. When the U.S.-trade deficit grew in the first half of the 2000s, the main thrust for rebalancing was requested to come from China, not from Japan or from Europe. Hence he warned against further euro appreciation which then materialized after publication of his essay. Overall, Mussa's approach to the dollar-euro exchange rate is multilateral, heaving the other heavy-weight currencies on the radar, as well as the current accounts of the respective countries or regions. Thus he sees more and other fundamentals at work than usually included in models. The under-valued RMB might have reinforced the euro's appreciation against the dollar. He seems to believe that the dollar-euro exchange rate has to adjust to the dollar-RMB-rate – if the RMB does not sufficiently appreciate against the dollar, the euro should play the stopgap role. This raises implicitly the notion that the global key currencies' cross rates have to be determined simultaneously and that there might be multiple equilibria. But Mussa does not go so far. What he offers is not more than plausible guesses that policies and mainly the U.S. vested interests play a key role in the making of exchange rates. Like Rogoff and others he does not search for explanations of the long and strong phases of over- and undervaluation. It seems that speculative exuberance is taken for granted and for unavoidable, so no need to mention as it might give support to heterodox economic policies.

Salvatore (2005) attempts to explain the euro performance 1999-2005 mainly with fundamentals which he sees at work but he distrusts econometric models which cannot capture all fundamentals in a broader sense than in traditional orthodox theories. He sees the debut of the

euro at a slightly overvalued rate, thus precipitating subsequent depreciation. The early euro weakness 1999-2001 is driven by prevailing skepticisms against the new currency by the majority of Anglo-Saxon economists, by higher interest rates and higher growth rates in the U.S., inefficient interventions for the euro, and negative political news (like the Danish referendum against the euro). The turnaround came when the U.S. economy stalled. The 9/11 events cast doubt on the safe haven function of the U.S. Growth picked up in the EA in 2002, contributing to a reversal of the interest rate differential. The strength of the deep fall of the euro seems to show for him the strength of the fundamentals, not the activity of unknown drivers. The euro appreciation after 2002 is seen as a recovery to normal – but his analysis stops when the switch from under- to overvaluation of the euro started in 2005.

Regarding the influence of non-fundamentals, he argues, similar to Mussa, that - like on stock markets – agents cannot clearly distinguish fundamental from non-fundamental factors. Besides, cross rates like the dollar-RMB rate can have a bearing on the dollar-euro rate. In other papers he adds that the U.S. budget deficit and the reserve currency status of the US-dollar may allow for some degree of neglect of current account deficits and a disregard of an overvalued dollar in real effective terms, like in the years 2005-2008. Salvatore does not recognize that the dollar was indeed over-valued in real effective terms, but the euro was also over-valued against the dollar in view of the PPP benchmark. This sheds light on the fact that current accounts are determined not only by (real effective) exchange rates and the latter may not be capable to rebalance trade and current account imbalances.

In contrast to Rogoff and other authors who contend “disconnect” between exchange rates and the real economy, Salvatore sees grand distortions from overly volatile key exchange rates and, even worse, from long-lasting misalignments like the long over-valuation of the dollar in the 1980s; this is considered the key failure of the present global exchange rates system (Salvatore 2012):

“Large and persistent exchange rate misalignments can be very disruptive to the flow of international trade and investment over time. An overvalued currency has the effect of an export tax and an import subsidy on the nation and, as such, it reduces the international competitiveness of the nation or trading block and distorts the pattern of specialization, trade, and payments, and it can lead to unemployment, idle capacity bankruptcy, protectionism, and serious trade disputes ... This is exactly what happened when the U.S. dollar became grossly overvalued in the mid-1980s and it could now result from the large overvaluation of the euro and undervaluation of the Chinese renminbi with respect to the dollar today, if they remain uncorrected.” (Salvatore 2005, 463)

We could not agree more. In the next section we try to interpret in more detail the performance with particular attention to the turning points of the dollar-euro-rates 1999-2015.

4.2.2 An alternative narrative

Both narratives mentioned end in 2005. Our own narrative encompasses ten more years and differs in a number of aspects: the role of speculation, introducing an additional fundamental determinant, more emphasis on central bank policies, role of other exchange rates on the dollar-euro rate.

As mentioned above, the euro devalued 30% from 1.17 dollar per euro, as the starting value 1999, until October 2000, reaching a low of 0.82 (data in this section are from ECB, Bundesbank, OECD.Stat, Eurostat). The reversal started not before February 2002. Both the EA and the U.S. economy were in a fairly strong growth phase until 2002 and 2001, respectively, stronger in the U.S. than in Europe. During September-November 2000, ECB, Fed and Bank of Japan intervened jointly to weaken dollar and yen. This may have helped somewhat to dampen the thrust of devaluation of the euro. As mentioned before, U.S. short-term interest rates lay more than 200 basis points above the ones in the EA. Maybe the NATO-led Kosovo war in the year 1999 invoked uncertainty on Europe's political and economic prospects, and later the 9/11 attacks in 2001 and the ensuing bursting of the dot.com bubble contributed to the weakening of the dollar. Some hold that the initial change of DM reserves in Russia and Eastern Europe into dollars rather than euro had supported the euro's weakness (Sinn 2009, 39ff.). But why should all these events have devalued the euro by 30% leading to an undervaluation of the euro, relative to PPP, of almost 29%? It is very likely that the uncertainty, caused by the advent of a brand-new currency, and the neglect of guidance by the central banks opened the doors for speculative traders who profit from over- and undershooting and exploit uncertainty. Several commentators assume that this infant phase of the euro cannot sufficiently be explained by fundamentals (De Grauwe 2000, SVR 2000, no. 350 ff.). But it is true that fundamentals showed the need for some euro depreciation, so fundamentals must have been involved. Hinting solely at interest rate and growth differentials obscures the role of speculation.

The start of euro appreciation 2002 was commenced by stronger reduction of interest rates in the U.S. than in the EA. The interest rate differential changed the sign. The U.S. authorities were now interested in the weakening of the dollar, since the current account deficit was on the rise. The strengthening of the euro was reinforced by the pressure of the undervalued renminbi and other emerging countries' currencies on the dollar. Again, it remains somewhat enigmatic whether the change in the interest rate spread was enough to cause a turnaround of the exchange rate. In other phases the interest rate differential was irrelevant. It could likely

be that traders started to bet on a weakening dollar, and authorities on both sides of the Atlantic were happy to see this. But again it led to overshooting euro appreciation, after a temporary setback of -12% during the year 2005, marking uncertainty about weaker growth in the EA and a tumescent interest rate differential supporting the value of the dollar.

The appreciation of the euro from end-2005 until July 2008 was not in line with some fundamentals: higher U.S. short-term interest rates 2005-7 and over-valuation of the euro in regard of PPP, while there was only slightly higher growth in the EA 2006-2008. The key point seems to have been the widening U.S. current account deficit until its peak in 2006, triggered by real undervaluation of both the renminbi and the devaluation of the yen, starting 2005, aggravated by high oil and commodity prices. Hence the euro appreciation was highly welcome for the U.S., supporting the real effective depreciation of the dollar which had already started in the early 2000s. The ECB was misguided at the time to keep interest rates high until a year after the Fed started lowering the Federal Funds Rate in July 2007; this triggered excessive euro appreciation up to US-dollar 1.60. The German Council of Economic Advisers considered the euro appreciation 2007 and 2008 and the fall 2008-9 as driven by fundamentals, hence justified by the interest rate differential and growth differential in Europe. There is no explanation of the exuberance of the euro appreciation and the subsequent free fall and the strong deviation from PPP until the peak in 2008 (SVR 2007, no. 73, SVR 2008, no. 128).

It is amazing that the real effective dollar depreciation from 2002-2008 by 20% went along with a *rising* U.S. current account deficit, while the euro's real effective appreciation of 43% (2001-2008) coupled with undervaluation of the renminbi and yen's real effective depreciation 2000-2007 by 28% did not lead to a EA trade deficit. This as mainly achieved by Germany's wage restraint and a switch in Germany's export market expansion in the EA, leading to strong internal imbalances in the EA. Germany and a few other members passed the burden of the euro appreciation on to the less competitive members who became strong deficit makers. Peripheral EMU members fell into trade deficits, to which the overvalued euro had contributed. More on this in chapter 5.

It is hard to explain the 85% nominal appreciation (+43% REER appreciation) of the euro from the low in 2001 until its peak in July 2008 (see graph 1 and 3) by the eight fundamentals mentioned. It is very likely made by the traders who pushed trending toward appreciation despite a strong overvaluation of the euro relative to PPP of some 15%. The traders knew that the Fed would not intervene in face of the U.S. current account deficit and that the ECB

would not intervene unilaterally. There was no guide-rail or buffer-stop against appreciation speculation.

The ensuing financial crisis and uncertainties regarding the financial stability of U.S. investment banks led to the reversal in July 2008. That the ECB started to lower interest rates almost a year after the Fed, causing a marked interest rate differential, likely has contributed to the fall of the euro, but this was probably not the key factor. What counted more is that U.S. wealth owners sold assets held abroad and returned to the U.S. as the safe haven. This shock wave hit the emerging economies' currencies most, but also the euro and even more the Sterling. Wealth owners reduced their risk proclivity and turned risk-averse, switching from low to high liquidity preference in times of uncertainty and emergency. The breakdown of the interbank markets reduced the supply of liquidity, until the Fed opened the faucets to flood the economy with liquidity (Smaghi 2015). The turnaround of the year 2008 – the euro fell by 22% from July to November – was likely not driven by conventional fundamentals, let alone the current account and the violation of PPP. It was a clear consequence of the crisis, which demonstrated which currency is the prime money on the globe. The paradox that the currency of the country that is the epicenter of the crisis appreciates against the rest of the world reflects the hierarchy of currencies and the predominant trust in the U.S. authorities to cope with the mess better than other competing currencies. The euro is a regional currency, the dollar is global money.

The change in risk inclination by wealth owners in the financial centres of the world includes the demand for dollar liquidity. Due to the return of dollar-denominated finance to the U.S., scarcity of dollar reserves in emerging economies and many OECD countries too let the demand for dollar liquidity suddenly rise.¹⁵ This happened despite the quick and huge increase of dollar supply by the Fed – its lender of last resort function for international liquidity – to the rest of the world. Changes in risk preference of wealth owners are the flipside of liquidity preference linked to certain currencies which offer a high degree of international liquidity. Such changes in liquidity preference should be considered similar to traditional fundamentals, a point neglected in standard exchange rate theories. Capital flows are not only driven by yield differentials, but also by risk preference and related liquidity preference.

¹⁵ The yen appreciated similarly to the dollar in the course of the financial crisis even though the yen has a relatively weak function as an international reserve currency. But for Japanese wealth owners it has a strong function. When carry trade became too risky in face of the global recession, yen investments in high interest rate countries were transferred home. Besides this, U.S. financial investments in Japan played a small role in face of the prolonged stagnation in Japan so that there was less foreign finance to be withdrawn to the U.S.

The fall of the euro 2008 and the volatility afterwards were a feast for FX traders. Again, uncertainty invites for speculation. After a series of three strong ups and downs 2009-2014 the euro fell further to a low of 1.06 by end-2015. This phase reflects mainly the uncertainties of the diverging recoveries on both sides of the Atlantic and the outbreak of the euro crisis 2010. The milestones were the announcement of ECB-president Mario Draghi 2012 to support the Euro “whatever it takes” and Quantitative Easing (QE) in the U.S. in three forms. QE started in the U.S. in November 2008, a second round came in November 2011 (QE2) and a third round in late 2012 (QE3 without a time limitation). By the end of 2013 tapering was announced and bond purchases came to a halt in February 2014. The Fed started to raise interest rates for the first time since almost a decade in December 2015, while the ECB had started to purchase assets in the framework of the “expanded asset purchase programme” (APP) by March 2015, geared to purchase assets by €60 billion per month until spring 2017 to fight deflation. The programme for “Outright Monetary Transactions” (OMT), announced already 2012 in the famous “Whatever it takes ...”- speech of the ECB president was never more than paper. The QE strategy of monetary policies in the U.S., in Japan and especially by the ECB de facto triggered – be it intentional or as an unintended but tolerated side effect – depreciations of the currencies, especially against China and other emerging economies. This started a wave of undeclared “currency wars”, initiated by the Fed, followed by Japan in 2010, later in the context of “Abenomics”, while China responded with a return to depreciation against the dollar in late 2013 (by -8% until February 2016) and the ECB came in belatedly (see also SVR 2010, no. 59 regarding QE2, similarly Sosvilla-Rivero/Fernández-Fernández 2015). The strong euro devaluation until 2016, led to 3.5% current account surplus (2015) in the EA. It is likely that the ECB deliberately aimed at current account surplus or infamous “beggar-thy-neighbour” policy, in the face of looming deflation and contractionary fiscal policy. This way, the ECB used for the first time actively exchange rate policy.

