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EQCHANGE Annual Assessment 2018

Carl GREKOU

Highlights

- As for 2016, the most important currency misalignments are concentrated in developing countries (DCs) and emerging economies (EMEs).
- Currency misalignments also appear to be geographically concentrated: the level of undervaluation is rather homogenous in Latin America and Asia; we observe more heterogeneity in Africa.
- The US dollar is still overvalued —although lesser than the previous year; the Chinese renminbi display a moderate undervaluation; the British pound, the Canadian dollar and the Japanese yen are moderately undervalued.
- Europe is again featured by two opposite situations: the Northern Europe (extended to France) is undervalued while the Southern, South Eastern and Eastern Europe is overvalued.
- Overall, the global configuration of currency misalignments is broadly unchanged in 2017—compared to 2016, with a tendency towards the narrowing/reduction of the misalignments.

RESEARCH AND EXPERTISE
ON THE WORLD ECONOMY

Abstract

The present publication, which accompanies the 2018's update of EQCHANGE, aims at providing an overview as extensive as possible of the exchange rate misalignments for the year 2017. It also aims at discussing the evolution of exchange rates and currency misalignments between 2016 and 2017 as well as their underlying factors, hence identifying global patterns and monitoring —global— imbalances. Despite some intra-year volatility across major currencies, the changes in the currency misalignments have been of relatively small amplitudes in 2017, thus leaving the global configuration of currency misalignments that prevailed in 2016 broadly unchanged. Relatively few countries, however, registered noticeable changes in their currency misalignments.

Keywords

EQCHANGE, Exchange Rates, Currency Misalignments, Imbalances.

JEL

E3, E4, E5, E6, F3, F4.

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RESEARCH AND EXPERTISE ON THE WORLD ECONOMY

EQCHANGE annual assessment 2018

Carl GREKOU*

Summary

Despite some intra-year volatility across major currencies, the changes in the currency misalignments have been of relatively small amplitudes in 2017, thus leaving the global configuration of currency misalignments that prevailed in 2016 broadly unchanged. Relatively few countries, however, registered noticeable changes in their currency misalignments.

Among the advanced economies, the United Kingdom, due to the depreciating British pound reflecting the still current uncertainty surrounding the Brexit, have registered an important increase in its undervaluations. Similarly, in Japan, the undervaluation increased by around 4 percentage points. The United States, on the contrary, registered a fall in the US dollar overvaluation in the order of 3 to 5 p.p. mainly owing from the decline of the US dollar during the first three quarters of 2017. In the Eurozone, the estimate call for a different interpretation given the single currency context, but they remain meaningful. Changes were rather timid but nonetheless broadly supportive of reducing price-competitiveness differential between the member countries. Indeed, Germany and the Netherlands, the countries with the more comfortable net foreign positions, registered a reduction in their estimated level of currency undervaluation. Meanwhile, France and Greece further narrowed the gap vis-à-vis the two aforementioned countries thanks to stronger fundamentals. For Austria, Latvia, Slovenia, Slovakia and Spain, changes were negligible. Overall, most of the changes in the major economies stemmed principally from the changes in the fundamentals.

Emerging economies were not left on the sidelines of these changes. Among others, Brazil, China, Russia, South Africa and Turkey have been distinctive by their currency variation during 2017. Against a backdrop of improving terms of trade —further facilitating growth and crisis exit in some cases, the Brazilian real, the

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Russian ruble and the South African rand registered large appreciations that reduced the previous year undervaluations. The depreciation of the Turkish lira, however, led to an increase in the undervaluation. This holds also for China but to a lesser extent.

Overall, while the broadly persistent configuration of currency misalignments pose risks to the global economy, the recent —although small— changes observed during 2017 revealed fragilities in some countries (namely China) and augur potential important issues for the coming years. Indeed, as reflected by the modest rebound of the US dollar during the last quarter of 2017, the ongoing fiscal easing in the United States is leading to a tightening of the monetary conditions. With the rising trade tensions, the global financing conditions could prove relatively quickly tightened hence slowing down growth especially in emerging economies and developing countries. A possible corollary of this, of course, is the instability that could stem from the accompanying and unavoidable asset and currency adjustments. Coming years could thus be accompanied by growth slowdowns and a resurgence of important imbalances. Europe and especially the euro area appear particularly exposed to these risks. Indeed, due to the lack of adjustment mechanisms —or incompleteness of stabilization policies— in the face of adverse shocks, the rise in the US interest rate could result in an increase in some countries' spreads. Social and political challenges, both regarding the management/survival of the eurozone and the rise of populism and nationalism will go along with that.

The CEPII's *EQCHANGE* annual assessment 2018 presents estimates of equilibrium exchange rates and corresponding currency misalignments for the year 2017 and discusses the evolutions between 2016 and 2017. It draws on information available from the CEPII's *EQCHANGE* database.

Convention:

As used in this publication, the country/economy name, when associated with a term pertaining to the exchange rate level or dynamics —i.e. overvaluation, undervaluation, appreciation, depreciation— refer instead to the country's currency.

This publication was prepared by Carl Grekou. It also benefited from the guidance of Isabelle Bensidoun, Cécile Couharde, Anne-Laure Delatte, Sébastien Jean and Valérie Mignon. Excellent research assistance was provided by Florian Morvillier.

1. Overview

The present publication, which accompanies the 2018's update of *EQCHANGE* (see Boxes 1 and 2), aims at providing an overview as extensive as possible of the exchange rate misalignments for the year 2017. It also aims at discussing the evolution of exchange rates and currency misalignments between 2016 and 2017 as well as their underlying factors, hence identifying global patterns and monitoring —global— imbalances.

This publication is organized as follows. Section 2 briefly overviews the configuration of the currency misalignments in 2017 as well as the changes that occurred between 2016 and 2017. Section 3 discusses in greater depth the case of 35 major economies. In Section 4, we provide regional outlooks. FInally, Section 5 presents a comparison between the *EQCHANGE*'s estimates and those from the *External Sector Report* (IMF).

Box 1 — EQCHANGE: objectives and approach

The widening and persistence of global imbalances have refocused real exchange rate distortions at the core of international debates. However, despite their importance, publicly available data regarding these distortions are very scarce and limited in terms of country and time coverage. In order to fill this gap, the CEPII has developed *EQCHANGE*, a database covering a large sample of countries (187 in the largest sample).

EQCHANGE is a global database of annual indicators on effective exchange rates. It includes two sub-databases containing data on (*i*) nominal and real effective exchange rates (computed using different weighting schemes), and (*ii*) equilibrium real effective exchange rates and corresponding currency misalignments for advanced, emerging and developing countries.

The substantial enhancement introduced by *EQCHANGE* lays in the latter sub-database which provides estimates based on the Behavioral Equilibrium Exchange Rate (BEER) approach.

The BEER approach. The BEER approach is a good alternative to PPP-based measures or normative approaches —such as the Fundamental Equilibrium Exchange Rate approach. Indeed, one of the difficulties when computing equilibrium exchange rates is to identify the long-run equilibrium paths of the economies. The BEER approach here appears more pragmatic as it does not require to estimate or to make assumptions on the long-run values of the economic fundamentals.[1] Instead, the BEER approach consists in directly assessing the equilibrium level of real exchange rates through the estimation of a long-run relationship between the real exchange rates and their fundamentals. We obtain currency misalignments by computing the difference between the real effective exchange rate and its fitted value from the long run relationship. See Couharde et al. (2018) for further details.[2]

In 2018, we have made different methodological improvements to the databases compared with the previous vintage (more information in Box 2 "What's new in *EQCHANGE*").

[1] We do not postulate that the BEER methodology achieves superior performance against other approaches. On the contrary, all the approaches are rather complementary.

[2] Couharde C., Delatte A-L., Grekou C., Mignon V., Morvillier F. (2017), "EQCHANGE: A World Database on Actual and Equilibrium Effective Exchange Rates", Working Paper CEPII 2017-14.

Box 2 — What's new in EQCHANGE

The 2018's version of *EQCHANGE* includes new features regarding both the sub-databases on (*i*) effective exchange rates and on (*ii*) equilibrium real effective exchange rates and corresponding currency misalignments.

First, we increase the frequency of our series by including monthly and quarterly effective exchange rates (both nominal and real). All the indicators are available for the three different weighting schemes and the two baskets of trade partners. This sub-database covers 187 countries.

Regarding the sub-database on equilibrium real effective exchange rates and corresponding currency misalignments, the 2018's version includes two additional fundamentals of the exchange rate: *government spending* and *trade openness*. However, due to a too high uncertainty regarding the assessments of equilibrium exchange rates for a number of countries, this update only covers 143 countries. Countries excluded are: Afghanistan, Angola, Argentina, Aruba, Azerbaijan, Bahamas, Belarus, Botswana, Cambodia, Congo D.R., El Salvador, Gambia, Georgia, Guinea, Iraq, Kazakhstan, Kyrgyzstan, Lebanon, Liberia, Macedonia, Mali, Malta, Mauritania, Moldova, Montenegro, Myanmar, Nicaragua, Sao Tome and Principe, Sierra Leone, Suriname, Swaziland, Tajikistan, Uzbekistan, Vanuatu, Venezuela and Zimbabwe.

Finally, data on equilibrium exchange rates and currency misalignments available from *EQCHANGE* now correspond to averages over all the models and estimation samples.[1] Accordingly, standard errors are also provided.

The data used in this publication:

This publication draws on data available from the latest version of *EQCHANGE*. As a result of the inclusion of two new fundamentals, the assessments of the equilibrium exchange rates and currency misalignments were based on five models, each model augmenting the previous with an additional fundamental as specified below:

$$reer_{i,t} = \underbrace{\underbrace{\underbrace{\underbrace{\underbrace{\mu_i + \beta_1 BS_{i,t}}_{Model\ 1} + \beta_2 nfa_{i,t}}_{Model\ 2} + \beta_3 tot_{i,t}}_{Model\ 3} + \beta_4 gov_{i,t}}_{Model\ 4} + \beta_5 open_{i,t}}_{Model\ 5} + \varepsilon_{i,t}$$

• *REER*: the real effective exchange rate is computed using nominal bilateral exchange rates and the Consumer Price Index from the International Monetary Fund (International Financial Statistics). The trade weights are computed vis-à-vis 186 trade partners over the 1973-2017 period. We relied on data from the Balance of Payments Statistics (IMF) to do so. All data are year average;
• *BS*: the Balassa-Samuelson effect is proxied by the ratio between the real GDP per capita (PPP terms) and the trade-weighted average real GDP per capita of the trade partners. Data on the GDP per capita (in PPP terms) are primarily from the Penn World Table and updated using IMF's data;
• *NFA*: the net foreign asset positions are from the Lane and Milesi-Ferretti database and updated using data on the current account balances from IMF (World Economic Outlook database);
• *TOT*: the terms of trade are from the UNCTAD (United Nations Conference on Trade and Development) database.
• *GOV*: the governments spending are from the World Development Indicators database (World Bank);
• *OPEN*: the trade openness is proxied by the sum of exports and imports of goods and services measured as a share of GDP. Data are from the World Development Indicators database.

[1] EQCHANGE download page: http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=34

2. Currency misalignments in 2017

Figures 1 and 2 map the exchange rate misalignments for the year 2017, the most recent year for which data are available.[1] They respectively show undervalued and overvalued currencies. A quick look at both figures allows to notice that more currencies were undervalued than overvalued compared to their long run trend. As for 2016, the most important currency misalignments are concentrated in developing countries (DCs) and emerging economies (EMEs). Currency misalignments also appear to be geographically concentrated. South Eastern Africa is the region where undervaluations are the highest, with Mozambique and Zambia heading the list. This picture holds also for most of the other African countries, although to a lesser extent, except in Ghana and Algeria where currencies display relatively important undervaluations. As the African countries, most of the Asian economies as well as the Near and Middle East countries had undervalued currencies. Among European countries, undervaluations mostly prevailed in Western countries (except Portugal and Spain) and Northern countries.

Contrary to undervaluations, overvaluations are particularly concentrated in Southern Europe, South Eastern and Eastern Europe. Outside these regions, cases of overvaluations are associated to relatively few countries.

Overall, the global configuration of currency misalignments is broadly unchanged in 2017 compared to 2016, with minor shifts in line with the dynamics observed the previous years. The changes between 2016 and 2017 are characterized in Figure 3. The left chart plots the distribution of the changes in currency misalignments during this period. As can be seen, the distribution is slightly negatively skewed indicating a small tendency towards a reduction in currency misalignments. Furthermore, around 70% of the changes lie in the -/+ 5 percentage points interval. The right chart, which plots the distribution of the currency misalignments for 2017 and 2016, confirms the similarity of the currency misalignments configuration for the two years and the tendency towards the narrowing/reduction of the misalignments as indicated by the relatively weak displacement of the distribution towards the right.

[1] Table A.1 in Appendix A reports the averages and standard deviations of estimated misalignments across the different types of specifications and for each country of the sample.

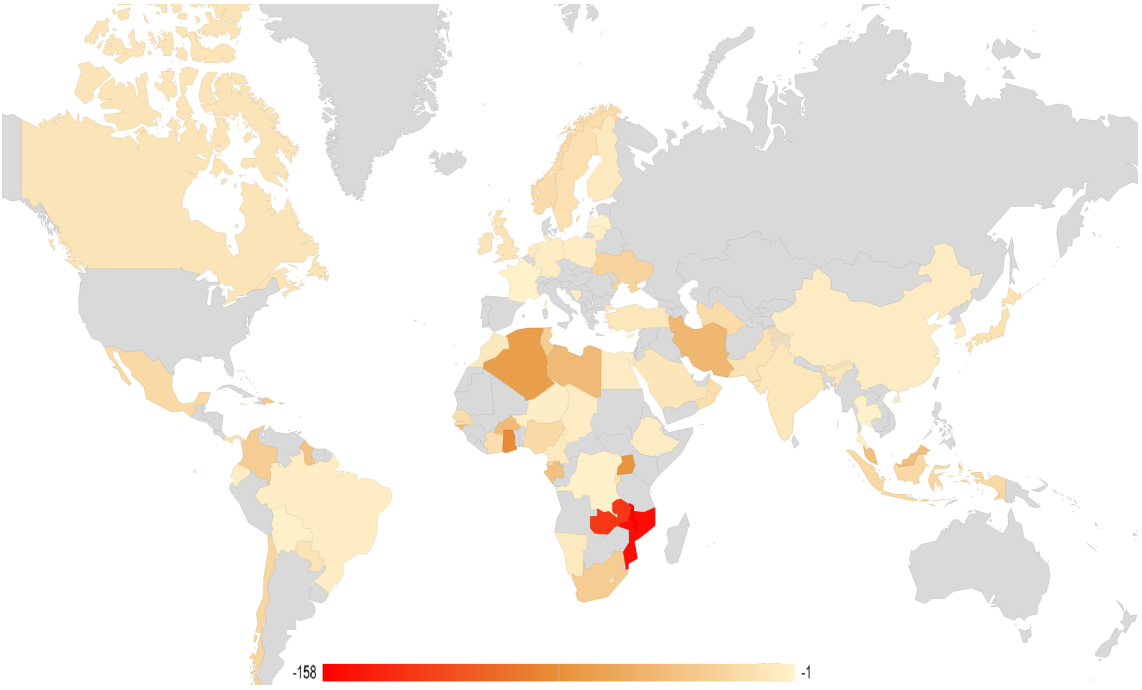


Figure 1 — Undervalued currencies

Source: *EQCHANGE* (CEPII). Data correspond to the averages of estimates over the different models and weighting systems (vis-à-vis 186 trade partners). Countries in grey, if not colored in Figure 2, are excluded from the analysis.