Growth performance after the financial crisis was much better in the U.S. than in Europe, thus strengthening the dollar, although policy interest rates remained higher in the EA until 2014. QE was much weaker and later practiced by the ECB. Hence the dollar appreciation after 2008, in particular after 2014, was pressured by central bank policies and the much better economic performance in the U.S., whereas the EA fell into recession 2013 and 2014 and crept into a very weak recovery 2015. The strength of the depreciation of the euro may again be determined by the technical traders leading to an undervaluation of the euro, relative to PPP, by almost 16% 2015. The PPP benchmark, following OECD calculations, stands at the time at around 1.30 dollar per euro.

Our narrative on the dollar-euro exchange rate 1999 until 2015 – summarized in chart 2 – differs from the other narratives in several aspects. It covers the period 1999-2015. It gives strong explanatory power to speculation of currency traders, mainly for explaining the strength and long duration of the swings of the exchange rate. We attach some weight to short-term interest rate (not based on IRP theory) and growth differentials, both not traditional determinants in exchange rate theories. We include changing risk preference for dollar denominated assets as another important factor. Further, we attach more weight to central banks' monetary and exchange rate policy which had – in the form of QE – strong impacts on the exchange rate. Finally, we emphasize more than other authors the impact of exchange rates of other key currencies on the dollar-euro rate.

Chart 2: Narrative on the dollar-euro exchange rate 1999-2016

1. 1999-2002 weakening euro

- January 1, 1999 to October 2000: euro falls by 30% (from 1.17 to 0.82 dollar per euro)
- fundamentals: GDP growth and interest rates higher in U.S. than EA; many considered initial euro as slightly overvalued
- skepticism against EMU
- interventions by ECB/Fed/BoJ with little success
- no unilateral intervention by ECB
- uncertainty about euro, speculation against euro

2. Turnaround in February 2002

- fundamentals: change in interest rate differential - lowered interest rates in U.S., higher in EMU, improved growth forecasts for EMU; strong deviation from PPP (euro undervalued by -22%)
- political events in U.S.: 9/11 2001, “war on terror”
- dollar considered too strong, current account deficit rising, under pressure from emerging economies
- FX traders switched to speculating on euro appreciation, no resistance

3. Strong appreciation of euro 2002-2008

- 85% appreciation, from 0.82 to 1.60 (trough October 2000 to peak in July 2008)
- fundamentals ambiguous: weaker GDP growth in EMU until 2005, then U.S. growth weakens; spread short-term interest rates supports euro until 2004, then U.S. rates higher until 2007
- rising current deficit in U.S., U.S. suffers from undervalued RMB; U.S. government likely in favour of euro appreciation
- no interventions against euro appreciation expected from Fed, no unilateral intervention from ECB; EMU follows *laissez faire* XR “policy”

4. Turnaround 2008: euro drops, dollar strengthens

- Fundamentals: euro overvalued relative to PPP by 15.4%
- financial crisis: repatriation of dollars to U.S., liquidity preference in “safe haven”, turn to risk aversion by financial investors; dollar shortage in emerging economies, demand for dollars rises

5. Decline of the euro 2008-2012

- euro drops 21%, with several ups and downs
- fundamentals: ambiguous; growth performance better in U.S.; interest rate higher in EMU
- Fed starts QE 2008, QE2 2011, expected to be efficient; lower interest rates in U.S. strengthen dollar

- euro crisis 2010, policies to cope with financial crisis expected to be more efficient in U.S.
- period of high uncertainty, more trust in dollar and respective U.S. policies

6. Further decline of euro 2012-2016

- fundamentals: mini spread of short-term interest rates; higher growth in U.S.; rising current account surplus in EMU, reduced current account deficit in U.S.
- short recovery of euro 2012-14 after Draghi's speech "Whatever it takes", strong decline of euro 2014-16 by 22% from 1.36 to 1.06 until early 2016, in 2015 undervaluation of euro against PPP by 17.5%
- double-dip recession in EMU 2012/13, sluggish recovery, deflation risks
- QE3 in U.S. 2012, tapering announced in early 2014, rise of interest rate in December 2015
- OMT programme of ECB not implemented, QE of ECB ("APP") started in March 2015
- "currency war" U.S., EMU, Japan, China and other emerging economies
- speculation tends to go for weakening of euro

Overall, our narrative shows that a solely fundamentally determined equilibrium exchange rate, not disturbed and distorted by short-term speculation or other factors, as stipulated by the German Council of Economic Advisers (SVR 2000, no. 350ff.), has never existed – there is no uniform and unambiguous set of fundamentals, at least not in the reality of a floating exchange rate regime. They always contradict each other. Such a fundamental equilibrium exchange rate is a myth. Determining a solely fundamental exchange rate requires normative evaluations, gauging trade-offs, weighing advantages and downsides.

The upshot of our broad discussion of the role of fundamentals is that these asserted determinants of exchange rates do not deserve the elevated rank as a gravitation centre for exchange rates, be it for the short or the long run. At times, some of them are specific co-determinants of exchange rates among many others. The notion of ONE equilibrium exchange rate should be abandoned. There are multiple short-term equilibria, with no firm anchor. The consequence of this is to look for normative exchange rates in a multilateral system that gauges different factors considered important to synthesize internal and external macroeconomic equilibria. Then *exchange rate policy* is needed to supplant the myth of a unique fundamentally determined exchange rate. If FX markets lead from one aberration to the next, with high volatility and long misalignments, markets need prudent guidance.

4.3 Summing up

In our analysis of the dollar-euro FX market under a market regime of perfect floating, we had found that nominal exchange rates in the short and medium term are driven by the unpredictable behaviour of heterogeneous agents, namely by short-term capital flows, speculation, trending and changing expectations. Among the fundamentals analysed, expectations built on news about short-term interest and growth differentials between the U.S. and EA are the most

important ones which feed into the behaviour of FX agents, We have rejected the conventional view that in the long run key fundamentals hold sway, namely (real) interest rate parity and PPP. There is no long run gravitation centre of exchange rates, no stable resting place, and in this sense no fundamental market equilibrium. There may be a notional, fictitious “equilibrium”, but reality does not follow this notion. Capital movements and expectations seem to be unanchored. We are always in the short run or in an endless sequence of short runs. Also relative PPP (corrected for the Balassa-Samuelson effect, transaction costs etc.) is not such an anchor since long-standing deviation from PPP distorts the structure of production. Hence measured PPP, touched by exchange rates in passing every five to ten years, is not the kind of PPP which Gustav Cassel and many others (among them Keynes 1923) had in mind. Thus, we conclude that market determined stable fundamental exchange rates are an oxymoron.

However, exchange rates are not totally chaotic. Chaos theory does not apply (Federici/Gandolfo 2012). We observe super-cycles similar to other asset bubbles. Hence, exchange rates do not grow or fall ever and ever, ceiling-less and bottomless. Sooner or later turnarounds come, which have according to our analysis idiosyncratic causes. Each turnaround in the past was different. We have argued, that conventional fundamentals are seldom totally absent. But the messages they send are rarely unambiguous. They need interpretations. The absence of those agents which have a strong interest in following certain fundamentals, if not all, opens vast space for private dealers – long opening hours for the FX casino. The natural caretakers with an interest in fundamentals, especially regarding price stability, financial stability, current account balances (or preventing extreme imbalances), stable and hence sustainable net international investor position, free trade and undistorted competitiveness – are or should be central banks and their governments. Whatever their decisions, they can follow benign neglect and laissez faire, they could also aggravate exchange rate distortions by extreme single-handed monetary or fiscal policy, but they could also constrain and limit exchange rate gyrations and manage the bilateral rate to approach compliance with fundamental variables to support the thriving of the real economies.

Our analysis has left many issues open. The main one is the role of capital flows for exchange rates and their determinants. This goes much beyond interest rate differentials.

Up to here we have neglected an important issue. Do we really fare badly with the capricious dollar-euro exchange rate and its strange gyrations? What exactly are the problems? Aren't our enterprises well equipped to cope with the fluctuations? At least on the European side of the Atlantic, haven't we generated a common currency to insulate our economies from the

fickleness of the former bilateral dollar exchange rates? Hence, how relevant is the dollar-euro rate?

We address these issues in the following chapter.

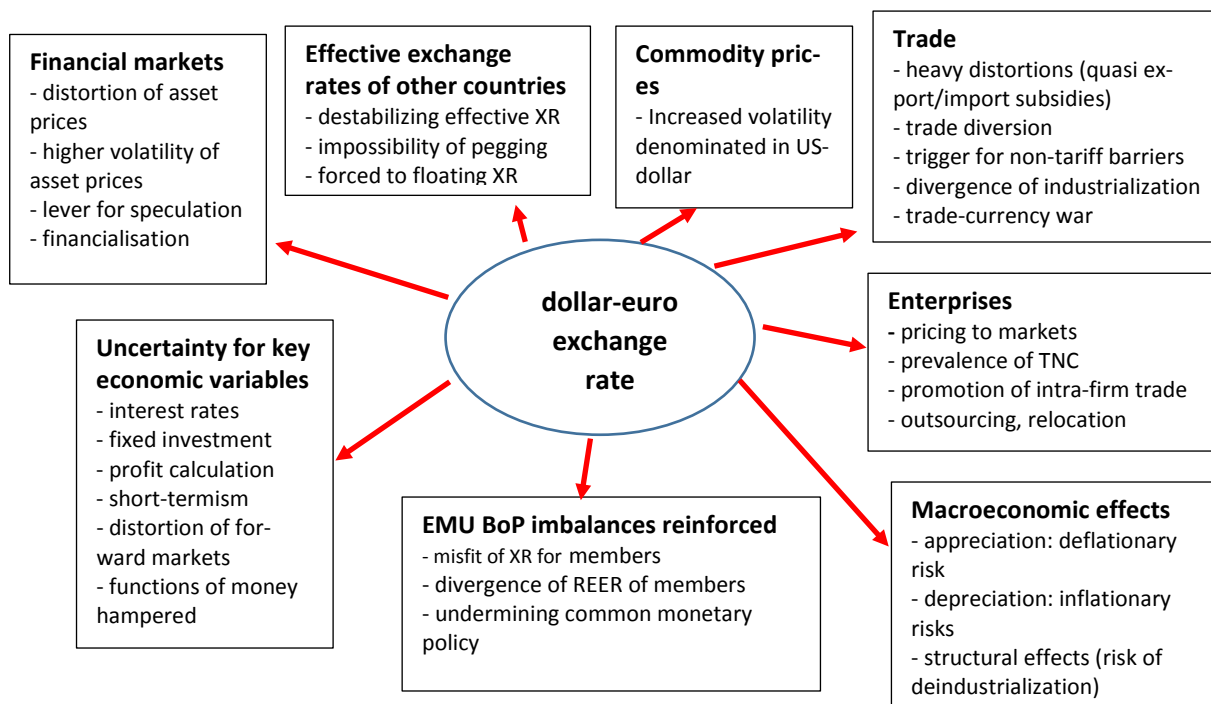
5. Consequences of the fickle dollar-euro exchange rate - can we cope with it?

Strongly volatile exchange rates are likely to be misaligned over long spells. On overview on the negative impacts of volatile and misaligned dollar-euro exchange rate is presented in chart 3. Most of the items listed will be explained in this chapter. Due to space limitations we will exclude the effects on commodity prices which are predominantly invoiced in US-dollar. Their volatility has many reasons, but the strength of the dollar is one important determinant. Commodity prices are extremely important for the majority of developing countries, especially for the poorer ones; yet, regarding fossil energy prices, they impact also advanced countries, with complex effects on energy and environmental policies and also on balance of payment issues. We also exclude the impact of the dollar-euro rate on nominal and real *effective* exchange rates for those countries which trade with both the dollar and the euro bloc. This applies for most commodity producers but also for most emerging economies. Their effective exchange rates become more volatile if they peg softly or tightly to either the dollar or the euro. From this angle, the dollar-euro FX market has a negative impact on developing countries harmed by the two centre-top boxes in the chart which are excluded in this chapter.

In what follows, we look first at trade shares in the EA which are not denominated in euro, or not in dollar on the U.S. side of the Atlantic. Second, we assess how enterprises cope with exchange rate changes. Third, the relationship between dollar-euro volatility and European trade imbalances is analysed. Fourth, we highlight the role of the dollar-euro exchange rate in the pricing of financial assets. This leads us also to the international usage of the euro and the dollar, especially regarding financial flows. Subsequently, we sum up.

Chart 3

Impacts of misaligned/excessively volatile dollar-euro exchange rate



5.1 Trade of EA mainly denominated in euro

One of the key initial ideas for inventing the euro was to insulate European trade against chaotic and unforeseeable exchange rate fluctuations of European currencies against the dollar and also amongst them. Indeed, if a large share of European trade is intra-Europe trade, denominated in common currency, the dollar-euro exchange rate would at first glance be relevant only for the small share of extra EU-trade, insofar the latter is denominated in foreign currencies. As a matter of fact, currency cooperation before the advent of the euro and the euro itself thereafter have strongly contributed to the highest degree of trade integration among all trading regions on the globe, of course in conjunction with intra-regional free trade policy.¹⁶

Yet the “insulation idea” of the euro is to some extent elusive. If a very high share of the EA trade were denominated in euro, seemingly not exposed to the dollar-euro exchange rate bonanza, it would imply that the PPP vis à vis the U.S. or the broader dollar bloc could simply be disregarded, as if the two blocs live on different planets. Even if the share of inter-

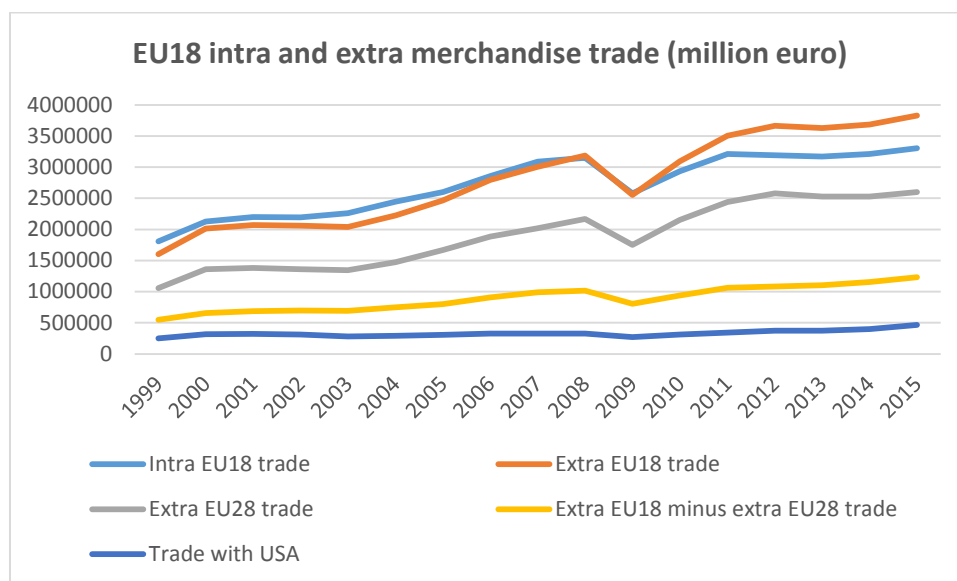
¹⁶ Intra-regional merchandise trade accounts in Europe for 71% of total trade, in North America for 48.7%, in Asia 52.6%, Latin America 26.0% and in Africa only for 12.3% in 2010 (Auboin 2012).

continental trade is small, prices of goods and services on the world market are connected and producers compete against each other. Under competition on “contestable markets” within and between the two blocs, being under threat from potential outsiders in trade or takeovers regarding shares, firms on both sides of the Atlantic watch diverging price levels with vigilance and suspicion. Hence the law of one price cannot be violated unlimitedly between two blocs with fairly low levels of tariff and non-tariff barriers. Attempts to evade the dollar-euro exchange rate with wide use of the home currency is quite limited, although the transatlantic trade is thin. Nonetheless, use of the home currency can lower the direct exposure to volatile exchange rates. In this limited sense using home currency provides some important shelter (lower hedging costs, reduced currency mismatches in balance sheets, option to issue bonds or shares internationally in local currencies). Therefore we attempt to assess how much trade of the EA is denominated in euro.

In the course of globalization, the share of extra-EU trade, i.e. trade with other economies in Europe and other continents has risen strongly, especially after the financial crisis of 2008/9. This is shown in graph 15 and 16 for merchandise trade with other regions, excluding trade in services for which regionalized data for the whole period are not available in Europe.

Trade with trade partners outside the EA (in graphs 15 and 16 without Lithuania, called EU18) makes up some 53.7% of total intra and extra trade. Trade is counted here as merchandise ex- and imports. Extra trade had outpaced intra trade since the financial crisis. Extra trade includes here trade with ten EU countries not in the EA, with other European countries, with the U.S. and the rest of the world. Trade with the United States remains a small chunk in EU18 trade, namely 6.5% of EA intra and extra trade and only 12.1% of EA’s extra trade in 2015 (Eurostat 2016).

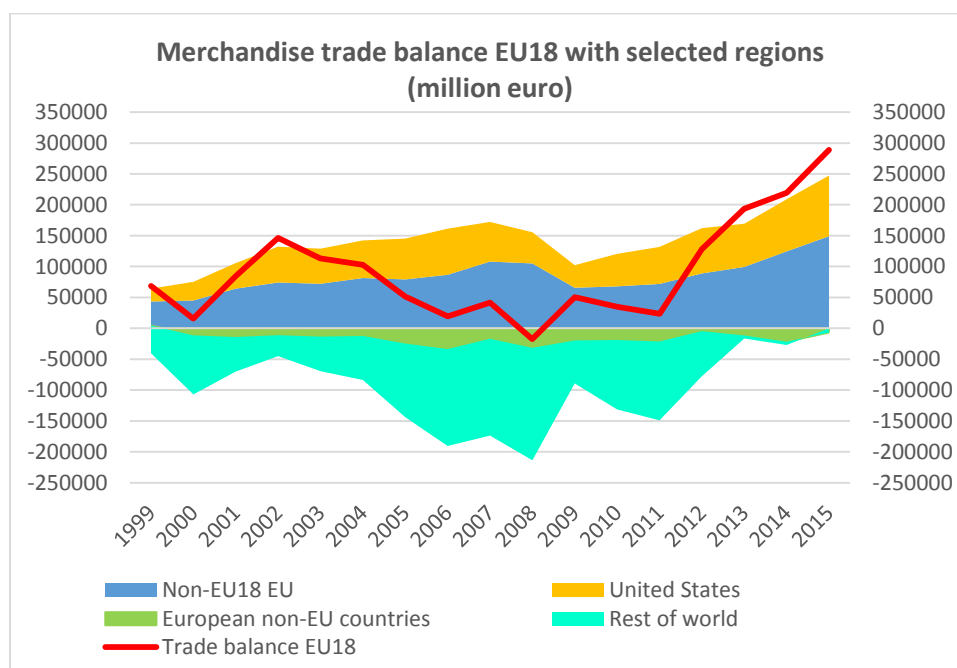
Graph 15



Source: Eurostat. Note: EU18 is EA without Lithuania. EU28 excludes Croatia. Extra EU18 minus extra EU28 trade is trade of the EA with 10 other EU members.

If we look at the merchandise trade balance of EU18 by partner regions, we see the rising surplus of the EA after the crisis, mainly caused by the vanishing deficit with the “rest of the world” (here defined as extra European trade without trade with the United States). The trade deficit with China shrank, also the deficit with OPEC countries.

Graph 16



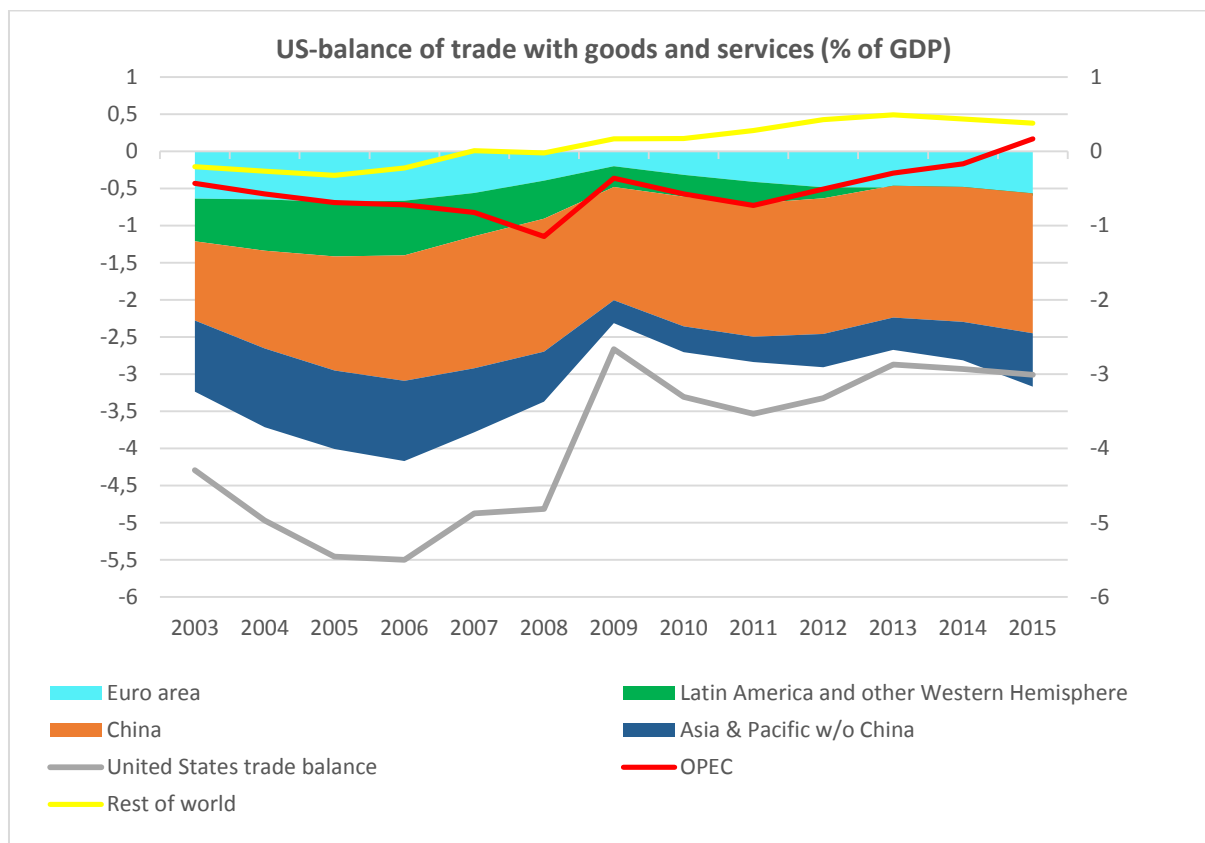
Source: see graph 15. Note: data from Eurostat on EU18 are imperfect; EU18 intra exports and imports should be equal, but differ slightly.

The EA trend in trade of services used to be in deficit until 2006, but turned to slight surplus since 2007 (Eurostat). Service exports account for around 16% of merchandise exports and imports by 2015. We presume that the regional pattern does not differ much from merchandise trade.

Eurostat reports that about 34% of extra EU-imports were denominated in euro, 58% in dollar in 2014. Of extra EU-exports, 49% were invoiced in euro, and 32% in dollar, in 2014. With these data we gauge that in 2015 70-78% of total EU28 trade (intra- and extra merchandise trade) was denominated in euro, presumed that most trade of the EA with 10 non-EA EU member states and most of the trade between them is denominated in euro. This does not imply that all exchange rate risks are excluded if ex- or imports are denominated in home currency, since the trade partners bear risks that can impact costs and prices which influences their demand and supply. Similarly, for the U.S. traders, most of their imports and exports are denominated in home currency, so that their exposition to currency risks are traditionally small. While the EU-trade (goods and services) share in global trade was about 24% (2014) and the U.S. share was only 22% (WDI 2016), the dollar's share in invoicing is estimated at 52% and the euro's share at 30.5% 2014 (SWIFT 2015). The predominance of the dollar is one dimension of the "extraordinary privilege" (Giscard d'Estaing) of having a global reserve currency accepted as global money in all its functions almost everywhere. The international usage of the dollar for denominating financial assets is even stronger (cp. 5.5 below). If these trends towards internationalization and globalization continue, the dollar-euro exchange rate gains relevance for the European economies and the degree of insulation shrinks.