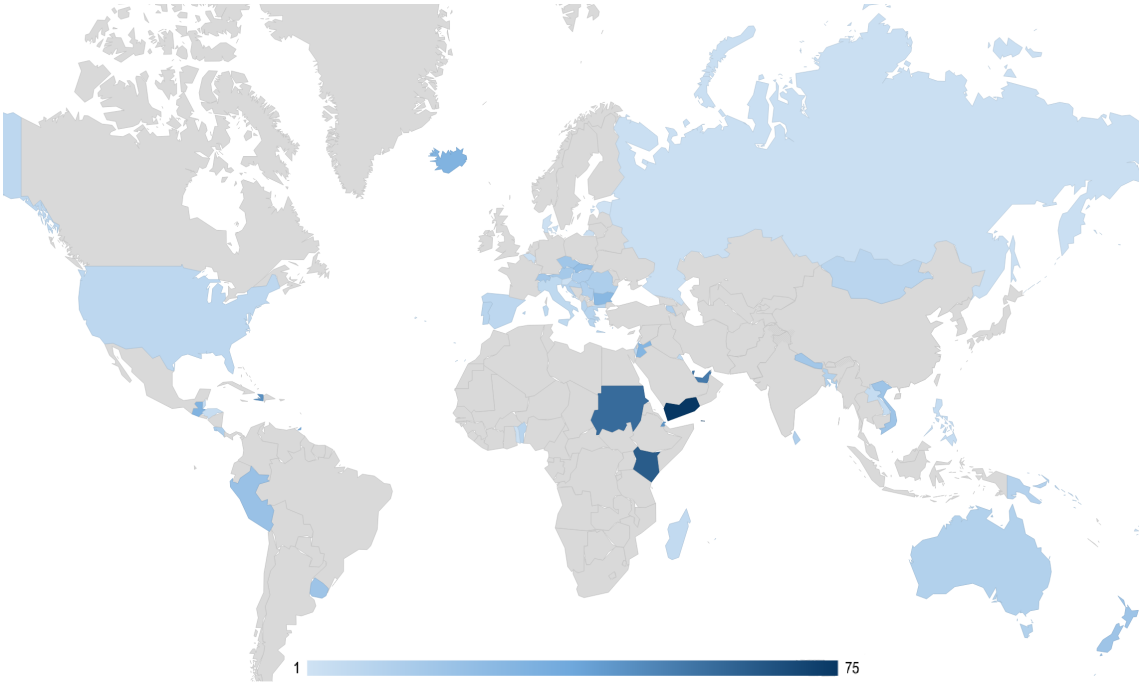


Figure 2 — Overvalued currencies

Source: *EQCHANGE* (CEPII). Data correspond to the averages of estimates over the different models and weighting systems (vis-à-vis 186 trade partners). Countries in grey, if not colored in Figure 2, are excluded from the analysis.

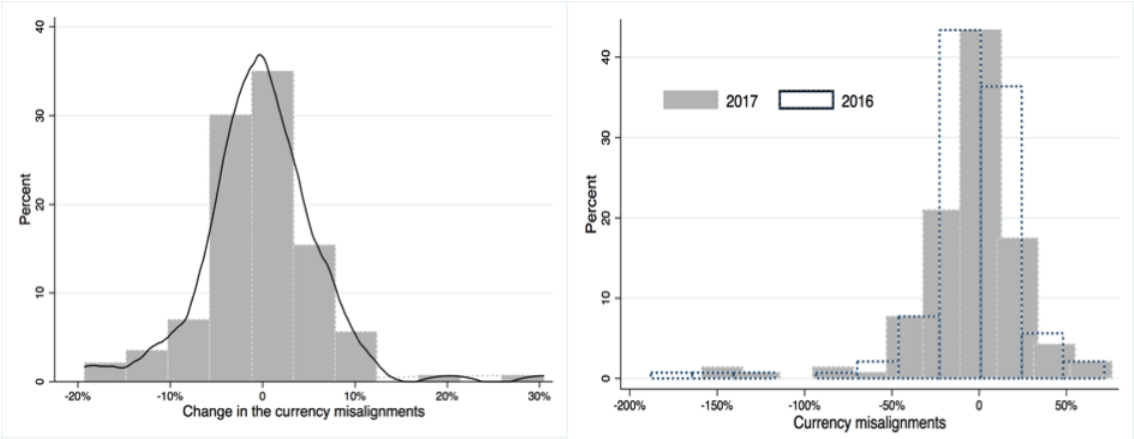


Figure 3 — Distributions of the changes in currency misalignments and the currency misalignments (2017 - 2016)

Notes: The left chart depicts the distribution of the change in the currency misalignments between 2017 and 2016 (the solid line represents the kernel density). The right chart plots the distribution of the currency misalignments for 2017 (gray bars) and 2016 (dashed blue bars).
Source: *EQCHANGE* (CEPII)

The global pattern noted hitherto, however, hides different dynamics as can be seen in Figure 4. In fact, there have been important disparities across countries and regions. Africa appears to be the most heterogeneous region in terms of dynamics. Moreover, it records the most important changes: (*i*) the largest increases in Sudan, Uganda and Libya; (*ii*) the most important reduction in Malawi. Changes in Europe were relatively of low amplitudes and quite uniform.[2] Northern Europe however slightly differs as exchange rate misalignments generally increased, especially in the United Kingdom and Iceland. This also applies to Middle East countries.

[2]Although European countries and especially euro area member countries are designated with both shades of green and red, the movements in currency misalignments were rather uniform. For instance, France is represented with a pale green as a reflection of the reduction in its undervaluation; however, Italy is colored in green with hints of pink because it slightly increases its overvaluation.

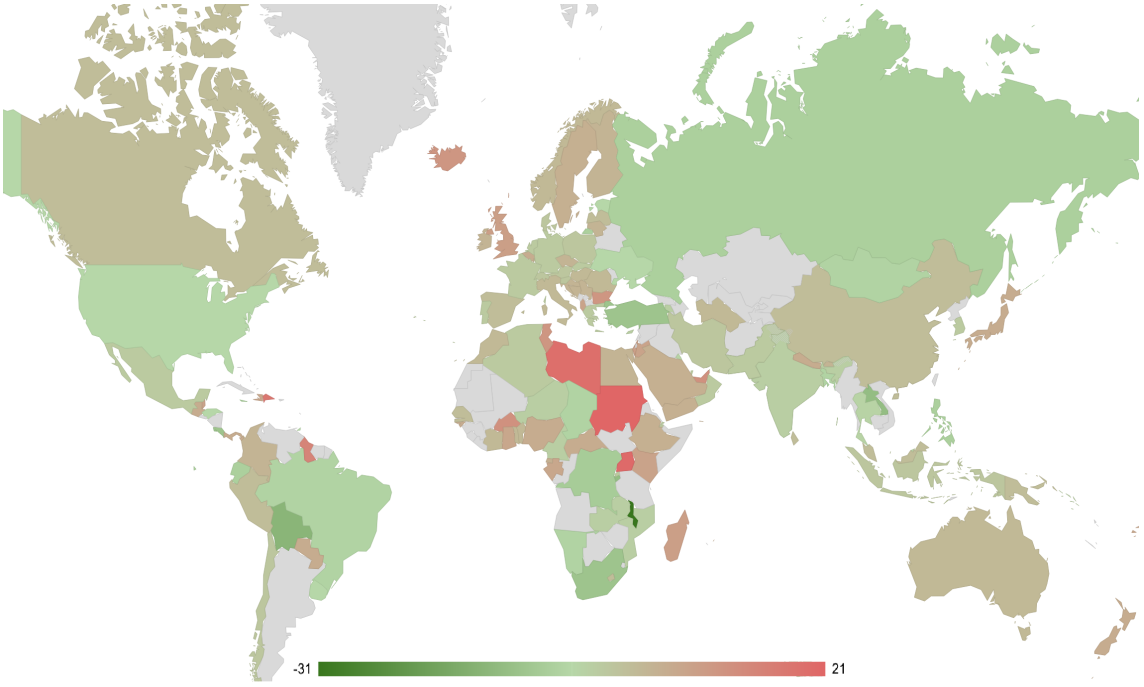


Figure 4 — Changes in currency misalignments between 2016 and 2017

Note: Data correspond to changes (in percentage point) in the averages of estimates over the different models and weighting systems (vis-à-vis 186 trade partners). The green (resp. red) color indicates a reduction (resp. an increase) in the misalignments (in absolute values), the shades reflecting the amplitude of the changes.
Source: *EQCHANGE* (CEPII)

Box 3 — Currency misalignments in 2017: key points

• As for 2016, the most important currency misalignments are concentrated in developing countries (DCs) and emerging economies (EMEs);

• Currency misalignments also appear to be geographically concentrated: the level of undervaluation is rather homogenous in Latin America and Asia; we observe more heterogeneity in Africa;

• The US dollar is still overvalued —although lesser than the previous year; the Chinese renminbi display a moderate undervaluation;

• Europe is again featured by two opposite situations: the Northern Europe (extended to France) is undervalued while the Southern, South Eastern and Eastern Europe is overvalued;

• The British pound, the Canadian dollar and the Japanese yen are moderately undervalued;

• Outside these regions, cases of overvaluations are associated to relatively few countries, e.g. Costa Rica, Guatemala, Haiti, Peru, Trinidad and Tobago, the United States and Uruguay for the Americas; Central African Rep., Kenya and Sudan for Africa; Bangladesh, Nepal, Sri Lanka and Viet Nam for the Asian continent;

• Overall, the global configuration of currency misalignments is broadly unchanged in 2017—compared to 2016, with a tendency towards the narrowing/reduction of the misalignments (see the right chart of Figure 3).

3. The misalignments of the major currencies/economies

The aim of this section is to document the currency misalignments for a set of 35 economies, their evolution —as well as the underlying factors— between 2016 and 2017. The economies considered are Australia, Austria, Belgium, Brazil, Canada, China, Denmark, France, Germany, Greece, Hong Kong, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Malaysia, Mexico, the Netherlands, New Zealand, Norway, Portugal, Russia, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, the United Kingdom and the United States.

3.1. The misalignments

The exchange rate misalignment estimates for 2017 are represented in Figure 5. Table 1 gives our assessments of these estimates ("coarse categorization") for each of the countries. Estimates for 2016 are also reported to illustrate the dynamics of the misalignments.

Over our 35 currencies, only 11 countries display overvaluations higher than 5% while 18 countries exhibit undervaluations higher than 5% —i.e. below -5%. The rest of the countries lie within the -/+5% interval suggesting that these countries are in line with their fundamentals, i.e. at their equilibrium value. This is the case for Belgium, Brazil, Denmark, France, Russia and Thailand. Except Denmark —already in line in 2016, all these countries went from moderate undervaluations to the "equilibrium".

Among the overvalued currencies, four appear with "large" misalignments: Austria, Greece, New Zealand and Switzerland. Except New Zealand that increased its overvaluation, the aforementioned countries already exhibited relatively large overvaluations in 2016. The remaining overvalued countries are concentrated in the 5-10% interval —"Moderate overvaluations". This group includes Israel, Italy, Spain and the United States. Australia, Hong Kong and Portugal lie in the intermediate group.

The undervalued currencies group is less uniformly distributed than the overvalued currencies group. Indeed, in ascending order, the different categories include respectively 8 countries, 4 countries and 6 countries. The moderate undervaluations group is composed of China, Germany, India, Ireland, Korea, Luxembourg, the Netherlands and Turkey.[3] Except Korea, Luxembourg and the Netherlands —that maintained themselves in this group, Germany, India and Ireland registered during 2017 a reduction in their undervaluations; China and Turkey, on the other hand, shifted from the "in line group" in 2016 to the moderate undervaluations group in 2017. The United Kingdom also shifted —in a quite abrupt manner— from a broadly in line currency

[3] Germany, India and Ireland flirt with the middle group.

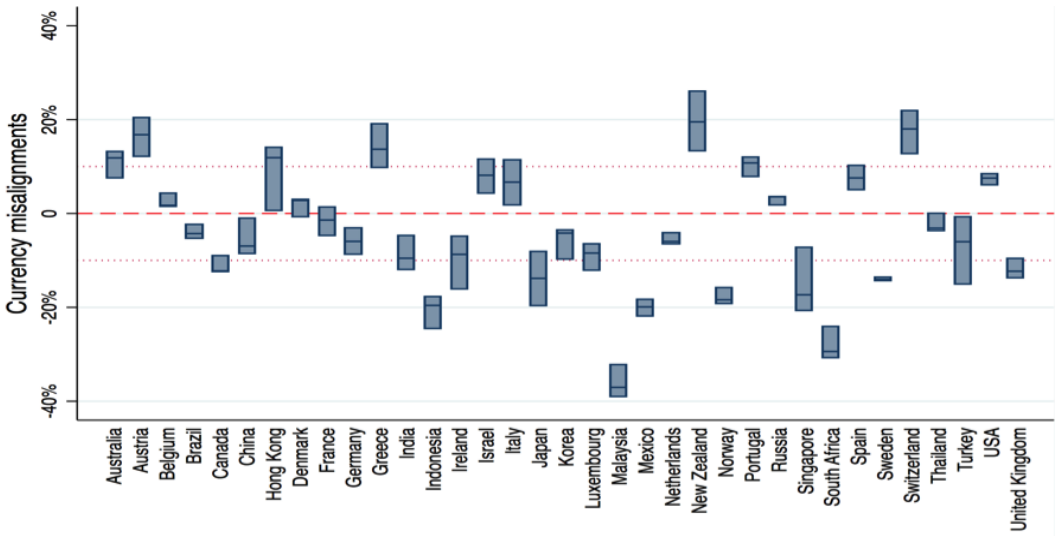


Figure 5 — Currency misalignment in 2017 (estimations range)

Note: Data are from *EQCHANGE* (CEPII). The red dot lines indicate the +10% and -10% levels.

Table 1 — Currency misalignments assessment

Country	Assessment 2016	Assessment 2017	Country	Assessment 2016	Assessment 2017
Australia			Luxembourg		
Austria			Malaysia		
Belgium			Mexico		
Brazil			Netherlands		
Canada			New Zealand		
China			Norway		
Denmark			Portugal		
France			Russia		
Germany			Singapore		
Greece			South Africa		
Hong Kong			Spain		
India			Sweden		
Indonesia			Switzerland		
Ireland			Thailand		
Israel			Turkey		
Italy			United Kingdom		
Japan			United States		
Korea					

Legend

Undervaluation — Overvaluation

Large — Moderate — In line — Moderate — Large

-15% -10% -5% +5% +10% +15%

Note: The proposed categorization is based on the average of country's misalignments, taking into account the standard deviation.

to an undervalued currency —in the intermediate group. Canada, Japan and Sweden also belong to this group. Indonesia, Malaysia, Mexico, Norway, Singapore and South Africa form the last group, i.e. large undervaluations.

3.2. Evolutions during 2017 and the driving factors

Despite the relative important movements in some currencies —such as the US dollar and the euro, the pattern of currency misalignments in 2017 for the here considered economies remained broadly unchanged. Indeed, as can be seen in the left chart of Figure 6, most of the countries appear very close to the 45-degree line hence illustrating a certain inertia/persistence. Very few countries, however, registered noticeable changes in their currency misalignments. South Africa and Malaysia top the list. There has been, however, a tendency towards the reduction of currency misalignments as indicated by the negative skewness of the distribution of the changes in the currency misalignments between 2016 and 2017 (see the right chart of Figure 6).

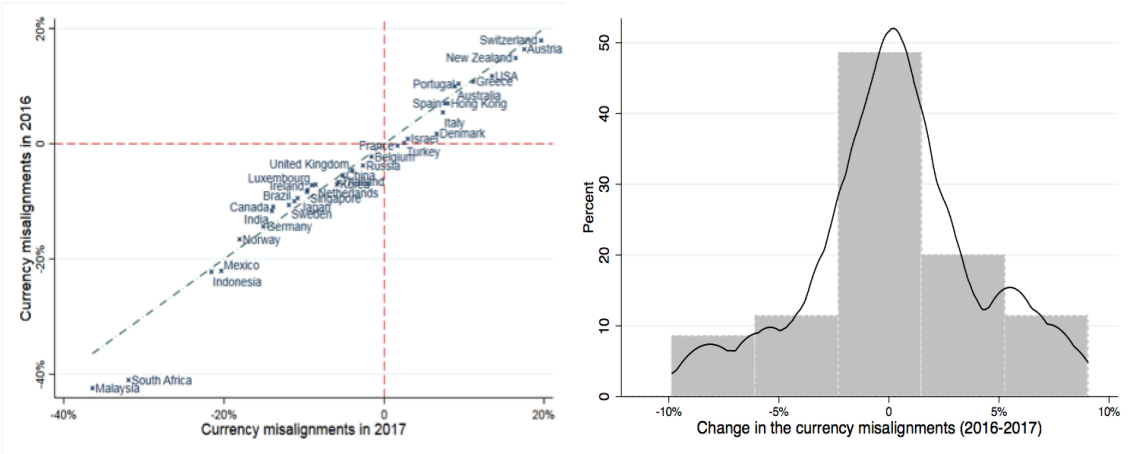


Figure 6 — Currency misalignments & changes (2017 - 2016)

Note: In the left chart, the dashed green line represents the 45-degree line. The solid line in the right chart correspond to the kernel density.

Source: *EQCHANGE* (CEPII)

Factors driving the reconfiguration of currency misalignments between 2016 and 2017 are diverse. In this respect, Figure 7 initiates the identification process of the underlying factors. Indeed, we plotted on the x-axis, the change in the estimated equilibrium exchange rates ($ERER$) and, on the y-axis, the change in the real effective exchange rate ($REER$). Hence, Figure 7 aims at illustrating the extent to which the evolutions of the currency misalignments have been related to variations in the real effective exchange rates and/or in the equilibrium real exchange rates. The

countries can then be classified in several categories, according to the evolutions of their $ERER$ and their $REER$. Policy implications about changes in misalignments can be drawn on a number of grounds, including the magnitude of these variations (small or large), the direction of these changes (improvement or worsening) and finally the roots of these evolutions (depending on whether they come from an improvement in fundamentals or an adjustment in the real effective exchange rate). For ease of reading, Figure 7 is divided in four regions defined by two reference lines: country above (resp. below) the horizontal dashed line registered an appreciation (resp. a depreciation) of their $REER$; those located at the left (resp. the right) of the vertical dashed registered a deterioration (resp. an improvement) of the fundamentals (or their equilibrium exchange rate). The four regions thus correspond to: (i) appreciation of both the $REER$ and $ERER$ (top right region), (ii) depreciation of both $REER$ and $ERER$ (bottom left region), (iii) appreciation of the $REER$ but depreciation of the $ERER$ (top left region), and (iv) depreciation of the $REER$ but appreciation of the $ERER$ (bottom right region).

Figure 7 — Changes in the currency misalignments: $\Delta.ERER$ *vs.* $\Delta.REER$

Note: "REER" (resp. "ERER") stands for the Real Effective (resp. Equilibrium Real Effective) Exchange Rates. Both scale express changes in percentage. The green dashed line represent the 45-degree line. A positive sign in both measures indicates an appreciation.

Source: *EQCHANGE* (CEPII)

Except few countries, movements in the $REER$ and $ERER$ have been of relatively small amplitudes. Excluding Brazil, Russia, South Africa and Turkey, the

variations in the $REER$ and/or the $ERER$ felt within the -/+5% interval. There is however an important concentration of countries around the horizontal dashed line —i.e. very small changes in the $REER$— hence suggesting that for a number of countries, the changes in the currency misalignments stemmed principally from the changes in the $ERER$ —or the fundamentals.

As can be seen, Russia, South Africa and Turkey —and to a lesser extent, Brazil— appear at the periphery of the countries cloud. Russia is the country that registered the most important variations in both the REER and the $ERER$; change in the $REER$ is however twice as high as the change in the $ERER$. The reduction in the 2016 undervaluation of the Russian ruble therefore comes from an appreciation in the $REER$ higher than the appreciation of the $ERER$. The reduction of the South African rand undervaluation also comes from the significant appreciation of the $REER$ —change in the $ERER$ being actually negligible. This holds also for Brazil where the reduction of the undervaluations principally reflects the appreciation of the $REER$.

The euro area countries appear dispersed along the horizontal dashed line, on both sides of the vertical reference line. This reveals different dynamics within the eurozone countries regarding the evolutions of the misalignments. On the one hand, Belgium, Germany, Italy and the Netherlands registered a deterioration of their fundamentals; on the other hand, France, Greece, Luxembourg and Ireland saw an improvement of their fundamentals.[4] With similar changes in the $REER$, and taking into account the 2016 levels of misalignments, these observations lead to the identification of four groups related to the dynamics of the currency misalignments. For Belgium, Germany and the Netherlands (resp. France, Ireland and Luxembourg), the reductions of the undervaluations came from the deterioration (resp. improvement) of the fundamentals; Italy increased its overvaluation due to the deterioration of its fundamentals while Greece reduced its overvaluation thanks to the improvement in its fundamentals.

Japan, Singapore, Sweden, the United Kingdom and the United States have seen, at the same time, their $REER$ depreciate and their $ERER$ appreciate. Excluding the United States that reduce its overvaluation, these movements results in the increase of the others countries undervaluations; the UK shifted from a broadly in line currency to an undervaluation. China remains relatively close to the first bisector hence indicating minor change in the currency misalignments. It should be noted,

[4] Although positives, changes in the $ERER$ for Austria, Portugal and Spain are very close to 0. This leads to globally unchanged misalignments.

however, that the change in the *ERER* is greater than that of the *REER*. This is also the case for Canada and Malaysia.

As aforementioned, departure from the first bisector implies a major source for the change in the currency misalignments, either the REER or the ERER —influenced by the fundamentals. Figure 8 addresses the issue of the change in the REER.

As can be seen, we plotted, in the left chart, the changes in the *NEER* (Nominal Effective Exchange Rate) and in the NER (Nominal Exchange Rate vis-à-vis the US dollar) and, in the right chart, the change in the *REER* against the change in the *NEER*. The left chart hence addresses the issue of the effect of the *NER* —and of the trade structure— while the right chart investigates that of the inflation differential vis-à-vis the trade partners.

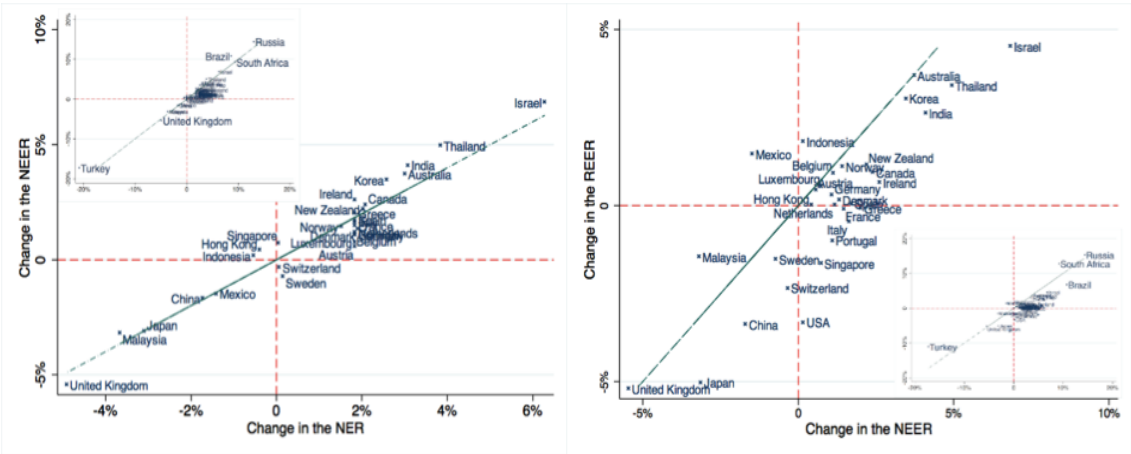


Figure 8 — Exchange rate variations

Note: "REER" (resp. "NEER") stands for the Real (resp. Nominal) Effective Exchange Rates; "NER" stands for the Nominal bilateral Exchange Rate (vis-à-vis the US dollar). A positive sign indicates an appreciation. Both scale express changes in percentage. The green dashed line represent the 45-degree line.
Source: *EQCHANGE* (CEPII) and IMF

From the left chart, one may note that for most countries, change in the *NER* vis-à-vis the US dollar translated into a rather equivalent change in the NEER. Hence, the main determinant of the movements in the *NEER* appear to be the National currency/ US dollar exchange rate in most countries, especially in China, Japan and Mexico —i.e. countries on the first bisector. Relatively few countries depart from the first bisector thus suggesting another source of variations for their *NEER*.[5] However, these departures could be considered as modest given their relatively small size.

[5]This latter is related to the existence of both direct and indirect quotations of currencies leading to the fact that a currency could be appreciating vis-à-vis certain currencies while depreciating vis-à-vis others. This, coupled with the trade structure, often either amplify, mitigate or overturn the transmission from bilateral to effective measures.

Overall, very few currencies depreciated vis-à-vis the US dollar and only six of them (China, Japan, Malaysia, Mexico, Turkey and the United Kingdom) depreciated both vis-à-vis the US dollar and in effective terms. Changes for Hong Kong, Indonesia, Singapore, Switzerland and Sweden are negligible. The euro area countries appear in the top right region, all on the same vertical alignment (around +2%) but at different levels due to differences in the trade structure.

Box 4 — On the evolution of the key —and some selected— currencies

The year 2017 saw important changes in the major currencies as well as in some emerging countries' currencies. This box briefly reviews the root causes of these movements.

During the year 2017, the US dollar and the euro exchange rates have drawn special attention. Indeed, while most investors, at the end of 2016/beginning of 2017 envisaged a US dollar/euro exchange rate close to 1, the dollar declined the first three quarters of 2017 before a modest rebound at the end of September. Explanations often evoked for the decline of the dollar during the first three quarters generally involve two factors. The first is related to the tightening of the US monetary policy which led to the reduction of the long-term interest rate, both absolutely and relative to the corresponding rate of the other major economies.[1] The second factor is related to risk, both political uncertainty (due to the US fiscal program financing) and the geopolitical risk as a result of the rising tensions between the US and North Korea. Amplifying this decline of the US dollar, the euro area countries registered a greater appreciation due also to the rise in the euro. Indeed, satisfying results —growth actually exceeded earlier forecasts— coupled with a relative political stability —partly owing to the election of Emmanuel Macron in France— have contributed to the appreciation of the euro. In contrast, the British pound depreciated as a result of the uncertainty surrounding the Brexit.

Emerging countries' currencies were not left on the sidelines of these exchange rate swings. Indeed, the Brazilian real, the Russian ruble, the South African rand and the Turkish lira also exhibited considerable changes. In fact, the first three currencies, against a backdrop of improving terms of trade and premises of crisis exit, sharply appreciated —see Figure 8, thereby breaking the previous years depreciation trend. On the contrary, the Turkish lira considerably depreciated. Reason for this depreciation includes the uncertain political environment as well as the vulnerable external position (see Figure B.3 in Appendix B). To a lesser extent, the Chinese renminbi, depreciated significantly in the beginning of 2017 under the pressure of capital outflows.

[1] The yen however depreciated due to interest rate differentials vis-à-vis the United States.

The right chart (Figure 8) deals with the other source of change in the $REER$: inflation or inflation differential vis-à-vis the trade partners. As it shows, inflation have also played a noteworthy role in the dynamics of the $REER$. Indeed, very few countries appear on —or close to— the first bisector which here indicates a "complete" pass-through (Austria, Australia, Belgium, Hong Kong, Korea, Luxembourg, Norway and the United Kingdom). Turkey is the country the more distant from the first bisector. Indeed, stemming from a depreciation —around 20% vis-à-vis the US dollar, the $NEER$ depreciated by around 17% that translated into a 11% depreciation of the $REER$. The reason for this incomplete pass-through is the 11% increase in

the Turkish consumer price index between 2016 and 2017. The increase in inflation even overturned the $NEER$ depreciation in a $REER$ appreciation in Mexico. In the United States, the $REER$ depreciated by around 3.5% —no change in the $NEER$— due to the increase in the trade partners price levels relative to the US.