Although the dollar-euro exchange rate as a bilateral rate has a seemingly small impact on the current accounts of the U.S. and the EA, the effective exchange rates are strongly influenced by the dollar-euro rate; 49 countries use the dollar as anchor currency (by pegging or managed float) and 28 countries the euro (ECB 2015, 8). Many other advanced countries co-move more or less with the euro against the dollar. Hence, the current account balance of the U.S. and the EA are strongly influenced by the (inflation adjusted) bilateral dollar-euro exchange rate. In other words, the bilateral and the effective exchange rates correlate. Graph 17 shows the trade balance of the United States with other regions. Since 2003 when data became available the EA played only a marginal role as a component of the US-trade deficit, similar to overall trade balance of the EA. China and other Asian countries are the main surplus partners of the U.S.

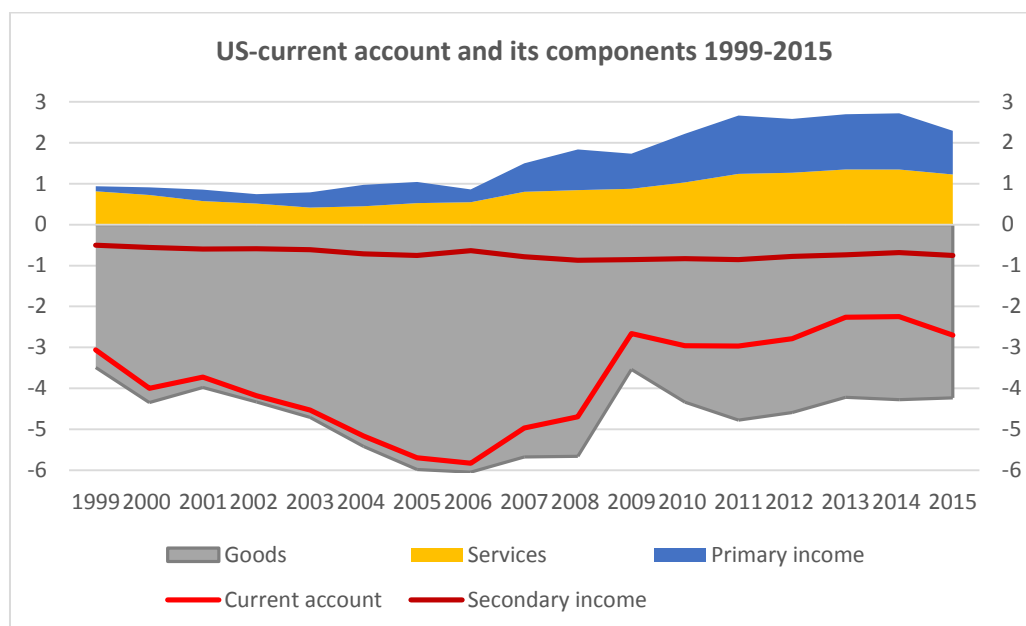
Graph 17



Source: Bureau of Economic Analysis, online database.

For the U.S. CA, the surpluses in trade in services and in the primary income balance (mainly net profits earned abroad) lower the high deficit in merchandise trade (see graph 18). The valuation (in dollars) of profits made by US-companies abroad, especially in Europe, increase if the dollar weakens and thereby reinforces the US primary income balance, and vice versa.

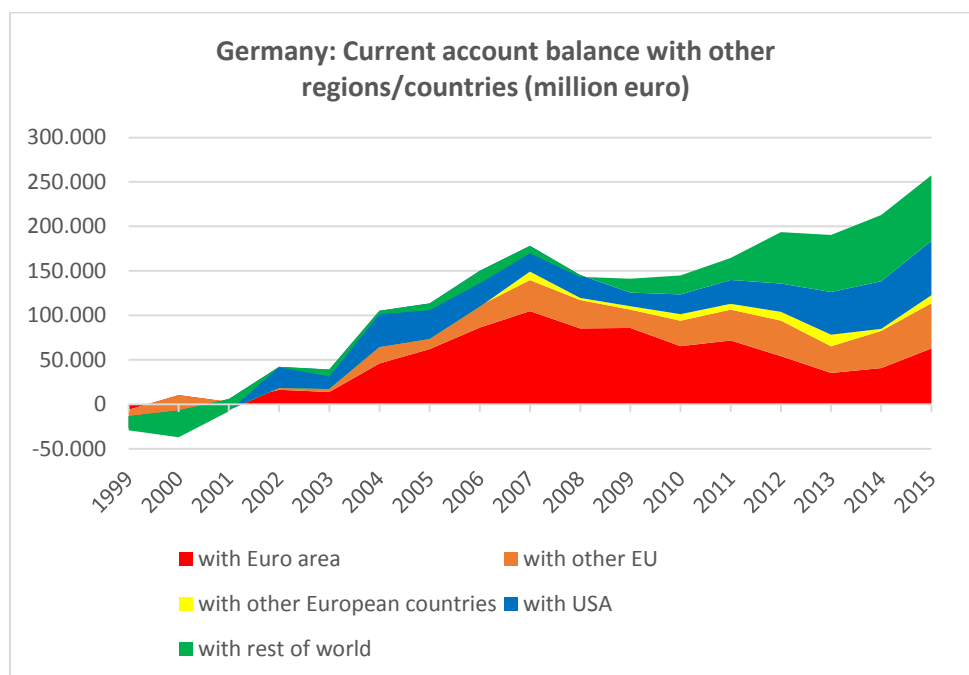
Graph 18



Source: see graph 17.

Regionalised data for the EA current account are not available. Since Germany accounts for the bulk of the EA CA surplus (70% 2015) and regionalized data for Germany's CA are available, we trace the performance of Germany's surplus since the advent of the euro (graph 19). The surplus peaked before the financial crisis, dropped in the aftermath and swelled since the outbreak of the euro crisis to a record 8.5% in 2015 and 3.5% for the EA CA surplus. Roughly 20% of the German surplus is vis à vis the United States which compensates – together with surpluses against the rest of the world – Germany's dwindling traditional surplus against other EA countries. 75% of Germany's surplus occurred in 2015 vis à vis non-EA countries. Hence the euro's exchange rates against the dollar and also other currencies gained enormous impact after the financial crisis and the outbreak of the euro crisis. This is relevant both for Germany, the EA as a whole and also for the United States.

Graph 19



Source: Destatis

The EA/US trade plays a fairly small role for both sides in their trade and current account balances. Germany has traded for long (until recently) more with France than with the US-economy, although the US-GDP is 6.25fold the size of France's in 2014 (WDI 2016). It seems plausible that this disproportion could be caused, among other reasons, by trade-unfriendly floating exchange rates. This would imply that the dollar-euro forex market has a grand-scale trade-diverting rather than trade generating function. Here we cannot delve deeper in this hypothesis.

Our bottom line in this section is: The establishment of a common currency area has also established a partial insulation of the common currency from the US-dollar, with regard to trade. This has contributed to the fact that the EA is a region with strong – and much stronger than before 1999 – internal trade integration. However, the euro has gained limited international importance beyond being merely a regional currency; in addition the EA became more and more embedded in the global economy, in trade and finance. Therefore the exposure of the euro to the “dollar area”, much larger than the US-economy, is on the rise, giving more impact to the dollar-euro intercept.

5.2 How do enterprises cope with the volatile dollar-euro exchange rate?

Enterprises can avoid exposure to exchange rates, with the dollar or other currencies, if they refrain from using other currencies as much as possible, hence trade within the EA or other EU countries whose currencies are pegged to the euro. However, the EA imports many raw materials and intermediate goods from abroad, let alone consumer goods from emerging economies, mostly denominated in dollar. The most important instrument for shielding against exchange rate risks is the usage of forward currency contracts and swap agreements for trade related payments. This is an insurance against exchange rate changes regarding payments for ex- and imports with a maturity up to a year. Yet, for the next transaction a new exchange rate might prevail which impinges on the profitability of exports or imports. Investment in fixed assets geared for export production cannot be insured against exchange rate risks. Hence, forward forex and swap markets offer limited hedging for trade, fixed capital, output and employment.

Relocation of production across the Atlantic or to low-wage areas may alleviate appreciation pressures. But again, foreign direct investment in other currency areas, say the U.S., is again exposed to unhedged exchange rate risks, unless production is assigned to satisfy only the domestic market, i.e. the US-market, or exports are denominated in dollar. Multinational companies producing in many countries in different currency areas have better options to diversify their production against exchange rate risks. Hence, the share of multinational companies in transatlantic trade is high, indicated by a 50% share of intra-firm merchandise trade, also called “related party trade” in contrast to “arm’s length trade” in the terminology of the WTO (Lakatos/Fukui 2013). US-intra-firm exports account for 32% of all US exports to the EU, intra-firm imports from the EU account for 62% all imports from there (ibidem). This reflects that transatlantic trade is mainly done by large-size enterprises, discriminating against small and medium ones whose role is tilted to supplying large corporations, apart from intra-currency area trade. For instance, the top 100 German industrial enterprises (without construction) have a market share in intra EU trade of 51% and 63% in extra-EU trade (Eurostat).

There is widespread consensus that corporations active on foreign markets with different currencies practice pricing according to “mark-to-markets” (Krugman 1986). This means that in case of appreciation of the home currency, prices on foreign markets are kept relatively stable. Thus, pass-through of higher costs is limited. Hence profit margins are diminished or become negative, either compensated by profits made in other currency areas or by future profits if exchange rates change. Maintaining the market shares is more important for the corporations

than achieving profits on shrinking markets. Of course, such imperfect competition pricing strategies that maintain the law of one price but breach the “law” of cross-border profit rate equalization cannot be sustained for long. Conversely, in periods of a depreciating home currency, market shares are extended with little pass-through of lower costs to the customers (sticky prices).

It is likely that companies and sectors faced with heavy exchange rate appreciation up to 100% are under pressure to cut costs on all fronts, mainly exerting pressure on wages, and/or shifting exports to other regions even if market shares on foreign markets are diminished to some extent. For the EA facing a strong euro it would mean shifting export market shares away from extra EU-exports to intra EU-exports (and respective changes of imports) and vice versa in times of a weak euro. Pressure on domestic wages can also be intensified by partial outsourcing of production to low or medium wage level areas, for instance in Eastern and Central Europe, thus lowering the value added share in high income European countries. By contrast, when the US-dollar remains overvalued against many other currencies in terms of real effective exchange rates, let alone strong fluctuations against the euro, deindustrialisation is likely to make its way, reflecting chronic exchange rate misalignment. Innovation strategies may help to counter over-appreciation somewhat, but they need time and have a long gestation period.

Short appreciation spikes are less harmful for enterprises than long spells of medium-sized overvaluation. It is very likely that distortions in production structures of countries occur with lasting effects; this could be called *exchange rate hysteresis*: Lost production cannot easily be resurrected. Thus lasting and strong currency fluctuations distort international competition, trigger downward international wage competition and unproductive “*Standortwettbewerb*” (cost competition among nations, similar to competitive depreciations) and eventually lead to less growth. Lastly, the obvious needs mention: exchange rate volatility and long-standing misalignments are a permanent source of uncertainty for costs, market expectations and investment. Thus, they induce and fire speculation on forex and securities markets.

After decades of floating exchange rates across the Atlantic, enterprises, financial investors and politicians have become accustomed to hefty market movements on the prime forex market of the world, blind against vast market inefficiencies. Like in residential quarters around airports, people tend to become unaware of the noise although it harms their health. Habituation to broadly inefficient forex markets seems pervasive, even in the business world.

5.3 Elasticity pessimism - disconnect of exchange rates and trade?

There is uncertainty and controversy about the relationship of real exchange rates and exports, imports, trade and current account balances. The traditional elasticity approach in balance of payment theory holds that there is a strong connect, the absorption approach emphasizes the role of demand for exports and imports, hence GDP growth differentials, and follows “elasticity pessimism”; a third stream sees the income elasticity of imports and exports as a key determinant for the trade and current account. The latter approach is prevalent in concepts based on “Thirlwall’s Law” (Thirlwall 2011). In what follows, we review a number of empirical studies. In trade theory, there is a long-standing debate on elasticity pessimism and optimism, since Machlup 1950, Orcutt 1950 and many others which flares up again in the face of global trade and widespread exchange rate volatility.