Overall, given the magnitudes, movements in the exchange rates have played a minor role regarding the evolution of currency misalignments during 2017 in most of the countries —despite some important intra-year volatilities. In few countries however, these movements played a more important role. Concerned countries are Brazil, Japan, Russia, South Africa, Turkey and the United Kingdom.[6]

Figure 9 pertains to the factors underlying the changes in the estimated equilibrium exchange rates. We plotted, on the x-axis, the changes in the Net Foreign Asset (NFA) position and, on the y-axis, the change in the Balassa-Samuelson effect proxy —relative GDP per capita in PPP terms (further details are provided in Box 5).[7] As can be seen, except few countries (China, India, Ireland and Turkey), changes in the relative GDP and the NFA were —also— of relatively small amplitudes. Ireland appears as an outlier regarding the changes in both the relative GDP and the NFA. This mainly reflects the important reduction in its debtor position due to the increase of the services surplus (see Figure B.4 in Appendix B for the changes in the current account and its components). Changes in the NFA mainly drove the $ERER$ movements in Korea, the Netherlands, Norway and the United Kingdom. The 2017 surpluses in the current account —originating principally from direct investment in the Netherlands and the United Kingdom, and from services in Norway— explain these changes. Conversely, the Korean NFA deteriorated due to the trade balance deficits. Except the Netherlands and Ireland, changes in the NFA of the euro area countries (in the selected 35 economies) were relatively small, ranging between -/+ 1 percentage point: Germany and Spain registered a slight deterioration of their NFA; changes for Austria and Belgium were negligible while Greece, Italy and Luxembourg improved their position. The United States appears slightly on the right of the vertical reference line indicating a broadly unchanged external position. Change in the relative GDP particularly helps explaining the $ERER$ depreciation in Australia, Belgium, Brazil, Luxembourg, New Zealand and Switzerland.

Table 2 provides a summary of the movements in the $REER$ and the $ERER$ for all the 35 selected economies.

[6] To a lesser extent, this also holds for Israel and the United States.
[7] Figure B.2 in Appendix B shows the changes in the terms of trade.

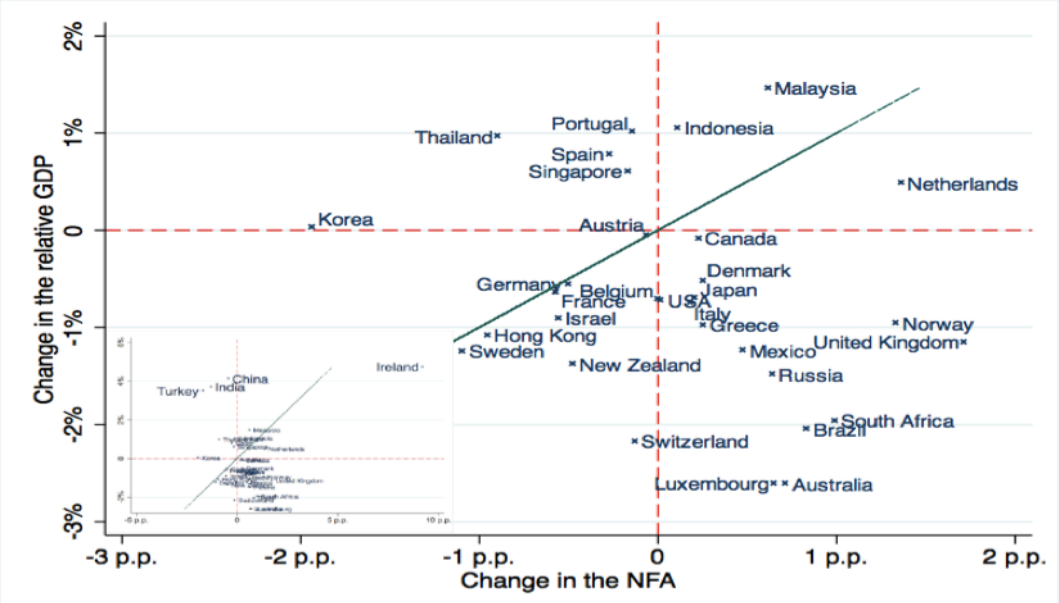
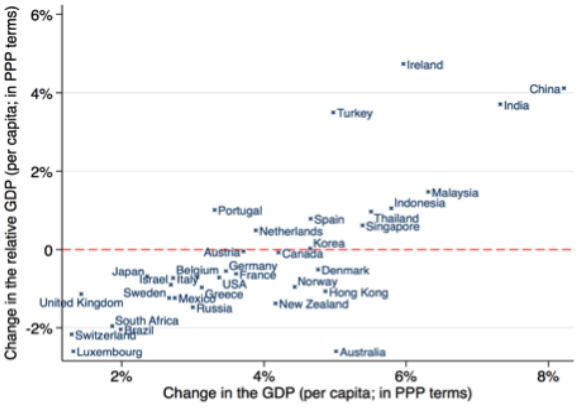


Figure 9 — Changes in the fundamentals: relative *GDP vs. NFA*

Note: "Change in the relative GDP" corresponds to the change in the GDP per capita of country *i* relative to the trade partners GDP per capita —both in PPP terms (see Box 5). "*NFA*" stands for the Net Foreign Asset position (as share of GDP). Changes in the relative GDP are expressed in percentage while those in the *NFA* are expressed in percentage points. Source: *EQCHANGE* (CEPII)

Box 5 — The relative GDP and the Balassa-Samuelson (BS) effect

Empirical studies often test the BS hypothesis by relating the real exchange rate to the income per capita (real GDP per capita in PPP terms) differential rather than to the productivity differential. The reason for this is that sectoral data on output and employment for traded and non-traded goods sectors are not available for all countries. Given our coverage, we adopt the same approach to proxy the BS effect. Our relative productivity measure is therefore proxied by the ratio between the real GDP per capita (PPP terms) in the considered country and the trade weighted average of those of the trade partners.[1] Reflecting a relative strengthening of of the economies compared to most trading partners, 12 countries (among the 35 selected economies) grew more than the average of their trade partners (see Box Figure 5.1). China, India, Ireland and Turkey top this group. While growth in India and Turkey were fueled by the importance of domestic demand (especially household consumption in Turkey and government spending in India), growth in Ireland reflects the falling unemployment and the strengthening of different sectors (services exports drove the current account). Among the euro area countries, Portugal, followed by Spain and Netherlands also display growth in relative GDP.



Box Figure 5.1 — Relative GDP vs. GDP

Data source: *EQCHANGE* an *IMF*

Overall, despite a broadly shared economic growth, the difference in the growth momentum between the countries and their most important trade partners (especially China and India) explains the concentration of countries below the horizontal reference line, and so, the "productivity differential".

[1] The weights and trade partners are those used for the calculation of the effective exchange rates.

Table 2 — Summary of the movements in the major currencies

Australia: Small increase in the overvaluation; large overvaluation group
- *REER* Increase in line with the *NER* change
- *ERER* Improvement mostly due to the terms of trade; stable *NFA* and negative change in the relative GDP.

.....

Austria: Overvaluation broadly unchanged
- *REER* No significant change despite the euro appreciation
- *ERER* No significant change; idem for the fundamentals

.....

Belgium: Reduction of the undervaluation; currency broadly in line
- *REER* Slight appreciation broadly in line with the euro appreciation
- *ERER* Deterioration due to negative change in the terms of trade and the relative GDP; stable NFA

.....

Brazil: Reduction of the undervaluation; currency broadly in line
- *REER* Considerable increase in line with the appreciation vis-à-vis the US dollar
- *ERER* Slight depreciation due to the negative change in the relative GDP —despite the improvement in the *NFA* and the positive terms of trade.

.....

Canada: Almost negligible increase in the undervaluation; middle category of undervaluation
- *REER* Slight increase in line with the NER appreciation
- *ERER* Higher increase due to the NFA and terms of trade; negative change in the relative GDP

.....

China: From an line currency to a moderate undervaluation
- *REER* Depreciation broadly in line with the *NER*
- *ERER* Smaller depreciation; negative (positive) changes in the *NFA* and terms of trade (relative GDP)

.....

Denmark: No major change; currency in line
- *REER* No significant change
- *ERER* No significant change; more or less stable fundamentals

.....

France: Reduction of the undervaluation; currency broadly in line
- *REER* Very slight depreciation despite the euro appreciation
- *ERER* Small appreciation

.....

Germany: Reduction of the undervaluation; currency moderately undervalued
- *REER* No significant change despite the euro appreciation
- *ERER* Small depreciation; (weak) negative changes in *NFA*, relative GDP and terms of trade

.....

Greece: Small reduction of the overvaluation; large overvaluation group
- *REER* No significant change despite the euro appreciation
- *ERER* Slight improvement due to *NFA*

.....

India: Reduction in the undervaluation; currency moderately undervalued
- *REER* Increase in line with the *NER*
- *ERER* No significant change; increase in the relative GDP mitigated by the negative change in NFA and terms of trade

.....

Indonesia: Undervaluation broadly unchanged; large undervaluation group
- *REER* Small increase despite the depreciation vis-à-vis the US dollar
- *ERER* Smaller appreciation; small but positive increase in the fundamentals

(Continued on next page)

Table 2 — Summary of the movements in the major currencies *(Continued)*

Indonesia: Undervaluation broadly unchanged; large undervaluation group
- *REER* Small increase despite the depreciation vis-à-vis the US dollar
- *ERER* Smaller appreciation; small but positive increase in the fundamentals

Israel: From an line currency to a moderate overvaluation
- *REER* Appreciation broadly in line with the NER
- *ERER* Depreciation of lower amplitude; negative changes in the fundamentals

Italy: Very slight increase of the overvaluation; currency moderately overvalued
- *REER* Very slight depreciation despite the euro appreciation
- *ERER* Higher depreciation; negative changes in the relative GDP and terms of trade

Japan: Increase in the undervaluation; from the moderate to the middle group
- *REER* Depreciation
- *ERER* Very small appreciation; small positive (negative) change in the NFA (relative GDP)

Korea: Undervaluation broadly unchanged; moderate group
- *REER* Increase in line with the NEER
- *ERER* Smaller increase; stable relative GDP and negative change in the NFA

Luxembourg: Undervaluation broadly unchanged; moderate group
- *REER* Very slight appreciation despite the euro appreciation
- *ERER* Weak appreciation; positive (negative) change in the NFA (relative GDP)

Malaysia: Undervaluation broadly unchanged; large undervaluation group
- *REER* Small depreciation
- *ERER* Weaker depreciation

Mexico: Undervaluation broadly unchanged; large undervaluation group
- *REER* Small appreciation despite the small depreciation vis-à-vis the US dollar
- *ERER* Slight depreciation; positive changes in NFA and terms of trade offset by the negative change in the relative GDP

Netherlands: Undervaluation broadly unchanged; moderate group
- *REER* No significant change despite the euro appreciation
- *ERER* Small depreciation; (weak) negative changes in NFA, relative GDP and terms of trade

New Zealand: Increase in the overvaluation; large overvaluation group
- *REER* Slight appreciation
- *ERER* Depreciation; negative (positive) change in the NFA and relative GDP (terms of trade)

Norway: Small increase in the undervaluation; large undervaluation group
- *REER* Small appreciation in line with the NER
- *ERER* Higher appreciation; important positive change in the terms of trade

Portugal: Undervaluation broadly unchanged; middle category
- *REER* Small depreciation despite the euro appreciation
- *ERER* Appreciation of lower amplitude mainly due to the change in the relative GDP

Russia: Reduction of the undervaluation; currency broadly in line
- *REER* Sharp appreciation broadly in line with the NER
- *ERER* Appreciation of lower amplitude mainly due to the change in the terms of trade

(Continued on next page)

Table 2 — Summary of the movements in the major currencies *(Continued)*

Singapore: Increase in the undervaluation; at the border of large and middle undervaluation category
- *REER* Small depreciation
- *ERER* Appreciation mainly due to the change in the relative GDP

.....

South Africa: reduction in the undervaluation; large undervaluation group
- *REER* Important increase broadly in line with the NER
- *ERER* Broadly stable; positive terms of trade and NFA changes offset by negative relative GDP

.....

Spain: Overvaluation broadly unchanged; moderate group
- *REER* No significant change despite the euro appreciation
- *ERER* Slight depreciation mainly due to the negative changes in the terms of trade and NFA

.....

Sweden: Increase in the undervaluation; middle group
- *REER* Small depreciation
- *ERER* Small appreciation

.....

Switzerland: Overvaluation broadly unchanged; large overvaluation group
- *REER* Small depreciation
- *ERER* Depreciation of similar amplitude; negative changes in the fundamentals

.....

Thailand: Reduction of the undervaluation; currency broadly in line
- *REER* Appreciation in line with the NER
- *ERER* Broadly unchanged; positive change in the relative GDP offset by the change in NFA

.....

Turkey: From an line currency to a moderate undervaluation
- *REER* Important depreciation; partly offset by inflation
- *ERER* Very small appreciation; positive change in the relative GDP offset by the change in NFA

.....

United Kingdom: Increase in the undervaluation
- *REER* Depreciation in line with the NER
- *ERER* Slight appreciation; positive (negative) change in the NFA (relative GDP)

.....

United States: Reduction of the overvaluation; moderate overvaluation group
- *REER* Depreciation
- *ERER* Small appreciation

Overall, changes in currency misalignments in the major economies during 2017 were, except few countries, of small amplitudes and supportive of reducing currency misalignments. This global pattern, however, hides heterogeneous dynamics. Corrections —i.e. reduction of the misalignments— observed for France, Greece and Ireland appear sustainable as they relied mainly on improving fundamentals. On the contrary, for Belgium, Brazil, India, Russia, South Africa, Thailand and the United States, it is quite likely that the corrections will only be temporary because they were mainly driven by the exchange rate dynamics. Also, the exchange rate dynamics further widen the misalignments in China, India, Israel, Japan and the United Kingdom.

4. Regional outlooks

This section is devoted to an overview of the geographical configuration of currency misalignments in 2017. It also briefly documents the dynamics of these currency misalignments as well as their sources. We relied on the United Nations M49 standard for the country groupings. It covers 143 countries distributed as follows: 39 African countries, 27 for America, 34 Asian countries, 34 countries for Europe and 9 countries for Oceania.

4.1. Africa

Overall, the configuration of currency misalignments in Africa was broadly unchanged in 2017 —compared to 2016. Indeed, as Figure 10 shows, most of the countries appear close to the bisector. Few countries however significantly depart from this reference line.

On the one hand, Burkina Faso, Comoros, Gabon, Ghana, Kenya, Libya, Madagascar, Sudan, Tunisia and Uganda increased substantially —i.e. at least 5 percentage points— their misalignments. More specifically, Comoros, Kenya, Madagascar and Sudan have seen their overvaluation increased while the other countries became more undervalued.[8] For Burkina Faso, Kenya, Madagascar, Sudan and Tunisia (resp. Comoros, Gabon, Ghana and Libya) the changes in the $REER$ (resp. $ERER$) mainly drove these increases.

On the other hand, for Burundi, Chad, Congo, Malawi, Namibia and South Africa, the misalignments noticeably decreased. In South Africa and Namibia, the appreciations of the $REER$ —owing to the appreciation of the rand— led to a decrease of the undervaluations. For Chad and Malawi, the depreciation of the $ERER$ mainly drove the reduction of the undervaluations while Congo Republic switched from a slightly overvalued currency to a moderately undervalued currency due to the appreciation of the $ERER$.

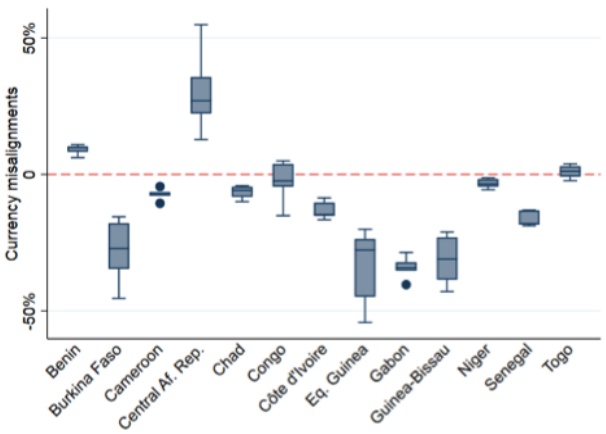
The rest of the countries display relatively small changes in their misalignments —i.e. within the -/+5 percentage points range— despite important changes in the $REER$ and $ERER$ in some countries. This is particularly the case for Nigeria which, during 2017, experienced wild swings of the naira owing to the existence of multiple rates and speculation on the black market. The dollar reserve depletion also prompted a naira devaluation. In average, the naira depreciated by around 21 percent vis-à-vis the US dollar and only 7 percent in effective terms —due to inflation and the naira rebound along with the price of crude oil. In the meantime, the ERER felt by around 3.5 percent. Egypt also experienced wild swings in its currency owing to the

[8] Note that Malagasy ariary shifted from an undervalued currency in 2016 —although broadly in line with its fundamentals given the uncertainty— to an overvaluation.

November 2016 devaluation of the pound and the subsequent adoption of a floating regime. This translated into a 29 percent depreciation of the pound in —real— effective terms. However, the currency misalignments only grew by 3 percentage points —from around -2% in 2016 to -5% in 2017 (standard deviations for 2016 and 2017 are respectively 7% and 6%)— due to the 26% depreciation of the $ERER$.

Box 6 — The CFA franc zone

Our regional outlook covers 13 CFA zone countries. As visible in Figure 10, except Burkina Faso, changes in the currency misalignments were of relatively small amplitudes. The situation in 2017 reveals the existence of important differences regarding the currency misalignments. On the one hand, Burkina Faso, Côte d'Ivoire, Equatorial Guinea, Gabon and Senegal exhibit considerable undervaluations —higher than -15%. Cameroon has an undervaluation of around 8%. On the other hand, Benin and Central African Rep. display noticeable overvaluations. Between these two groups of countries, Chad, Congo Rep., Niger and Togo appear broadly in line with their fundamentals. Except Burkina Faso that significantly depreciated in effective terms, changes in the ERER seem to be the main driver of the misalignment changes. Indeed, Benin, Cameroon, Chad, Côte d'Ivoire, Equatorial Guinea and Senegal display changes in their REER equal to 0 despite the euro appreciation; for Congo Rep., Gabon, Niger and Togo, these variations are in the order of 2 percent (see Figure 11). Among the observed adjustments, the increase in the undervaluations in Côte d'Ivoire, Equatorial Guinea and Gabon —and the shift from an overvaluation to an undervaluation for Congo— appear sustainable as they result from stronger fundamentals. In Benin and Cameroon, however, the adjustments reflect deteriorated fundamentals. The observed misalignments configuration in 2017 is however a longstanding one (see Box Figure 6.1). Over the 2013-2018 —this also applies to a longer period— three groups of countries corresponding to persistent (i) undervaluations, (ii) overvaluations, and (iii) broadly consistent currencies can be identified. This pattern naturally questions the issue of the sustainability of such an union in the long run and more specifically that of the coherence of the peg and/or its rate for all the members.



Box Figure 6.1 — Misalignments : 2013-2018

Source: *EQCHANGE* (CEPII)

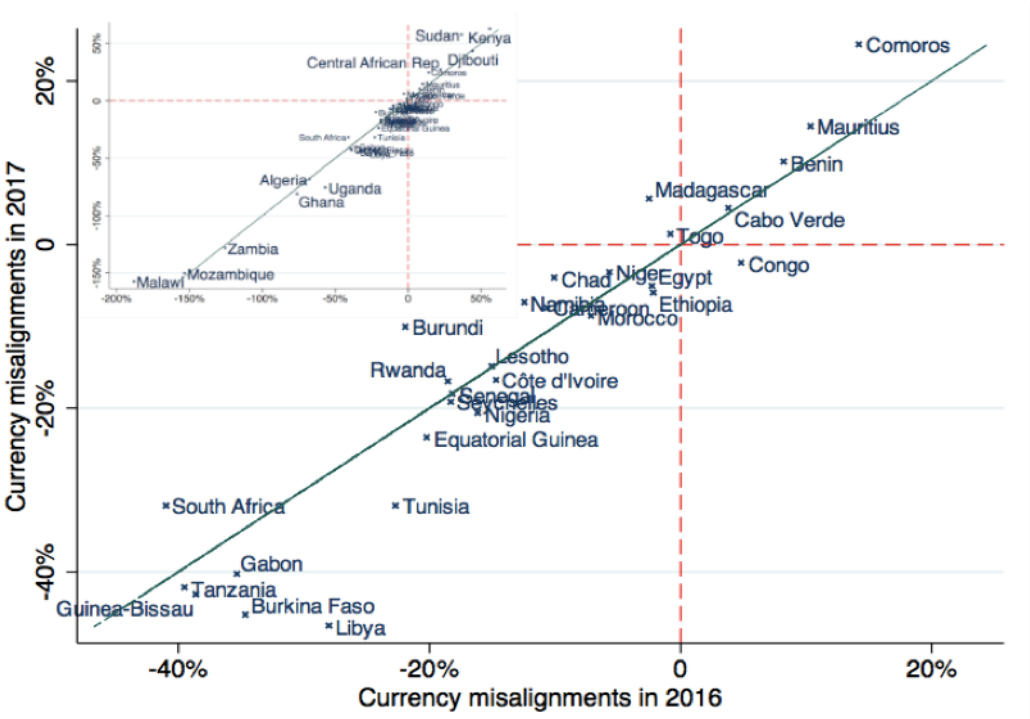


Figure 10 — Africa | Currency misalignments in 2016 and 2017
Note: A positive (resp. negative) sign indicates an overvaluation (resp. undervaluations).
Source: *EQCHANGE* (CEPII)

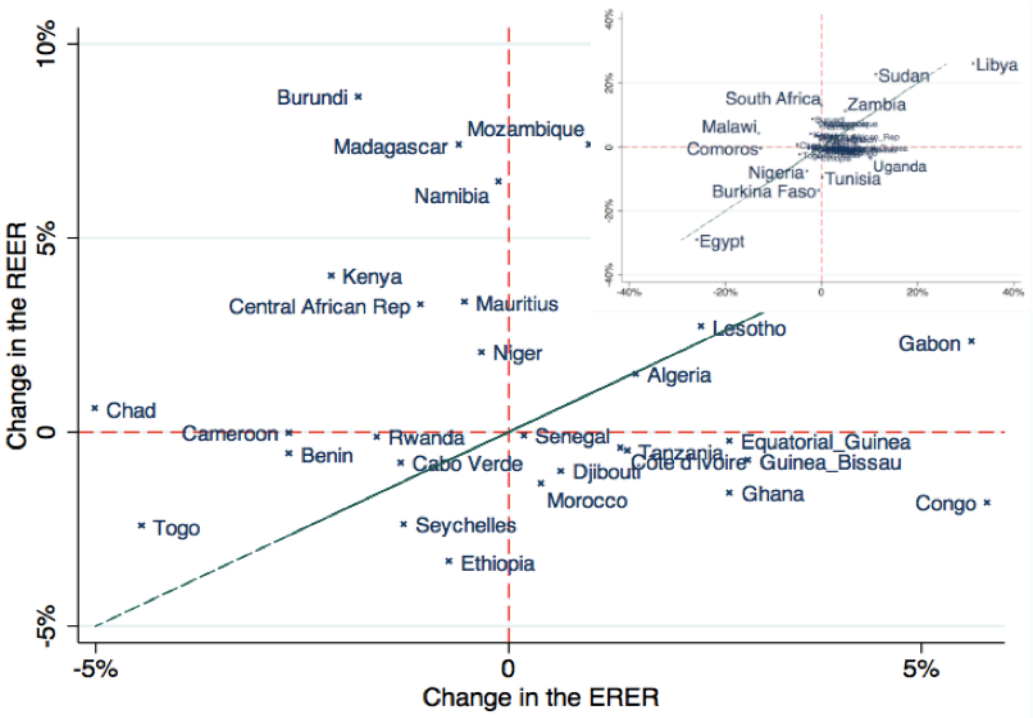


Figure 11 — Africa | Changes in the currency misalignments: $\Delta.ERER$ *vs.* $\Delta.REER$
Note: "*REER*" (resp. "*ERER*") stands for the Real Effective (resp. Equilibrium Real Effective) Exchange Rates. Both scale express changes in percentage. The green dashed line represent the 45-degree line. A positive sign in both measures indicates an appreciation.
Source: *EQCHANGE* (CEPII)

4.2. America

In America, changes in the currency misalignments have been mostly weak with a slightly high number of increases in currency misalignments —both undervaluations and overvaluations— compared to reductions.

As a result of its long decline during the first three quarters of 2017 and despite the modest rebound in October of the same year, the $REER$ of the United States depreciated only by around 3.5% —no change in the $NEER$— due to the increase in the trade partner price level relative to the US. In the meantime, growth, coupled with a very modest improvement in the net foreign asset position led to a barely perceptible appreciation of the ERER. The combination of these two movements thus led to the reduction of the US dollar overvaluation. In Mexico, the reduction in the undervaluation was also mainly driven by the $REER$ —most specifically the $REER$ appreciation despite the peso depreciation vis-à-vis the US dollar. In Canada, however, the currency misalignments were broadly unchanged due to the appreciation of the $REER$ more or less equivalent to the appreciation of the $ERER$.

In Latin America, the sharp appreciation of the Brazilian real have led to the reduction of the currency misalignments in Brazil. The real displayed for 2017 an average misalignment of -4%, hence being broadly consistent with the value given by the fundamentals. In Bolivia and Costa Rica, the reduction in the misalignment also comes from the $REER$. While both reduced their overvaluations, the former currency is now broadly in line.[9] The largest increases in currency misalignments were observed in Belize, Dominican Rep., Ecuador, Guyana and Haiti.

Overall, noticeable corrections —i.e. reductions— in the currency misalignments have been observed in relatively few countries: Bolivia, Brazil, Costa Rica, Honduras, Jamaica, Trinidad and Tobago, the United States and Uruguay.[10] On the other hand, for Dominican Rep., Guatemala, Guyana and Haiti, the misalignments significantly increased. The rest of the countries display rather small changes in the misalignments except Belize that switched from an undervaluation to an overvaluation —vice versa for Ecuador.

[9] In Jamaica, however, the large reduction of the undervaluation comes from the depreciation of the $ERER$ higher than that of the $REER$.

[10] Except Jamaica and the other countries already discussed, the listed countries reduced their overvaluation. To a lesser extent, Antigua and Barbuda and Chile also reduced their misalignment.

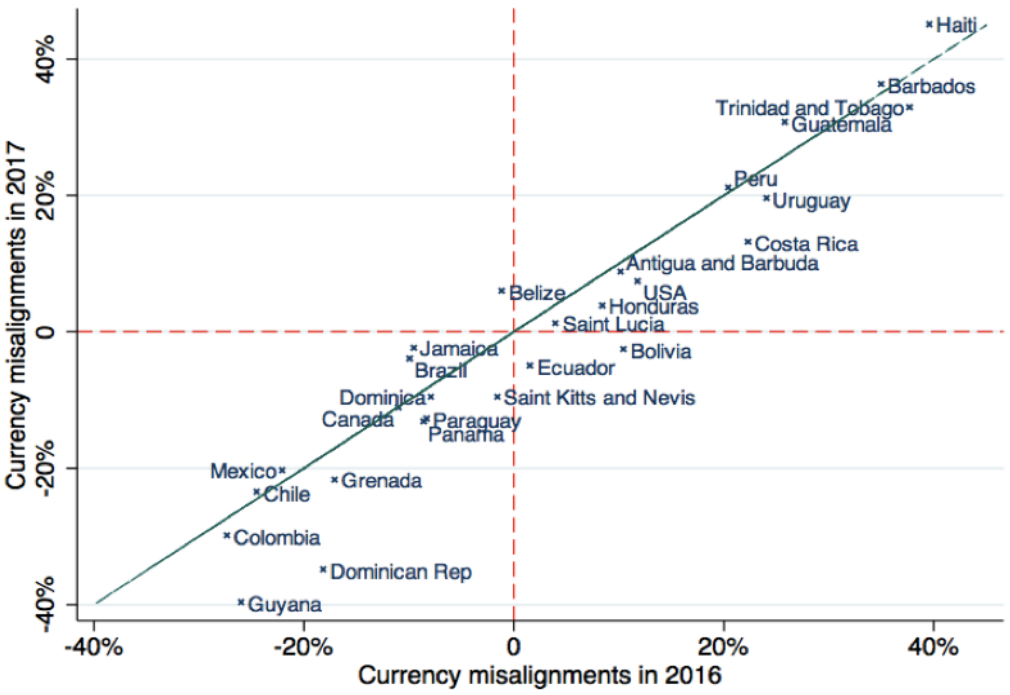


Figure 12 — America | Currency misalignments in 2016 and 2017
Note: A positive (resp. negative) sign indicates an overvaluation (resp. undervaluations).
Source: *EQCHANGE* (CEPII)