In the “World Economic Outlook” (WEO 2015), the IMF published a long chapter on exchange rate elasticities of trade (see also Leigh et al. 2015). The background were reports and fears that that the connect between exchange rates and trade tends to evaporate in face of increasing global value chains and other forms of globalization. Moreover, country-specific experiences show that cases seem to exist in which exchange rate changes had very little bearing on trade and current accounts. In WEO 2015 a panel analysis of 50 advanced and developing countries with large exchange rate changes was conducted for the period 1980-2014, excluding special cases of exchange rate crises with joint banking crises. The main result is summarized in an average real effective exchange rate elasticity of the volume of net exports of 1.5: 10% real effective depreciation raises net exports by 1.5 %. The bulk of the effect comes in the first year. The elasticity differs across countries and episodes in the range 0.5 to 3.1. By contrast, the demand elasticity of exports is strong, a bit stronger than the import elasticity: rising aggregate demand in the trade partners’ economy by 1% induces a rise in exports by 2.3%, whereas imports rise by 1.4% if domestic demand increases by 1%. The authors find no general tendency of decreasing exchange rate elasticity.

The information on the average exchange rate elasticity of 1.5 for net exports bears explosive for surplus countries like Germany and also the EA as a whole. Germany would need around 33% (50%) real effective appreciation to reduce the trade balance by five percentage points, other variables being constant. The EA would need 23% (35%) real appreciation to re-balance its trade balance from a 3.5% surplus in 2015. Since this would have a negative effect on GDP growth, which tends to let imports shrink, the rebalancing would either not be achieved or even more appreciation would be needed, if the latter can offset the growth effect. This shows

how painful rebalancing of trade imbalances is one they have emerged. These data cast doubts on the capacity of exchange rate adjustments for rebalancing trade and current accounts that have gone out of control.

For the broad range of the elasticities across countries the IMF authors offer mainly three explanations. Inclusion of a country's trade in global value chains lowers elasticities slightly, but the average of foreign value added in exports is estimated at 25% without a clear rising trend. Initial conditions before the depreciation matter; the more economic slack is prevalent, the stronger the elasticity and vice versa. Depreciations in the context of a banking crisis reduce elasticities as trade can be credit constrained. Overall, the Marshall-Lerner conditions hold; the traditional notion of expenditure-switching between exports and imports during exchange rate changes is vindicated: "There is little evidence of a general trend toward disconnect between exchange rates and total exports and imports." (105)

Although the EA is included in the analysis, there is no special information on the dollar-euro rate. The great range between countries remains a bit an open issue. Differences between advanced economies with strong oligopolistic pricing and product differentiation and other countries are not analysed, neither the composition of exports based on the country-specific production structure. Although questions remain, the findings reaffirm that exchange rates continue to matter for trade and policies, but demand for imports and exports – hence the growth differential – is a strong determinant of trade balances.

Before the start of the euro, Deutsche Bundesbank had investigated the dependency of German real exports and imports on the real effective exchange rate of the D-mark (Deutsche Bundesbank 1998). A real appreciation of the D-mark against 18 trade partners' currencies by 1% would reduce exports by 0.7%, other circumstances constant. The elasticity of exports to non-EU countries was estimated at only 0.3, since the lion's share of German exports were absorbed by EU-member countries. By contrast, the elasticity of imports dependent on the REER was estimated at 0.25, for imports from non-EU countries only 0.07. Authors explained the lower import elasticity with commodities and raw materials indispensable for production in Germany. For the German trade balance the elasticity is reported with -0.95 relative to the REER. Given the weights of exports and imports, Marshall-Lerner criteria are fulfilled.

The German ifo-Institute estimated for the period 1993-2014 that a change of the dollar-euro rate by 1% induces a change of German exports by only 0.3-0.4%, while improving price competitiveness of German exports leads to 0.6% more exports, including those to other EU-countries. A simulation for an improvement in price competitiveness by 1%, considered as

real depreciation, in 2015 against 37 trade partners in and outside the EA triggers 1% increase of exports (including services) in the first and 0.5% in the second year, compared to a scenario without depreciation (Grimme/Thürwächter 2015).

A simulation by Horn/Stephan (2005) from IMK research institute attempted to explain the German trade balance with regressions over a long period since the early 1990s. The main result was that the demand for investment goods in OECD-countries explains one third of the trade surplus, the REER against 18 countries explains only 14%, and the bulk of explanation (50%) stems from a summary factor called “globalization”, chiefly the trade performance in the past which is, however, also determined partially by exchange rates. The authors hold that long-standing entrenched price- and non-price competitiveness of the German economy follows a trend variable that may summarise various factors of non-price competitiveness and also the income elasticity of demand.

Zeddies (2009) from the German IWH Halle Research Institute analyses German exports in face of an appreciating euro prior to the financial crisis. He finds an elasticity of German exports with regard to the REER against 23 OECD countries of -0.9 in the period 1999-2008, which was lower than in previous periods. Moreover, Zeddies argues that Germany has improved its price competitiveness despite REER appreciation based on CPI data by strong wage restraint, against countries inside and outside the EA (252). Similar to other analyses, the author finds a much stronger impact of demand elasticity for German exports, compared to the exchange rate.

Berthou/di Mauro (2015) contend that the microstructure of enterprises is important for different trade elasticities with regard to exchange rate devaluations. With disaggregated data, they find that large and highly productive firms are likely to respond with low elasticity, whereas small and medium enterprises with below average productivity display much higher elasticities. Fragile EA countries with weak export bases have a higher share of enterprises of the second type. Conversely, this finding should also be valid in appreciation episodes (not mentioned by the authors). The reasoning is in line with “pricing to markets” in case of exchange rate changes, implying lower profit margins for exports faced with appreciation, a practice not tenable for less productive smaller firms.

In all these studies exchange rates matter for trade balances, but the strength of the connection varies. Even with relatively low elasticities, in face of a trend toward rising trade shares in GDP, exchange rates *gain* importance. The price-quality relationship in oligopolistic and monopolistic competition implies that prices, costs and profits have *not* evaporated as determi-

nants for trade. As countries tend to specialize on distinct products and sectors in the course of international division of labour, the production structure, often evolving with knowledge accumulation over decades and even over more than a century, is given too little attention in most of the studies. Nonetheless, exchange rate disregard or propositions of irrelevance for trade are not justified.

One should expect, adding to the IMF-analysis mentioned, that oligopolistic practices of pricing to markets as well as specialization of trade toward quasi-monopolistic supplier positions reduces export elasticities, at least in the short and medium run. Further, if net imports can easily and cheaply be financed by external capital inflows, import elasticities and hence also export elasticities of suppliers will be less. Lastly, there may be a snag in estimating elasticities: if real depreciation increases net exports, one would expect a subsequent growth acceleration which itself induces more imports; the latter effect reduces the initial effect of the depreciation on net exports. Separating both effects may be difficult. Conversely, an appreciation cheapens prices of imported investment and consumer goods and may promote growth so that the initial contractionary effect is offset. In other words, demand effects on imports and exports can be partly induced by exchange rate changes. Empirical studies have found in many countries evidence of contractionary depreciations and expansionary appreciations. Even if findings on exchange rate changes on exports are robust, effects on net exports and growth rates are much more complicated.

Rectifying large current account imbalances by exchange rate adjustments alone may be questionable or prove very difficult. Therefore preventive action is key. We leave these intricate issues open here, especially relevant for notorious heavy surplus makers like Netherlands, Germany, Switzerland, Singapore and a few others, apart from the heavy deficit countries in the European monetary union. The U.S. authorities seem to have learnt that benign neglect of the U.S. current account – after the Plaza and Louvre accords in the 1980s and after the China-US trade conflict – is not an advisable guideline, neither good for the U.S. nor for the rest of the world.

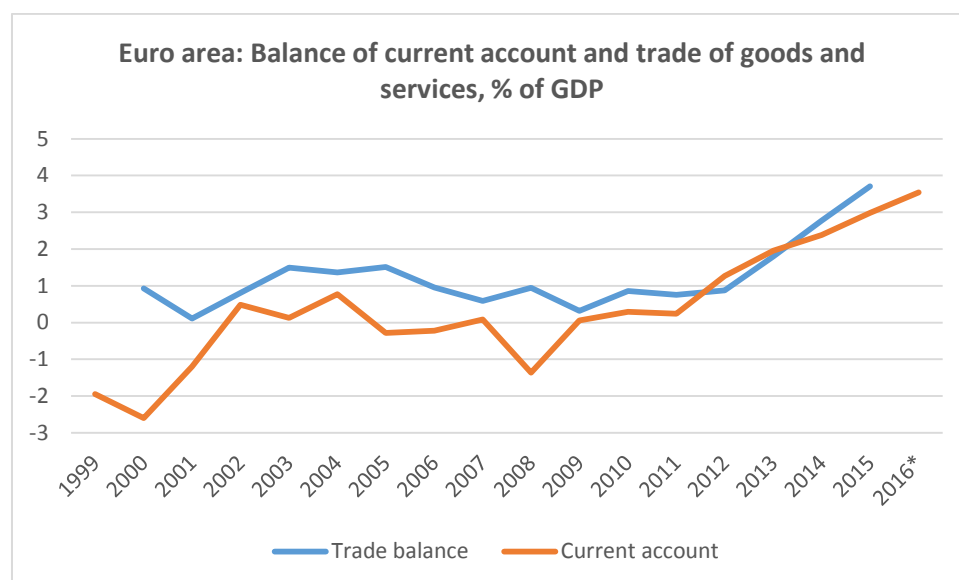
5.4 Interdependency of the dollar-euro exchange rates and EA imbalances

The EMU used to be a best-practice model regarding the external balance, be it the trade or the current account balance – until 2012. The euro area looked like a model currency area not contributing to global imbalances, despite the roller-coaster of the dollar-euro exchange rate. Even the years of strong euro appreciation 2002-2008 did not throw the “area” into trade defi-

cits. And surpluses had seldom been (slightly) above one percent of GDP. In 2015 the trade surplus for goods and services reached, however, 3.7% of GDP (graph 20), and seem to tend upwards in 2016. In absolute terms, this is a huge surplus which presses many smaller economies in the rest of the world economy in negative territory, and burdens also the U.S. recovery.

If we presume that the euro area comprises two blocs of countries which are statistically united in the EMU trade balance, we see permanent high imbalances between the surplus and the deficit bloc or strong diversity in surpluses after 2012. The surplus and the deficit bloc have not only surpluses or deficit against each other, but also with non-members of the EMU. So, what is then the relationship between the dollar-euro exchange rate and these European imbalances?

Graph 20



Source: WDI, WEO Database 2016. Note: *estimate of IMF

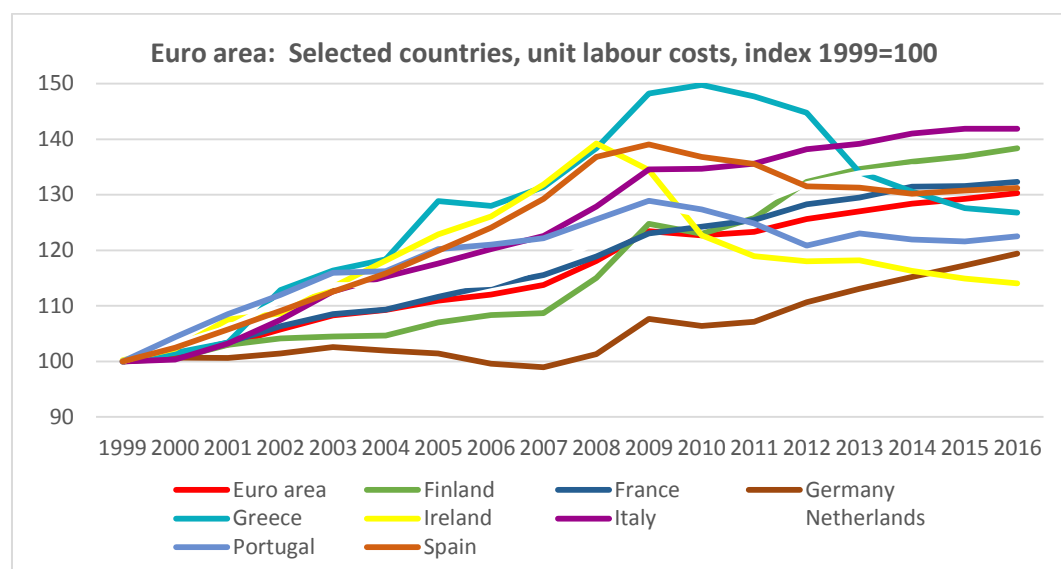
At first glance the dollar-euro exchange rate has no causal relationship with the imbalances within the EA which emerged after the start of the euro system. However, there are some important mutual interdependencies:

- Member countries are exposed in different degrees to extra EA trade and hence to the fluctuations of dollar-euro exchange rate. The adoption of a common currency led to the loss of nominal exchange rates in two aspects: abandoned exchange rates vis à vis other members of the monetary union and misfit of the dollar-euro exchange rate for individual countries. At the same time, adequate replacement mechanisms for the loss of national exchange rates were not provided in the architecture of the EA.

- As the structural heterogeneity of the EA causes divergent exposure to both symmetric and asymmetric shocks, the EA governance was not prepared to prevent such shocks and/or to generate institutional mechanisms to cope with them. Thus the shock of the financial crisis – a symmetric shock with asymmetric consequences – opened the doors for the euro crisis.
- Members of the EA responded differently to the appreciation of the euro 2001-2008 (and, in parallel, the REER of the EA vis à vis the rest of the world). Some embarked on wage and cost pressure to boost price competitiveness within the EA, with contractionary effects on domestic demand and growth. At the same time non-price competitiveness was improved, especially by Germany. Other countries with weaker price- and non-price competitiveness ignited domestic credit booms, fueled by capital inflows from the surplus countries, and used their internal real appreciation to boost domestic demand, mainly for production of non-tradables. This parallelism between surplus and deficit countries, following either real under- or real overvaluation, exists also in the world economy, with the U.S. as the main deficit country, apart from many developing countries. Thus two euro blocs emerged, the surplus bloc led by Germany and the Netherlands, followed by Austria, Luxemburg and Finland, and the rest of 14 countries, the peripheral ones and more and more also France.
- When the value of the euro started to fall after the financial crisis in several steps, the current accounts of the deficit bloc could improve, reinforced by austerity (compressed imports), falling unit labour costs and in some countries by revamped exports. While the devalued euro was very helpful for these countries, it led to a strong real undervaluation in the surplus bloc which gained unprecedented current account surpluses, especially in Germany. Although this supported growth in the EA and contributed to overcoming the recession 2012/13, the imbalances in the EA were not reduced but corroborated. The weak euro supports the majority bloc, for the other bloc it is an outright misfit. The overall outcome harms the world economy and dampens global growth. It is unlikely that the CA surplus of the EA and especially of Germany can be reduced quickly and without pain. If it comes to rebalancing, Germany will need a heavy real appreciation, meaning very strong nominal costs and price increases or a very strong real effective appreciation of the euro, which will not only dampen German growth but also throw peripheral countries back in trade deficit. Alternatively, Germany and the entire EA would need a period of stronger growth than in the rest of the world, if exchange rates remain unchanged.

Of course, the imbalances of the EA are an issue of its own, in many aspects independent from the dollar-euro exchange rate. Yet, the REER of the EA and of each EA member are strongly influenced by the dollar-euro exchange rate. The ups and downs of this crucial exchange rate functioned as a catalyst for the EA's internal imbalances since this exchange rate is not always suitable for all EMU members alike.

Graph 21



Source: AMECO

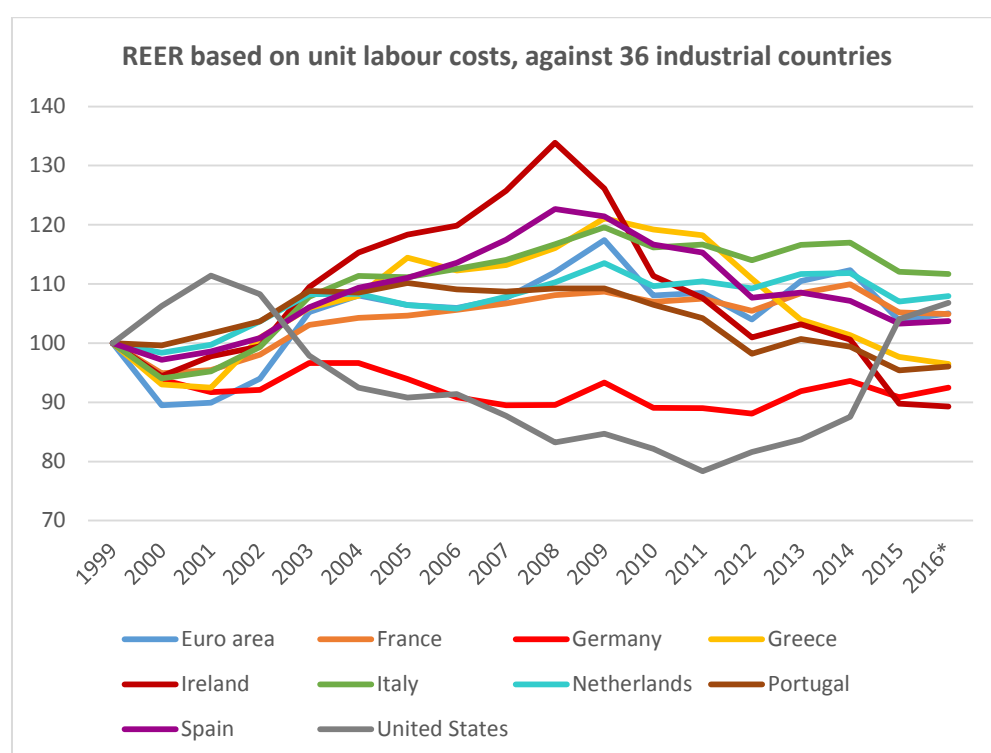
Graph 21 and 22 show cost and price divergences in the EA. Relative cost and price performance within the EA, were widened in the early 2000s and continued in mitigated degree after the financial crisis. Graph 21 shows the divergence of nominal unit labour costs. Graph 22 shows the REER, based on unit labour costs indices. Here we see that Germany was able to *devalue* (!) in real terms by 7% (1999-2008) with pressures on wages in contrast to all other monetary union members in the period 1999-2000, when the euro appreciated in real terms by 17% for the EA (cp. also Zeddies 2009).¹⁷ Strong wage restraint in Germany was not fully passed-through to consumer prices, hence the wedge between CPI- and the ULC-based REER (cp. graphs 3 and 22). The wedge fired profitability of firms; profits were saved to a considerable extent via capital export to abroad, especially in the periphery of the EA. Ireland, Spain, Greece and Italy were faced with strong real appreciation above the EA average, while the U.S. depreciated strongly until 2008 by massive nominal depreciation against the euro. What

¹⁷ In graph 3 above we had shown the REER for Germany based on CPI data. Then the REER appreciated in the period 2001-2008, though much less than for the EA. REER CPI based and REER ULC based can differ strongly, an often ignored fact.

was perceived in Germany in the late 1990s and early 2000s as a “*Standortproblem*” (a problem of lacking national “international competitiveness” due to supply side obstacles) was de facto at a considerable extent an exchange rate problem of the euro.¹⁸

With both indicators for price competitiveness for the EA countries, ULC- and REER-divergence have remained to a considerable extent after the financial crisis, apart from the extremes in Ireland, Greece and Portugal. The spread between Germany and Italy, bottom and top of the band, hovers in 2015/16 around 20 percentage points (graph 22).

Graph 22



Source: AMECO, own calculations. *estimate by European Commission

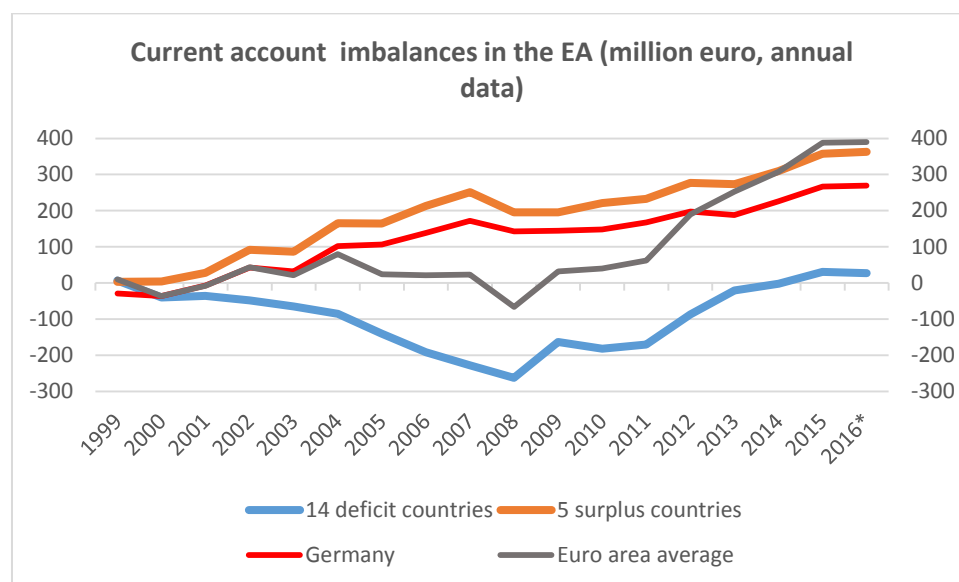
The interpretation of unit labour costs as a dummy for the internal REER should not only focus on divergent price competitiveness but point out at the promotion of non-tradables via demand effects in the case of real appreciation.¹⁹ Real appreciation can have a temporary expansionary effect, in contrast to textbook wisdom, as it fuels via cheaper imports both consumption and investment and dampens inflation. Conversely, real depreciation can have a contractionary effect on aggregate demand. What is not shown by unit labour costs perfor-

¹⁸ The REER calculation displayed in the graph includes only trade with industrial countries. If China and other emerging economies were included, European countries’ real appreciation might look even more pronounced.

¹⁹ Real appreciation of small open economies’ currencies can be understood as rising prices of non-tradables relative to tradables which are priced more or less according to the world market.

mance is the divergence in non-price competitiveness²⁰, i.e. the specialization on innovative sectors and products with high income elasticity of demand. Thus the divide of the EMU in two blocs of different competitiveness is also a divide in technological capability.

Graph 23



Source: AMECO, own calculations. *estimate of the European Commission.

Graph 24 illustrates the build-up and corroboration of CA divergences in the EA. The deficit bloc could get rid of their (aggregate) deficit, at the expense of huge and unsustainable CA surpluses in the other bloc and the EA as a whole. Of course, the overall surplus since 2012 is not only caused by the devalued euro, but also by higher growth in the rest of the world, apart from the specifics of German non-price competitiveness.

5.5 Impact of the dollar-euro rate on financial assets and capital flows

As we have seen above, the euro has indeed been used until recently for trade transactions within the EA and also increasingly for extra EU exports and imports, with the exception of oil and gas imports which are mainly denominated in dollars. Hence the volatile dollar-euro exchange rate could be bypassed to some extent, although extra trade is on the rise and needed to exploit global trade opportunities. However, the use of the euro is much less in cross border financial transactions, i.e. in denominating financial assets in international transactions. The

²⁰ "Non-price competition" is a euphemism: competition is always about the balance of price and quality.

often ignored importance of the dollar for financial transactions involves several aspects. First, in many countries outside the EA and the U.S. financial assets are partially denominated in dollars, however with limited aggregate statistical data available. Second, gross financial flows across continents, especially across the Atlantic dwarf trade flows. Third, U.S. financial markets are much deeper and more liquid than European markets. Hence, the dollar-euro exchange rate is much more important on international financial markets than in trade of goods and services, yet more important for European financial agents than for US-Americans.

The exchange rate is involved in the pricing of assets and liabilities (also in intra EA trade of financial assets) and is insofar part of the three functions of money (medium of exchange, standard of measurement, store of value) applied to financial products. Volatile and misaligned exchange rates create distortions and disturb the functions of money. Hedging is in many instances possible but costly. Moreover, many asset prices are already volatile if priced in domestic currency, but this volatility is potentiated by volatile exchange rates. This generates huge new playing fields for speculative activities. By contrast, non-speculative savers or financial investors may be deterred by doubled risks (asset risks and exchange rate risks) so that otherwise sensible and rational capital flows fall through. This would strengthen the home bias of many conservative savers. The widespread home bias is often not well understood and considered a strange, somewhat enigmatic or even irrational behaviour in a world with global capital mobility.