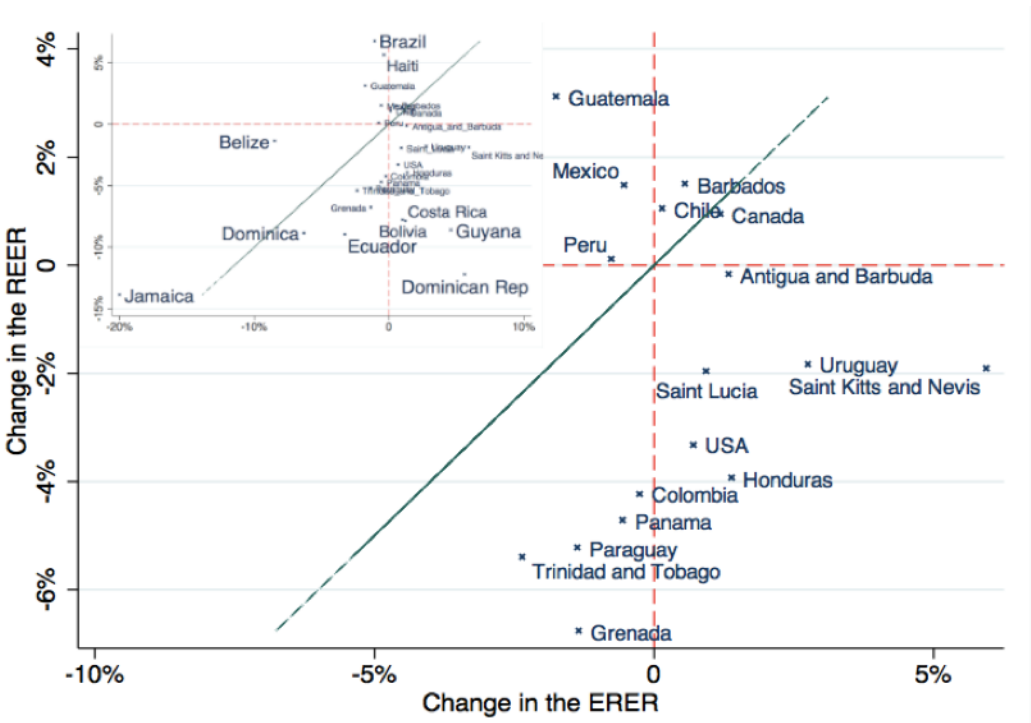


Figure 13 — America | Changes in the currency misalignments: $\Delta.ERER$ *vs.* $\Delta.REER$
Note: "$REER$" (resp. "$ERER$") stands for the Real Effective (resp. Equilibrium Real Effective) Exchange Rates. Both scale express changes in percentage. The green dashed line represent the 45-degree line. A positive sign in both measures indicates an appreciation.
Source: *EQCHANGE* (CEPII)

4.3. Asia

In Asia, most countries faced negative terms of trade shocks that led to the depreciation of the currencies (see Figure B.2 in Appendix B). In some cases, the depreciation of the currencies were exacerbated by financial turmoils owing either from interest rate differentials vis-à-vis the US (Japan), capital outflows (China, Indonesia, Malaysia), uncertain political environment or vulnerable external position (Turkey). Gulf countries, however, due namely to the rising price of oil, were relatively shielded. These negative terms of trade changes were, however, mitigated in some cases by the growth momentum shared by all the countries in the region —except Gulf countries (see Figure B.1 in Appendix B). Overall, and in a year marked by a rising US dollar, only 14 countries —out of 34— depreciated in effective terms (see Figure 15). Hence, the change in the $REER$ mainly drove the large —i.e. higher than 5 percentage points— variations of the currency misalignments in Israel, Jordan and Turkey. The latter three countries respectively departed from an in line currency to an overvalued currency, increased its overvaluation and shifted from an in line currency to an undervalued currency. Movements in the $REER$ also mainly explain the noticeable reduction of the overvaluations in Mongolia and Philippines.[11]

The rest of the region is marked by relatively small movements —i.e. below 5 p.p.— in the currency misalignments. As China —that saw a slight increase in its undervaluations despite intra-year important changes, Japan also increased its undervaluation —due to the $REER$ depreciation. The picture is also the same for Bhutan, Malaysia and Saudi Arabia. On the contrary, India, Korea and Thailand have seen their undervaluation reduced. These latter corrections appear however more sustainable in Korea and, to a lesser extent, in India, because they have been also driven by an appreciation of the $ERER$.

[11] 5 other countries displayed important changes in their misalignments. While Bahrain, Singapore and the United Arab Emirates saw an increase in their misalignments (undervaluations for the first two), Bangladesh and Lao reduced their undervaluation. For these 5 countries, the main driver was the changes in the $ERER$.

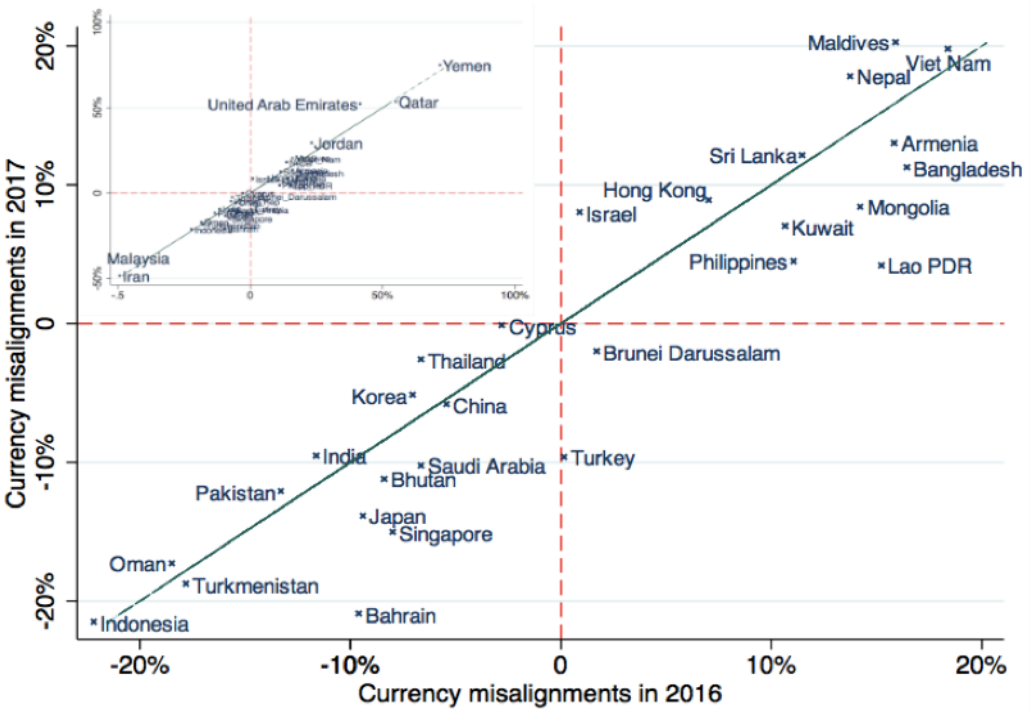


Figure 14 — Asia | Currency misalignments in 2016 and 2017
Note: A positive (resp. negative) sign indicates an overvaluation (resp. undervaluations).
Source: *EQCHANGE* (CEPII)

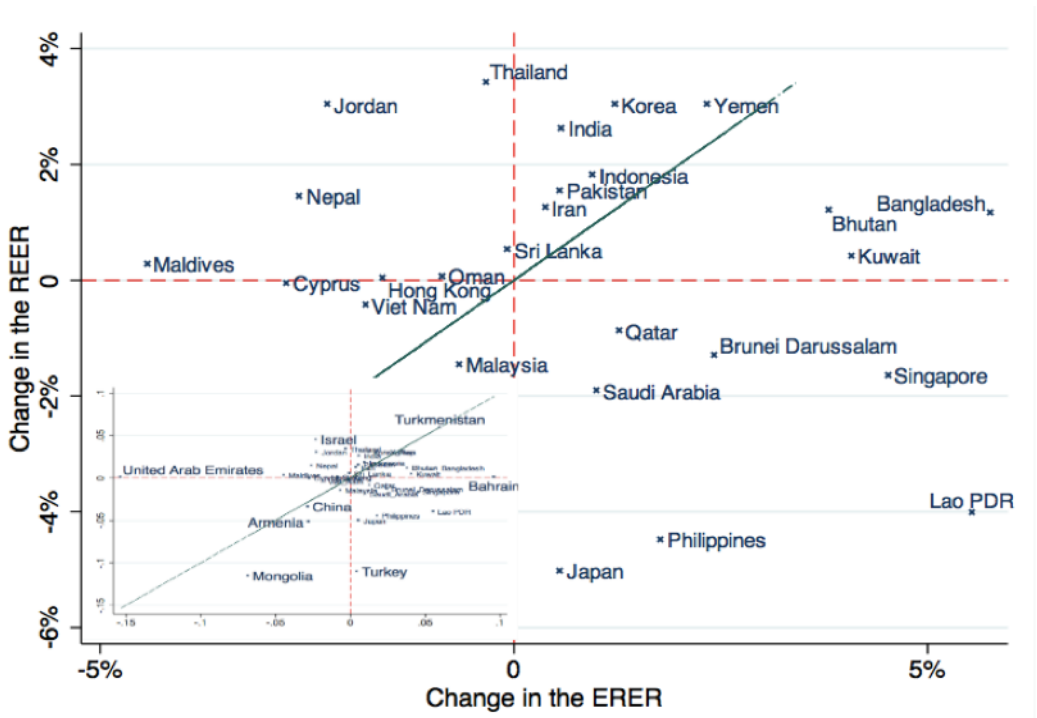


Figure 15 — Asia | Changes in the currency misalignments: $\Delta.ERER$ *vs.* $\Delta.REER$
Note: "$REER$" (resp. "$ERER$") stands for the Real Effective (resp. Equilibrium Real Effective) Exchange Rates. Both scale express changes in percentage. The green dashed line represent the 45-degree line. A positive sign in both measures indicates an appreciation.
Source: *EQCHANGE* (CEPII)

4.4. Europe

Most European currencies appreciated because of a broadly shared economic growth, further boosted in the commodity exporter countries —namely Norway and Russia— thanks to the appreciating terms of trade. In the euro area, satisfying results —growth actually exceeded earlier forecasts— coupled with a relative political stability —partly owing to the election of Emmanuel Macron in France— have contributed to appreciate the euro. However, the changes in the currency misalignments between 2016 and 2017 have been quite heterogeneous and mainly of small amplitudes (see Figure 16).

Indeed, only 5 countries exhibited important changes in the currency misalignments: Albania, Bulgaria, Iceland, Russia and the United Kingdom. Except Albania and Bulgaria where the changes in the ERER were at stake, changes in the REER mainly drove the currency misalignments (see Figure 17). The appreciating Russian ruble —fueled by improving terms of trade and premises of crisis exit have reduced the Russian undervaluation; in turn, the depreciating British pound due to the uncertainty surrounding Brexit has exacerbated UK' undervaluation. In Iceland, the overvaluation increased as the $REER$ appreciation offset the $ERER$ improvement.

Despite the appreciation of the euro recorded during 2017, the changes in the currency misalignments within the eurozone were also marked by a certain heterogeneity. This owes to the fact that the real effective exchange rates of euro area members barely reacted the nominal appreciation of the euro. Changes in the fundamentals have been the drivers of the changes in the currency misalignments in Belgium, Estonia, France, Germany, Greece, Ireland, Italy, Luxembourg and the Netherlands. Estonia switched from moderate overvaluation to an "in line currency". Currency misalignments in the rest of the eurozone were relatively stable between 2016 and 2017 and changes were even negligible in the case of Austria, Latvia, Slovenia, Slovakia and Spain.

In contrast with the above countries, Eastern Europe countries, and particularly Romania, Serbia and Ukraine, displayed relatively important changes in both their real effective exchange rate and their fundamentals (see Figure 17). Yet, these changes did not result in significant changes in the currency misalignments because they offset each other. Romania and Serbia (resp. Ukraine) increased (resp. decreased) their overvaluation (resp. undervaluation) by respectively 2 and 3 p.p. (resp. 4 p.p.). In Switzerland, the weaker fundamentals were offset by the depreciation of the real effective exchange rate, hence leaving the currency misalignments unchanged.

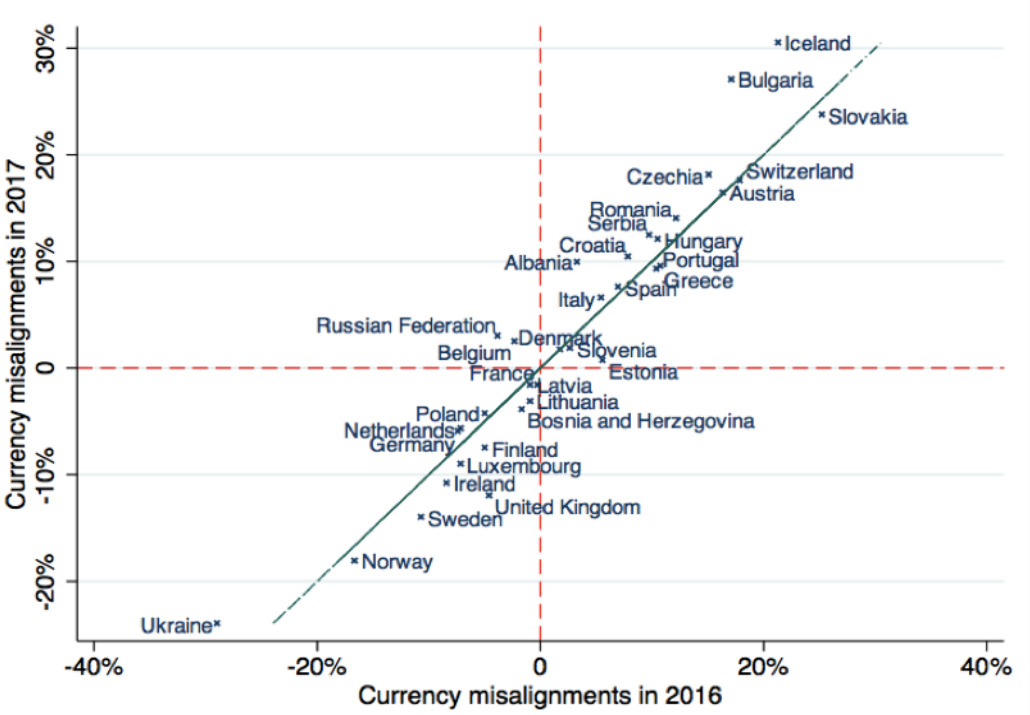


Figure 16 — Europe | Currency misalignments in 2016 and 2017
Note: A positive (resp. negative) sign indicates an overvaluation (resp. undervaluations).
Source: *EQCHANGE* (CEPII)