Let us have a look at two crucial financial markets on both sides of the Atlantic, stock markets and bond markets. In 2014, the capitalization of the U.S. stock market was \$26.3 trillion or 41.5% of the market value of global stock markets, while the EA market value was only \$7.0 trillion or 11.1% of the global aggregate (World Bank Financial Sector Data 2016). In percent of GDP, stock market capitalization stood at 151% in the U.S. and only at 54% in the EA. The annual turnover ratio, i.e. the value of shares traded in percent of market capitalization (a stock measure), was reported by SIFMA²¹ with 165%, which translates into annual sales (or purchases) of \$43.4 trillion, which is almost 2.5fold the U.S. GDP. We do not know the amount of shares purchased by citizens from the EA (or the wider euro bloc), but the numbers are likely gigantic compared to the trade of goods across the Atlantic since many institutional investors (pension funds, mutual funds etc.) invest globally.

²¹ Securities Industry and Financial Market Association, www.sifma.org, accessed 16 May 2016. The global turnover on stock markets in 2015 can be estimated with data from SIFMA and WDI at \$103 trillion, which is 132% of the gross global product and 223% of global trade with goods and services.

The picture of global bond markets is similar. SIFMA reports the outstanding stock of bonds (public and corporate) in the United States in Q4 2015 with \$39.9 trillion, 223% of US-GDP. Daily turnover was \$729 billion, which amounts to an annual turnover – assuming 260 trading days – of \$190 trillion, 475% of US-GDP. The sum of all debt securities outstanding in Q3 2015 in EA countries was only \$18.5 trillion (BIS data online), less than half of the U.S. volume. Data on turnover are not reported. Again, it is very likely that many European financial investors are engaged in bonds in the rest of the world, especially in the U.S. with the deepest bond market on the globe.

We remember: as shown in the introduction to this paper, daily transactions on the dollar-euro FX market made up for \$1.3 trillion; the annual merchandise trade volume between the EA and the U.S. was \$464 billion (see data underlying graph 16) 2015, which might correspond to a daily trade volume – assuming 260 trading days – of \$1.78 billion, perhaps a bit more than \$2 billion including service trade. Hence FX transactions not related to trade of goods and services between the EA and the U.S. account for almost all transactions. These transactions determine supply and demand for the euro and the dollar on the dollar-euro FX market, and the exchange rate, in return, impacts also capital flows. That capital flows, unrelated to trade, cause exchange rate changes is well-known, but that exchange rates also cause revaluation of financial assets – as foreign demand, denominated in foreign currency, for domestic assets has an impact on their price – is often ignored. Take as a simple example domestic house price booms. As soon as they loom, foreign investors ferret out them and tend to amplify them and retreat with sudden stops when risks emerge or their risks appetite drops.

If the exchange rate on this market is unpredictable in the short and medium run, also prices of financial assets and liabilities, denominated in home currency, are unforecastable. As there is no long run forecastable equilibrium exchange rate, the uncertainty of the short and medium run remains. Increased volatility of asset prices induces short-termism among financial investors, i.e. frequent sales and purchases with almost zero transaction costs around the globe, and hedging against exchange rate and other risks with derivatives which gave rise to the growth of derivative markets. As is well known, derivatives are a double-edged sword, they can be used for risk mitigation, but also for more risk taking, i.e. for more speculation. Even more, often the counterparts of those who seek hedging are risk-taking speculators (e.g. hedge funds), so that hedging triggers demand for speculation.

Compared to the dollar, the international role of the euro is quite limited and even lost impact after the financial crisis (ECB 2015, Goldberg 2010). The international role of a currency is mainly determined by its role on financial markets. A few figures may suffice here:

- The dollar is involved in daily FX transactions beyond the dollar-euro market with a volume of \$3,363 billion, which is 62.3% of global daily FX transactions; the share of the euro beyond the dollar-euro market is only \$496 billion or 9.2% of global transactions (all data for 2013, see chart 1 in chapter 1).²²
- In 2007, 104 countries used an exchange rate regime by either pegging against dollar, official dollarization or managed float with reference to the dollar, as reported by Goldberg (2010, using the counting method of Reinhart/Rogoff for de facto exchange rate regimes). These 104 countries represent 36% of Gross World Product, together with the U.S. 61% of Gross World Product (2007); since the U.S. share shrank to 22% in 2014, and if China were excluded because of limited floating after 2005, the dollar bloc would embrace around 45% of global GDP. By contrast, only 26 countries peg their currency against the euro or use it as reference by managed float (ECB 2015, 8)²³ The “euro bloc” in the broader term, including the whole EU and Central Europe represents 25.6% of global GDP (2014), with Norway and Switzerland somewhat more. Broadly speaking, the “dollar bloc” is more or less twice as large in terms of global GDP.
- The usage of the dollar for FX reserves embraces 63% of global reserves, the euro is used for only 22% (ECB 2015, 8).
- According to SWIFT reports, the dollar is used for 43% of global payments, the euro for 29% (ECB 2015, 8). It is not clear whether “payments” refer only to trade and cross-border income transactions or include in part purchases of financial assets.
- The dollar’s share in international debt securities is 58% compared to the euro with 23% (ibidem).

The ECB does not actively encourage the international use of the euro (ECB 2015, 10), whereas the Fed or the US-government encourages the use of the dollar and discourages or sanctions other practices, e.g. in denomination of oil and gas exports.

²² ECB (2015, 8) reports that the FX turnover of the dollar as a share in global transactions is 46%, the share of the euro 19% in 2014. These figures are misleading as both include the dollar-euro transactions, whose share in total U.S. transactions is much smaller than in total euro transactions.

²³ In this counting method (following IMF de facto regimes), only 49 countries follow the dollar.

5.6 Summing up

In this chapter we have analysed whether the dollar-euro exchange rate is of great importance for the U.S. and the EA economies. For trade with goods and services, indeed the dollar-euro exchange rate has limited impact. For both sides, transatlantic trade is – until quite recently – not so important for total U.S. and total EA trade. The traditional focus on intra European trade by EA members is the most important way to cope with the enigmatic exchange rate by bypassing it. However, this is a trade diversion and hence a trade distortion to be explained in part by the volatile exchange rate. Precisely this was one of the reasons for the invention of the euro (and its predecessors), and this has indeed materialized to a big extent. However, in the long-run trend, particularly since 2012, extra EA trade is on the rise. In the meantime extra trade has already surpassed intra trade.

However, this “insulation” attempt in Europe has limited impact, since even with a small share of transatlantic trade, there is a strong degree of import and export competition across the Atlantic. The EA cannot evade the world market, nor can the U.S. Strong deviation from PPP across the Atlantic fire competition and redistribution of market shares (or a return to outright protectionism). Pressure is exerted on domestic costs and prices.

Enterprises weather strong exchange rate changes by “pricing to markets”, i.e. they behave as if the exchange rate had not changed, thereby reducing or increasing their profit margins. Hence, the pass-through of costs and prices tends to be small. Such pricing is oligopolistic and cannot be sustained by small and medium enterprises. Thus the law of one price and adjustment to PPP is often facilitated by disparity in profit margins. Transatlantic trade is predominated by large-size companies, in particular by transnational corporations. Around 50% of this trade is intra-firm trade. Building-up subsidiaries on the other side of the Atlantic adds to this. Hedging against exchange rate changes insures short-term volatility risks, but not investment and employment risks. Strong appreciation of the euro is also countered by wage repression, outsourcing and relocation of production toward low wage locations, such as Eastern Europe, Mexico or China. One of the most important strategies is re-directing trade toward intra European export destinations, in particular in the EU, and promotion of extra trade in episodes of a weak euro.

Fears that real exchange rates have lost their capacity to influence trade and trade balances have not materialized. There is much evidence that trade elasticities have not changed much, despite a trend toward global value chains and non-price competition. However, elasticities differ across countries and on the timeline, Elasticities are not very high, but mostly suffice

the Marshall-Lerner criterion. Growth of demand for imports and exports has a stronger impact on trade balances compared to real effective exchange rates, as contended in the traditional absorption approach in balance of payment theory. For total trade, real effective exchange rates matter, not the bilateral dollar-euro rate. The latter, however, has a leading function for other bilateral rates due to the co-movement of many exchange rates with the euro or the dollar as a reference. It is likely that real exchange rate changes do not suffice to rebalance strong current account imbalances, but we have not delved deeper in this issue. Early prevention of imbalances in the current accounts is recommendable.

The emergence of the internal imbalances in the EA is interdependent with the swings of the dollar-euro exchange rate. As mentioned, strong and lasting euro appreciation tends to redirect trade to EA partners, especially by the big surplus countries, Netherlands and Germany. The rebalancing after the outbreak of the euro crisis 2012 was not yet successful although most deficit countries were able to reduce their deficits; but at the same time the surplus bloc engaged in unprecedented high surpluses so that the spread between current account balances among members of the EA is hardly reduced. Before and after the financial crisis, the euro was for one bloc too strong, for the other too weak – misfit for almost all member countries.

The greatest impact of the volatile and often misaligned dollar-euro exchange rate is on capital flows and the valuation of financial assets which are traded internationally. The predominance of the dollar as the prime global currency is mainly rooted in usage of the dollar for measuring and trading financial assets. This is based on much bigger and unified stock, bonds and real estate markets in the US. Since transatlantic and global financial markets are strongly integrated with gigantic gross capital flows, which dwarf trade flows, prices of financial assets bear double risks, namely their intrinsic risks and their exchange rate risk. Both reinforce each other. On the one hand, prices of assets become more volatile if exchange rates are so volatile that they are not predictable; on the other hand, sensible capital flows, especially long-term flows, fall through. Risk-averse wealth owners shy exchange rate risks and follow a home bias. Agents with higher risk preference find a huge playing field for speculation in financial assets, and the globally active financial industries are keen to serve these interests. This way, the volatile floating of the euro and the dollar against each other are a key lever for “financialisation”, meaning here the emergence of oversized, under-regulated and largely unproductive, financial instability generating financial industries. One can probably say that financialisation would not be possible without the floating prime exchange rate on the global foreign exchange markets.

The bottom line in this chapter is as follows: the dollar-euro rate with its enigmatic gyrations has huge, complex and far-reaching macroeconomic consequences which are not always evident at first glance. Thus the exchange rate does matter. The invention of the euro, partly caused by intents to evade the dollar-euro chaos and to reinvent a stable regional quasi-successor of the Bretton-Woods system, can only partly achieve its goals in the age of globalization.

6. Summary and conclusions

In the introduction we had raised a number of questions. Here are the brief answers.

What explains the strong and long swings and the turning points of the dollar-euro exchange rate movement?

As there is no firm gravitation centre for the full-fledged floating dollar-euro rate, for the short- and medium term exchange rates cannot be explained with any of the fundamentals. But this does not mean that chaos or random walk prevails. Traders on the FX forward market bet on depreciation or appreciation, following their expectations. Market leaders take over, the rest follows with herding. The direction of the movement is likely in line with at least some of the fundamentals, but the thrust of the movement depends on the dealers' expectations, their risk appetite and the existence of counterparties. Movements are done in a sequence of many small steps, with trial and errors, also with interruptions and smaller setbacks or sideward movements, quite similar to stock markets.

There is certainty that the rate cannot move onward forever, but nobody knows the critical level of return. It is likely that the deviation from PPP and also current account imbalances have played a role, or "exogenous" shocks like the Lehman shock in September 2008. Each turning point of the super-cycle of the euro (and formerly the DM) has idiosyncratic features. If a level of strong appreciation/depreciation is reached, fundamentalist traders gain influence, and central banks can be ready for intervention or are more wary or even in alarm mode. The exchange rate performance should be understood similar to other asset markets, especially the stock and the real estate markets. Price bubbles can emerge if no one stops technical traders.

What is the role of the fundamentals?

To recap, the euro started with 1.17 dollar per euro, fell to 82 US-cents on October 2000, climbed to the peak of 1.60 in July 2008, and stands at 1.12 on 21 May 2016. Around one third (sometimes more, sometimes less) of the swings can be explained by the bilateral inflation differential. The REER of the EA fell first by 21% after the euro debut (based on monthly averages), climbed by 43% to the peak 2008 and fell by around 18% until end-2015. And the REER for the U.S. dropped by 22% between the peak in 2002 and the low in 2008. Neither this bonanza nor the turning points of the dollar-euro rate cycle can be explained by traditional fundamentals – but also not *without* fundamentals! They do play a role, especially if many fundamentals would indicate in the same direction of movement. The most important fundamental variables are short-term nominal interest rate differentials and the growth forecast differential between the U.S. and the EA. Traders give U.S. data more attention because it is the prime currency, financial markets are deeper and policies are less fragmented and uncertain.

But interest rates do not play the role assigned to them in uncovered interest rate parity theory: higher nominal interest rates indicate often (but not always) appreciation pressure even if they signal higher cyclical inflation and need for depreciation. Higher interest rates are often seen as a more solid growth prospect rather than a need for depreciation to keep PPP stable.