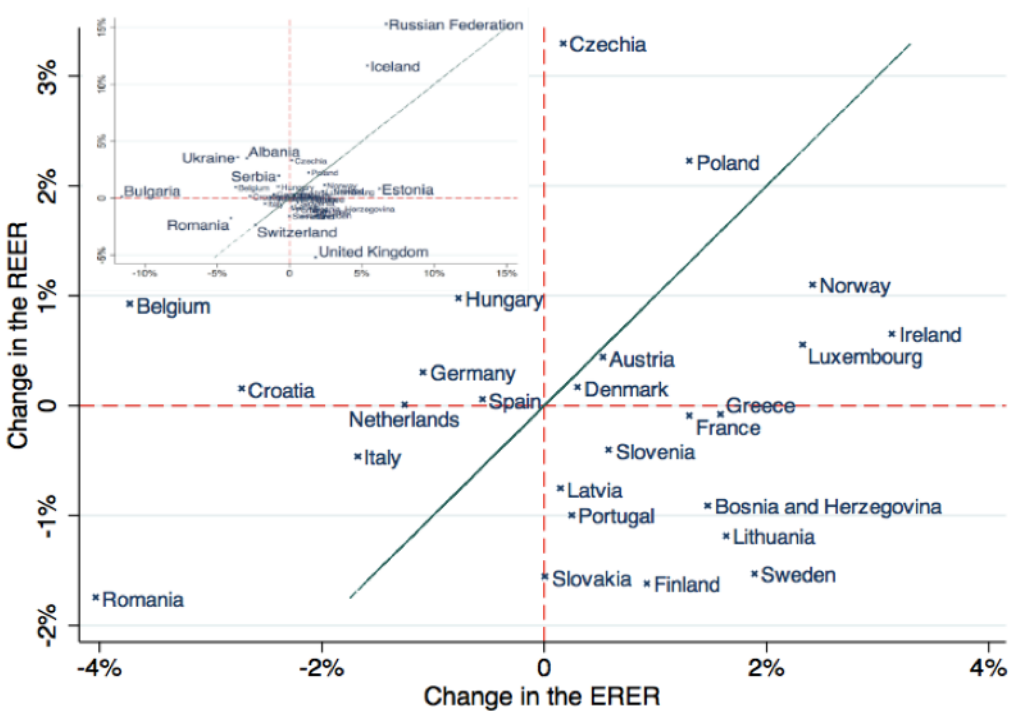
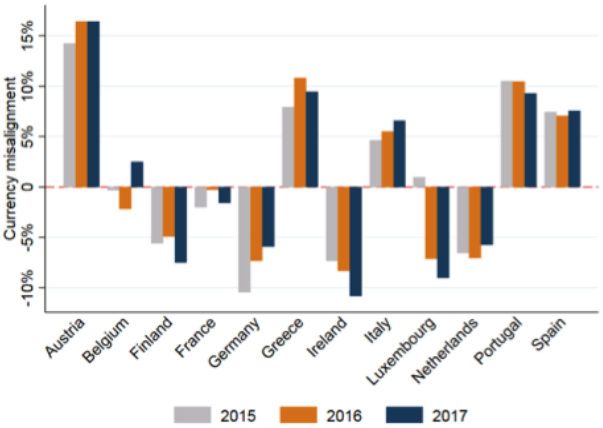


Figure 17 — Europe | Changes in the currency misalignments: $\Delta.ERER$ *vs.* $\Delta.REER$
Note: "$REER$" (resp. "$ERER$") stands for the Real Effective (resp. Equilibrium Real Effective) Exchange Rates. Both scale express changes in percentage. The green dashed line represent the 45-degree line. A positive sign in both measures indicates an appreciation.
Source: *EQCHANGE* (CEPII)

Box 7 — Monitoring (Macroeconomic) imbalances within the euro area

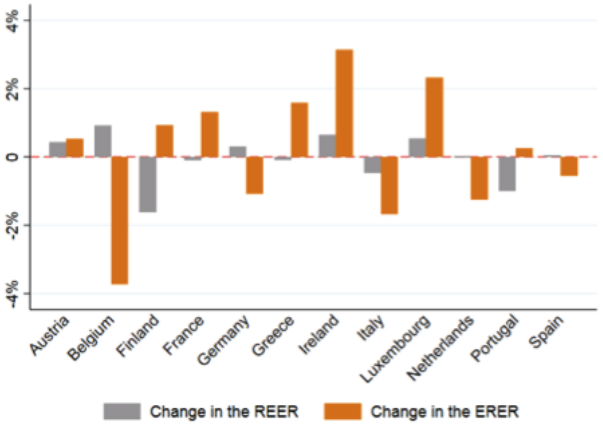
It has been well documented that the build-up of large external imbalances across the Eurozone during the first decade of the euro was partly due to the overvaluation of peripheral countries' currencies against those of the core. Recently, Couharde et al. (2017)[1]⋆ documented that the evolution of currency misalignments has reversed in the periphery since the Eurozone crisis, but the dispersion across the Eurozone remains large. This box fits into this framework by updating the analysis.

As can be seen in Box Figure 7.1, the recent appreciation of the euro has been concomitant with a reduction of the undervaluation in Belgium, Germany and the Netherlands and the increase of the overvaluation in Italy and Spain. Meanwhile, Finland, France, Ireland and Luxembourg increased their undervaluation. Weaker fundamentals appear to be the main driver of the changes in the misalignments in Belgium, Germany, Italy, the Netherlands and Spain. In Finland, the depreciating $REER$ and the stronger fundamentals fueled the change; for France, Ireland and Luxembourg the appreciation of the $ERER$ drove the reconfiguration. Greece (resp. Portugal) reduced its overvaluation owing to the $ERER$ (resp. $REER$) dynamics.



Box Figure 7.1 — Currency misalignments

Source: *EQCHANGE* (CEPII)



Box Figure 7.2 — Underlying factors (2016-17)

Note: Changes are expressed in percentage
Source: *EQCHANGE* (CEPII)

Overall, and compared to 2016, the 2017 configuration of the misalignments is more in phase with the objective of reducing imbalances within the Eurozone. Indeed, excluding Ireland and Luxembourg that presented considerable undervaluations in 2016 and 2017, the range of the misalignments, i.e. the gap between the more under- and overvalued countries within the zone narrowed. The reduction of the undervaluations in Germany and the Netherlands particularly helped in reducing these asymmetries in price-competitiveness across the zone. Furthermore, strengthening economies such as France further benefited from these reductions in the countries with the most important surpluses as they also adjusted thanks to improving fundamentals. Movements in France and Greece hence appear to be very likely sustainable in the medium/long term as they mostly arise from movements in the fundamentals. Hence, the euro area has been relatively insulated from the appreciation of the euro. This also augurs well as it reflects, as for the modest economic growth, recovery factors pertaining essentially from within the area.

[1] Couharde C., Delatte A-L., Grekou C., Mignon V., Morvillier F. (2017), "Sur- et sous-évaluations de change en zone euro: vers une correction soutenable des déséquilibres?", La Lettre du CEPII, 375.
⋆English version | Blogpost: https://voxeu.org/article/new-database-actual-and-equilibrium-exchange-rates

4.5. Oceania

In Oceania, there has been a trend towards the increase in the overvaluations. Indeed, more than the half of the countries concentrated in the region delimited by the y-axis and the first bisector —see Figure 18. Only Marshall Islands and Solomon Islands appeared with reduced overvaluations. In Fiji and Kiribati, however, the change in the currency misalignments were upwards, and the currencies appeared broadly in line with their fundamentals in 2017. Overall, despite the economic growth in the region and the improvement in the terms of trade, the currencies displayed modest appreciation especially in effective terms. Except Marshall Islands and Solomon Islands that depreciated in effective terms, Tonga followed by Australia were the countries that appreciated the most (see Figure 19). New Zealand only appreciated by around 1% in average between 2016 and 2017.

Despite the noticeable appreciation of its exchange rate, Australia only increases its overvaluation by 2 percentage points due to the offsetting effect of stronger fundamentals —and especially the improvement in the NFA due to the current account surplus in 2017. On the contrary, the deterioration of the NFA in New Zealand depreciated the ERER and resulted in a considerable increase in the overvaluations. Kiribati was the country the most affected by the deterioration of the ERER and accordingly considerably reduced its undervaluations. In Tonga, the change in the $REER$ was fully reflected in the misalignment's change.

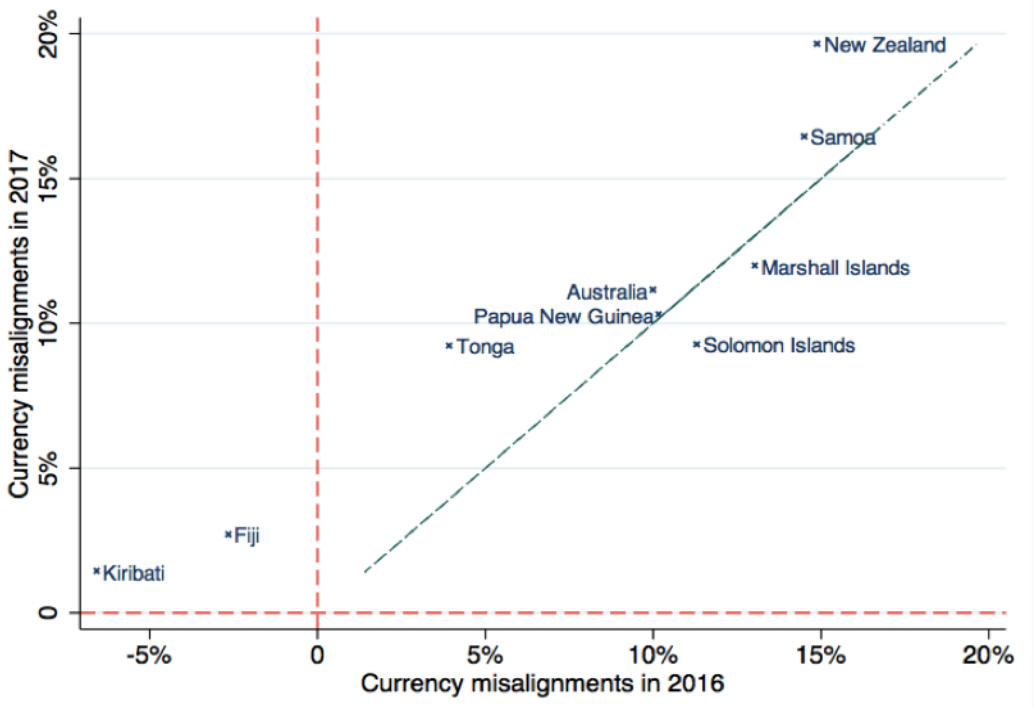


Figure 18 — Oceania | Currency misalignments in 2016 and 2017
Note: A positive (resp. negative) sign indicates an overvaluation (resp. undervaluations).
Source: *EQCHANGE* (CEPII)

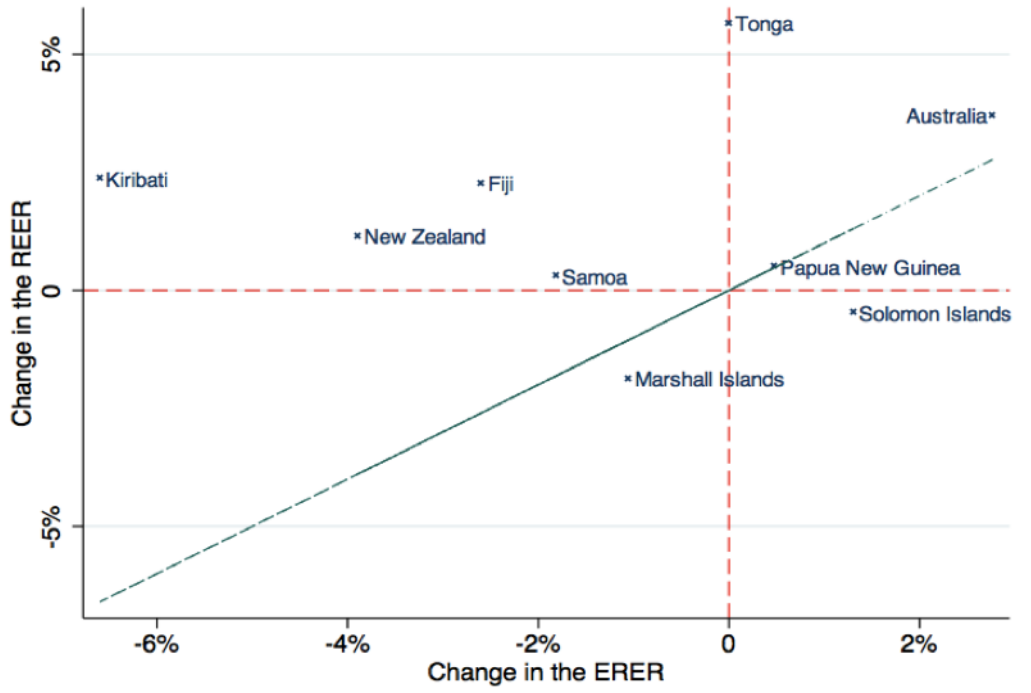


Figure 19 — Oceania | Changes in the currency misalignments: $\Delta.ERER$ *vs.* $\Delta.REER$
Note: "$REER$" (resp. "$ERER$") stands for the Real Effective (resp. Equilibrium Real Effective) Exchange Rates. Both scale express changes in percentage. The green dashed line represent the 45-degree line. A positive sign in both measures indicates an appreciation.
Source: *EQCHANGE* (CEPII)

5. Comparison with the IMF External Sector Report estimates

As is done periodically, the IMF, through the External Sector Report (ESR), analyzes and discusses the evolution and the misalignment of 30 systemic economy currencies. In this section, we compare our estimates and discuss the major reasons for differences between the estimates.

The IMF estimates of currency misalignments (or "$REER$ gap" following their terminology) reported in the External Sector Report are based on various equilibrium exchange rate determination approaches. More specifically, the estimates are derived relying on four complementary approaches constituting the so-called External Balance Assessment (EBA) methodology: (i) the current account regression-based approach, (ii) the real exchange rate regression-based approaches (both index and level), and (iii) the external sustainability approach.[12] The current account-based approach calculates the difference between the current account (CA) projected over the medium term at prevailing exchange rates and an estimated equilibrium current account, or "CA norm". The real exchange rate regression-based approaches directly estimate an equilibrium real exchange rate for each country as a function of the fundamentals of the $REER$ —including controls. Finally, the external sustainability approach calculates the difference between the actual current account balance and the balance that would stabilize the net foreign asset (NFA) position of the country at some benchmark level. Each of these approaches has relative strengths and limitations —which further motivate the need for complementary approaches. Phillips et al. (2013) argues for instance that the current account regression-based approach is often but not always the most informative and reliable of the different EBA approaches. Still according to Phillips et al. (2013), it is able to take full advantage of cross-country information. Its limitations however tend to be most apparent when analyzing countries with high reliance on natural resource sectors (e.g. large oil exporters) and relatively small economies that are financial centers. For a few economies, this approach would yield very large regression residuals, and thus large Total CA Gaps, which require careful further interpretation. The second approach, the real exchange rate regression-based approach (REER index) seem to appear especially useful where the first approach faces a particular difficulty. Its limitations are a reduced reliability in countries with large structural changes, as well as those with short data spans. However, this method, due to fixed effects, forces gaps for

[12] These approaches are thus in line with the three methods underlying the CGER methodology, the EBA predecessor. For full details of CGER, see Lee, J., G. Milesi-Ferretti, J. D. Ostry, A. Prati, and L. A. Ricci, 2008, "Exchange Rate Assessments: CGER Methodologies," Occasional Paper No. 261, (Washington: International Monetary Fund).

each country to be zero in average over time. The third approach, based on $REER$ levels rather than indices, provides a solution to this issue. The fourth approach, is a bit different from the others in that it suits well (more relevant and informative) for countries with large NFA imbalances, and for which there is a clear view of what would be a more appropriate NFA level.[13]

In light of the above, it appears that the main source of differences between the ESR REER gaps and the $EQCHANGE$ estimates should principally lie in the approach retained by the ESR staff —in case there are important divergences between the different approaches.[14]

The different ESR REER gap estimates as well as the $EQCHANGE$ estimates are reported in Table 3. Among the 29 economies reported (including the euro area)[15], there is a rather "perfect" matching between the ESR staff-assessed REER gap midpoints and the $EQCHANGE$ estimates of misalignments for 8 economies: Australia, Brazil, China, Italy, Korea, Poland, Russia and Spain. In the case of Brazil and Russia, the EBA REER-based estimates differ considerably (although to a lesser extent for Russia) from the EBA CA-based estimates, these latter constituting the retained estimates. This is also the case when considering the REER index-based estimate for Korea which points to an overvaluation while the other EBA approaches and $EQCHANGE$ point to an undervaluation. These 8 economies are followed by 5 others for which the different estimates are very close: Belgium, the euro area, the Netherlands, Singapore and the United States.[16] In the case of the Netherlands, the $EQCHANGE$ methodology performed better than the EBA REER-based approaches as these latter point to an overvaluation of 10.6% while the misalignment is assessed to be between -7% and -10% by the other EBA approaches.