The theory of interest rate parity looks at *actual* interest rate differentials and hence at arbitrage; however, if market participants look at *expected* interest rates and *expected* exchange rates, they take on risk and go for speculation rather than only arbitrage. Current accounts and PPP play minor roles for the *bilateral* exchange rate, as both are subject to multilateral real rates.

Since in the turning points of the dollar-euro rate the deviation from PPP was strong (-29% 2001 and 18.5% 2008, on an annual basis, see graph 10), this might have fed into the considerations of fundamentalists among the traders. But there is no discernable threshold where PPP or current accounts reach a critical stage. We only know that exchange rates cannot grow or fall forever.

We explain the steep downward and upward phases of the exchange rate mainly by the predominance of technical trading following trending; fundamentals are either disregarded or perceived as ambiguous, sometimes they are used to detect the required *sign* of change. The initial steep fall of the euro can be partly explained by the interest and growth differential, but the strength of the fall remains unexplained. The turnaround 2002 came with the change of

the interest rate differential and reversal of growth prospects, besides some timid central banks interventions. It was the Lehman-crisis as an exogenous shock that triggered the turn-around 2008; the surprising subsequent appreciation of the dollar was the consequence of a sudden stop of U.S. capital outflows, a strong turn toward risk aversion and a return to the safe haven function of the prime world currency. The stepwise fall of the euro after 2008 corrected its over-valuation and was influenced by differences in monetary policy between Fed and ECB and the emergence of the euro crisis, apart from a conspicuous growth differential. Again, a mix of shocks, fundamental considerations, monetary policy action and trending by technical traders seem to have driven the rates.

The main adverse events in the life of the euro, regarding the dollar-euro exchange rate, were the heavy under-valuation after inception and the exuberant over-valuation until 2008, similar to the historical over-appreciation of the DM at 1.36 DM per dollar in April 1995, and its record under-valuation at 3.44 DM in February 1985.

Are the exchange rate gyrations important for the real economy?

The dollar-euro rate and its extreme swings exert the biggest impact on flows of finance, i.e. gross capital flows, and on the valuation of financial assets insofar they are traded internationally. Capital flows impact the real economy indirectly, as shown in the financial crisis or the euro crisis. The lion's share of financial assets in the world economy is denominated in dollars. The U.S. have by far the deepest and most sophisticated financial markets with a high degree of liquidity. Gross flows of short-term capital explain the volume of \$1.3 trillion daily turnover on the dollar-euro market. Even small differentials in some indicators and in exchange rate expectations can induce huge movements of capital. These movements potentiate the volatility of asset prices and can also deepen asset price bubbles at any place in the world. It is a big lever for speculation and for profits (and losses) not related to real output and employment. One has to take into account that annual transactions on the second and third biggest securities markets, bonds and stocks, apart from real estate markets, reach mammoth magnitude of which a rising share are cross-border transactions. The share of internationally traded financial assets denominated in dollar is much higher than in trade. Data on regionalized gross flows are not available with few exceptions.

Furthermore, the euro area trades goods and services at an increasing scale with regions outside Europe, in which the dollar is the prevailing currency. In 2015, extra EA merchandise trade had reached 53.7% of EA total trade and surpassed intra EA trade (chapter 5.1). Hence

the initial function of the euro of bypassing the overly volatile dollar-euro exchange rate is slowly diminishing. The euro is mainly a regional currency and only in a few functions carrying global impact. Trade becomes more and more intercontinental, especially for Germany. Yet, considerable parts of the extra EA trade (EA with rest of the world) is denominated in euro. We estimate that around 70-78% of the total trade of EA members (i.e. intra and extra trade) is invoiced in euro. This helps to bypass the fickle dollar-euro exchange rate so that costs of hedging and risks of currency mismatch can be reduced. However, it is an elusive notion that this insulates the euro area from the dollar-euro FX market. Even though trade across the Atlantic is small relative to total EA trade (trade EA/U.S. makes up only 6.5% of total EA intra and extra trade and 12.1% of total EA extra trade 2015), the EA is not disconnected from the world market and its price level. The dollar bloc of countries using the dollar or taking it as a reference currency is estimated at 45-60% of global GDP, more or less twice the share of the euro bloc (chapter 5.5).

Strong deviation of PPP fires export- and import competition and puts pressure on domestic costs and prices, on both sides of the Atlantic, and triggers redistribution of market shares. Often this was perceived as a “Standortproblem” (national location issue) giving rise to massive contractionary supply-side policy. For some observers this sounds like benevolent competition, but it is broad-based price and trade distortion. The small share of transatlantic trade reflects trade diversion rather than trade creation. Trade distorted by real exchange volatility and misalignments is equivalent to tariffs on imports and subsidies on exports in case of under-valuation, and vice versa for over-valuation.²⁴

A rough measure for a correct valuation could be the PPP rate which stood at 1.31 dollar per euro on average in 2015 (IMF 2015). The IMF calculated for 2014 an equilibrium exchange rate of 1.33, using its EBA-methodology (Isard 2007, IMF 2006, 2013). The Peterson Institute for International Economics calculated 1.24 dollar per euro as a fundamental equilibrium rate (Cline 2015, based on Cline/Williamson 2012, Cline 2008, 2014). The methodology behind these asserted fundamental equilibrium rates is complex and subject of debates.

In this study we have neglected the relevance of the dollar-euro FX market for developing/emerging countries. Since the latter attempt to manage their exchange rate as they fear floating for a number of reasons, they tend to either peg their currency to the dollar or the euro

²⁴ The reason why WTO does not take action on this problem is that this institution is not in charge of exchange rates. This assigned to the IMF. But the IMF is not in charge of trade but favours floating exchange rates and free capital mobility with some exceptions as of late. IMF staff seems to be aware of the problem and started to publish exchange rate benchmarks in the framework of its EBA methodology (cp. IMF 2015).

or use these currencies as references. However, the more volatile the dollar-euro rate is, the more volatile is the *effective* exchange rates of these countries which normally trade with both blocs, the dollar and the euro bloc. Hence the fickle dollar-euro rate makes the effective (trade weighted average) exchange rates of developing countries also fickle and impedes their development. Thus XR pegging (tightly or softly) is undermined, as well as managed floating. Developing countries' exchange rates are - on the whole – much more volatile and often misaligned than the rates among advanced countries, and not for home-made reasons. They have less opportunities to devalue because external debt is mostly denominated in hard currency as their own currency is not accepted by international creditors (“original sin”). With pegged or semi-pegged currencies they have little domestic policy space for monetary policy, and also for fiscal policy as the latter might impact the current account negatively. Developing and emerging countries suffer from heavy real exchange rate shocks which hamper industrialization. These few remarks may suffice to show that the present global currency system is development-unfriendly. In the centre of this “unfriendliness” stands the main FX market, the dollar-euro market as both dollar and euro are the main vehicle currencies which connect domestic currencies with trade and finance in the rest of the world.

Has the relationship between exchange rates and trade changed?

The review of several older and recent studies on exchange rate elasticities have shown that elasticity of trade with respect to real bilateral exchange rates is given but low. A recent IMF study of a big sample of countries came to a mean for net exports of 1.5, sufficient to satisfy the Marshall-Lerner conditions. Elasticities vary across countries. For the current account, real effective exchange rates are relevant. If both dollar and euro co-move with many other bilateral exchange rates, changes of REER could be attenuated, meaning a stronger magnitude of change in the rate is necessary to impact the current account.

Moreover, relative demand for exports and imports, hence income elasticities matter more for the current account than elasticities. The absorption approach of balance of payment adjustment is more important than the elasticity approach. Over time, there is not much change in elasticities in the course of globalization, despite the emergence of global value chains. Differences between countries are not sufficiently clear. Probably the place in the technology hierarchy with more or less “non-price competition” can make a difference. But even this is not independent from prices and exchange rates.

What is the relationship between the dollar-euro exchange rate and the intra-monetary union imbalances?

There are complex interdependencies. Strong euro appreciation against the dollar bloc puts exports but also production for European markets under tight import competition pressure. Strong euro depreciation favours switching to advance extra trade with trade surplus. Further, the dollar-euro exchange rate affects different countries in the EA differently, if their competitiveness, growth rates, inflation and real interest rates differ and the current accounts too. Although nominal exchange rates are abandoned in the EA, quasi real exchange rates, namely diverging unit labour costs and diverging other cost components remain that can lead to different prices for tradables as well as segmented export markets.

These divergences have led to current account imbalances which have separated the EA in two blocs. The surplus bloc predominated by Germany (and a few others) managed to counter the heavy euro appreciation 2001-2008 by 43% (REER, and 95% nominally) with real effective *depreciation* (measured with ULC) by -7% via pressuring unit labour costs downwards. Hence Germany could gain market shares in European deficit countries while trade with the dollar bloc was countered with pricing to markets. This way Germany gained a record high current account surplus despite excessive euro appreciation, but suffered from low domestic demand. Other countries followed policies with slightly higher inflation, lower real interest rates, predominance of domestic markets for nontradables, and tolerance of current account deficits. What is more, there was and still is no effective European governance that prevents this systematic misfit of surplus and deficit countries. Since the outbreak of the euro crisis, the divergence in unit labour costs, real effective exchange rates and current accounts did not change much. What changed was the real depreciation of the euro against the dollar that lifted almost all EA members out of current account deficits, but some into exorbitant surplus. Germany's record 8.5% current account surplus in 2015 and the EA surplus of 3.5%, achieved to an extent of 70% by Germany, shows the persistence of imbalances. Germany's surplus is now mainly against extra EA countries, only 20% of the surplus against EA members. The EA surplus is not only caused by the depreciated euro, but also by comparatively slow growth.

There is no doubt that the strong EA surplus which is de facto chiefly a German surplus, is not sustainable. It has a negative impact on the rest of the world and fires risks of currency wars. Demounting the surplus will pose severe challenges for Germany in the years to come.

Are exchange rates the main variable for balancing the current accounts, especially in the EA?

In the first place, the question is when is the current account in equilibrium? The IMF EBA methodology prescribes country-specific norms based on a complex regression approach, for the EA 1.9% surplus. Cline/Williamson from the Peterson Institute for International Economics propose a general $\pm 3\%$ margin around balance, apart from oil- and gas-rich countries. They consider exchange rate adjustments, especially by surplus countries, as an important tool. It is doubtful whether they alone can do the job of rebalancing. Higher domestic demand growth can contribute, but if the growth trend of surplus countries is lower than of deficit countries, this may not suffice. The transfer balance has to be taken into account too. We leave the questions at this point open to further research.²⁵

What are the overall conclusion of the analysis?

First, the dollar-euro exchange rate in an exchange rate regime of unfettered floating can cause more problems than it solves. Mainstream exchange rate theories see foreign exchange markets in a biased way, like roses without thorns. It is high time to reconsider exchange rate theories with more realism and overcome entrenched blockades of thought.

Second, instead of routinely praising flexible exchange rate against fixed of the Bretton Woods era more thought should be invested in currency cooperation between Fed and ECB and the respective authorities in the governments. Of course there is no way back to Bretton Woods which became a too rigid system. The dollar-euro rate performance should be smoothed, exuberant gyrations prevented. The rates should better reflect fundamentals, especially current account and price level convergence, which requires that those whose task it is to take care of fundamentally correct rates take on responsibilities against technical trading. *Managed floating* on the most important FX market on the globe might lead forward. This a step forward to creating a new global currency system. A first small step is to publish regularly data on deviation of the dollar-euro rate from fundamental indicators and to establish exchange rate norms which can serve as a general reference band.

Third, regarding the interdependencies of the EA imbalances and the dollar-euro rate stabilization, more attention must be given to the EU Macroeconomic Imbalance Procedure. Surplus

²⁵ See also Frenkel/Rapetti 2015 for other normative concepts (called SCRER: sustainable and competitive real exchange rates), in contrast to the IMF EBA methodology and the FEER approach from Cline and Williamson. See also Bresser-Pereira 2010 for a view on competitive real exchange rates for emerging economies.

countries have secured themselves privileges that undermine the functioning of the EA. Tools that can bite are needed for the implementation of convergence policies that combine external and internal macroeconomic balance, the latter focused at employment and price stability in each country. We should return to a situation where the dollar-euro rate fits by and large all members; presently it seems to fit no member sufficiently. No doubt, overcoming the divide of the euro area is the litmus test for the long-term survival of the euro system.

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