[13]For further details on the EBA methodology see Phillips, S., Catão, L., Ricci, L., Bems, R., Das, M., Di Giovanni, J., Unsal, F., Castillo, M., Lee, J., Rodriguez, J., Vargas, M., 2013. "The External Balance Assessment (EBA) Methodology," IMF Working Papers 13/272, International Monetary Fund. The technical supplement of the IMF External Sector Report 2018 provides the latest refinements.

[14]The term "principally" is important as there are differences regarding the empirical framework between ESR REER index-based approach and $EQCHANGE$. Indeed, the ESR REER index-based approach departs from strict theoretical background underlying the determination of the equilibrium in many respects (retained regressors, estimation methods) —probably to ensure consistency between the REER approaches and the CA approach regarding the time horizon of the analysis— while the $EQCHANGE$ methodology sticks to the BEER approach. It is worthwhile noting that $EQCHANGE$ is in its infancy and that refinements —through alternative approaches— are already scheduled.

[15]As a reminder, Argentina is excluded from the 2018's vintage of $EQCHANGE$ due to the large uncertainty surrounding the determination of its equilibrium exchange rate.

[16]Germany is somewhat at the frontier of this group even if our estimates of the undervaluation is smaller.

Table 3 — Comparison of estimates: *EQCHANGE* and *External Sector Report*

	External Sector Report						*EQCHANGE*	
	Staff-assessed REER gap			*Estimates by approach*[a]				
	Midpoint	Low	High	CA	REER index	REER level	Mis	Std. Err.
Australia	8.5	0	17	Staff	6	17	11.1	3
Belgium	6	3.5	8.5	Staff	6	14	2.5	1
Brazil	-2	-7	3	Staff	9	23	-4	2
Canada	7	1	13	Staff	2.2	-6	-11.2	2
China	-3	-13	7	Staff	-5.3	8	-5.9	4
Euro area[b]	-4	-8	0	Staff	2.2	2.9	-0.3	3
France	4	0	8	0,5	-2.2	-4.1	-1.6	3
Germany	-15	-20	-10	0,5	NR	-19	-5.9	3
Hong Kong	0	-5	5	Staff	NR	NR	8.8	7
India	-1	-7	5	Staff	10.9	8.8	-9.6	4
Indonesia	-1.1	-9.4	7.2	Staff	2.1	-5.5	-21.6	4
Italy	5	0	10	Staff	7.2	5.4	6.6	5
Japan	-3.5	-13	6	Staff	-17	-18	-13.9	6
Korea	-4.5	-7.2	-1.7	Staff	4.4	-2.1	-5.2	5
Malaysia	-6.8	-8.8	-4.8	Staff	-33	-36	-42.8	8
Mexico	-4	-12	4	Staff	-23.2	-11.9	-20.4	2
Netherlands	-10	-13	-7	-9.2	10.6	-0.7	-5.7	2
Poland	-2.5	-5	0	-5	-2.5	-16.9	-4.2	2
Russia	5	0	10	Staff	-5	-5	3	1
Saudi Arabia	15	10	20	Staff	NR	NR	-10.3	1
Singapore	-10	-16	-4	Staff	NR	NR	-15.1	7
South Africa	5	0	10	Staff	-13.4	-7.4	-31.9	7
Spain	6.5	3	10	In line	5.1	5.8	7.6	8
Sweden	-5	-10	0	0/-12	-10	-10	-14.1	3
Switzerland	-1.5	-5.3	2.3	Staff	15	22	17.5	1
Thailand	-10.5	-14	-7	Staff	6.4	-2.1	-2.7	5
Turkey	0	-10	10	14.5	-5	-6	-9.7	2
United Kingdom	7.5	0	15	Staff	-9.3	-10	-11.9	9
United States	12	8	16	12	8.1	14.4	7.3	2

Notes: Estimates of "*REER* gap" or "currency misalignment" are in percentage. "Staff" in the CA column indicates that the estimates from the CA model are consistent with the staff-assessed *REER* gap. "NR" indicates that the approach-based estimate is not reported in the IMF ESR 2018. Estimates for the different approaches are from the ESR 2018-Individual Economy Assessments. Positive sign (resp. negative) sign indicates an overvaluation (resp. undervaluation).
a: The External Sustainability (ES) approach are not reported since they are not specifically mentioned in the full report except Turkey. The ESA indicates that the Turkish lira was broadly in line in 2017.
b: The staff-assessed euro area CA and *REER* gaps are calculated as the GDP-weighted averages of staff-assessed CA and *REER* gaps for the 11 largest Euro area economies (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, and Spain). We follow the same approach to assess the misalignments for the euro area which is here presented only for comparison purpose.

For France, Japan, Malaysia, Mexico, Sweden, Switzerland, Turkey, and the United Kingdom, the ESR staff put more weights on the CA model —if not disregarding the other approaches. Hence, while the *EQCHANGE* and the EBA *REER*-based estimates are consistent, the differences are mainly the reflection of the focus on the CA model estimates.[17]

Six economies (Canada, Hong Kong, India, Indonesia, Saudi Arabia and South Africa) present relatively important differences regarding the staff-assessed midpoint *REER* gaps and the *EQCHANGE* average misalignments. Except Hong Kong and Saudi Arabia for which estimates based on the EBA *REER* models are not available —they are actually not included in the estimation sample, the EBA *REER*-based estimates also differ from the *EQCHANGE* average misalignments. However, the *EQCHANGE* estimates for Hong Kong (resp. India) is very close to the staff-assessed *REER* gap's upper (resp. lower) bound. Cautious should however be taken when focusing on Hong Kong staff-assessed *REER* gap as Hong Kong is not included in the EBA estimation samples and that the *REER* gap estimates are derived by applying the CA model estimated coefficients to Hong Kong (see the ESR-2018 Individual Economy Assessments, page 63). It is also worthwhile noting that for India, the ESR staff retained estimates from the CA model as the *REER* based estimates pointed to a —considerable— overvaluation. The case of Saudi Arabia is similar to that of Hong Kong as Saudi Arabia is not included in EBA models. Estimates of *REER* gap for Saudi Arabia, derived using the same approach as for Hong Kong, should therefore be treated with cautious too. For Canada, our estimates point to an undervaluation around 11% while the ESR staff-assessed *REER* gap is an overvaluation between 1% and 13%, 7% being the midpoint. In the meantime, the EBA *REER* index (resp. level) model points to an overvaluation (resp. undervaluation) of the Canadian dollar of 2.2% (resp. 6%). It is important to note that these ESR 2018 estimates contrast with the ESR 2017 estimates (*REER* index-based: -9.5%; *REER* level-based: -19.9%).[18] While this important change in the *REER* based estimates are hardly explicable —and actually not explained, it casts doubt on the ESR 2018 *REER* index based estimate which has been considered by the ESR staff

[17] It is however important to note that for Turkey, the diametrically opposed estimates has forced the staff to consider the lira as broadly in line in 2017 with a -/+10 percent range. See the Individual Economy Assessments associated to the ESR 2018, page 98. Thailand can also be included in this group given that the *EQCHANGE* estimates coincides with the EBA *REER* level estimates, disregarding the EBA REER index model which points to an overvaluation of 6.4%.

[18] See page 12 of the ESR 2017 – Individual Economy Assessments: https://www.imf.org/en/Publications/Policy-Papers/Issues/2017/07/27/2017-external-sector-report-individual-economy-assessments

in its assessment of the $REER$ gap.

Indonesia and South Africa are the countries for which the estimates diverge the most. Indeed, the EQCHANGE estimates for Indonesia and South Africa are respectively -21.6% (standard deviation of 4) and -31.9% (standard deviation of 8). In the ESR 2018, the range of the Indonesian rupiah (resp. South African rand) misalignments is -9.4%/+7.2% (resp. 0/+10). As for the ESR 2017, the ESR 2018 REER based estimates were disregarded for South Africa as the other approaches pointed to another direction.[19] Indeed, the staff relied on the EBA CA model and the External Sustainability (ES) approach to assess the $REER$ gap. However, the rationale underlying the ES approach differ from the usual one. In the case of South Africa, the ES approach compares the CA balance expected to prevail in the medium term with the one that would stabilize the NFA position at its emerging market peer's benchmark (-35% of GDP). While the South African NFA position is equal to -6.5% of GDP in 2017 (-7.58% in average over the last five years) and actually display and upward trend over a relatively long period, this change in the rationale underlying the ES approach —and the associated shift of the NFA benchmark— is of a nature to indicate an overvaluation or a far lower undervaluation of the rand. Indonesia is typically the case where uncertainty regarding the equilibrium value of the exchange rate is important —even the staff-assessed range is important. While the lower bound of the ESR 2018 staff-assessed REER gap is an undervaluation of 9.4%, our estimates point to a higher undervaluation. Hence, the gap between the estimates tend to indicate that the time horizon of the analysis is at stake.[20]

[19] In the ESR 2017, the $REER$ approaches point to undervaluation of between 12.6 percent (level approach) and 28.8 percent (index approach). See the ESR 2017 - Individual Economy Assessments, page 48.

[20] In fact, focusing on the long run, our methodology retains only long run fundamentals while the EBA methodology include also short/medium term variables —to ensure consistency of the different methodology regarding the time horizon. As a result, the REER short-term changes are accounted for which lead to a reduction in the assessed misalignment.

Appendices

Appendix A. Estimated currency misalignments

Table A.1 — Estimates of currency misalignments in 2017 (in %)

Country	Misalignment		Country	Misalignment	
	Mean	St. Err.		Mean	St. Err.
Albania	9.9	7	Djibouti	43	9
Algeria	-68.6	7	Dominica	-9.6	1
Antigua and Barbuda	8.7	4	Dominican Rep.	-35	16
Armenia	13	3.6	Ecuador	-5	8
Australia	11.1	3	Egypt	-5.1	3
Austria	16.4	4	Equatorial Guinea	-23.7	2
Bahrain	-21	2	Estonia	0.7	2
Bangladesh	11.2	4	Ethiopia	-5.9	5
Barbados	36.2	6	Fiji	2.7	8
Belgium	2.5	1	Finland	-7.5	5
Belize	5.9	10	France	-1.6	3
Benin	10	3	Gabon	-40.4	5
Bhutan	-11.2	4	Germany	-5.9	3
Bolivia	-2.6	3	Ghana	-81.2	5
Bosnia and Herzegovina	-3.9	3	Greece	13.9	7
Brazil	-4	2	Grenada	-21.8	10
Brunei Darussalam	-2.1	5	Guatemala	30.7	9
Bulgaria	27.1	4	Guinea-Bissau	-42.9	17
Burkina Faso	-45.4	12	Guyana	-39.8	2
Burundi	-10.1	11	Haiti	45	10
Cabo Verde	4.3	1	Honduras	3.8	6
Cameroon	-7.8	11	Hong Kong	8.8	7
Canada	-11.2	2	Hungary	12.1	6
Central African Rep.	27	16	Iceland	30.5	4
Chad	-4.2	6	India	-9.6	4
Chile	-23.6	3	Indonesia	-21.6	4
China	-5.9	4	Iran	-48.5	6
Colombia	-30	15	Ireland	-10.8	6
Comoros	24.4	2	Israel	8	4
Congo	-2.4	7	Italy	6.6	5
Costa Rica	13.1	2	Jamaica	-2.4	2
Côte d'Ivoire	-16.6	8	Japan	-13.9	6
Croatia	10.4	8	Jordan	29.3	7
Cyprus	-0.2	7	Kenya	62.2	14
Czechia	18	4	Kiribati	1.4	6
Denmark	1.6	2	Kuwait	7	9

Note: The values in the column " Mean " (resp. " Std. Err. ") correspond to the averages (resp. standard errors) of the estimates over all the specifications (i.e. models, number of trade partners, and weighting systems). Positive (resp. negative) sign indicates an overvaluation (resp. undervaluation).

(Continued on next page)

Table A.1 — Estimates of currency misalignments in 2017 (in %; *Continued*)

Country	Misalignment		Country	Misalignment	
	Mean	St. Err.		Mean	St. Err.
Lao P.D.R.	4.2	7	Rwanda	-16.8	8
Latvia	-1.6	8	Saint Kitts and Nevis	-9.6	1
Lesotho	-15	1	Saint Lucia	1.2	4
Libya	-46.7	4	Samoa	16.4	5
Lithuania	-3.1	5	Saudi Arabia	-10.3	7
Luxembourg	-9	3	Senegal	-18.4	9
Madagascar	5.5	7	Serbia	12.5	6
Malaysia	-42.8	8	Seychelles	-19.3	9
Maldives	20.2	6	Singapore	-15.1	7
Marshall Islands	12	2	Slovakia	23.7	6
Mauritius	14.4	8	Slovenia	1.8	2
Mexico	-20.4	2	Solomon Islands	9.3	9
Mongolia	8.4	5	South Africa	-31.9	8
Morocco	-8.8	8	Spain	7.6	3
Mozambique	-150.4	31	Sri Lanka	12.1	6
Namibia	-7.2	2	Sudan	57.2	6
Nepal	17.8	1	Sweden	-14.1	1
Netherlands	-5.7	2	Switzerland	17.5	5
New Zealand	19.6	6	Thailand	-2.7	2
Niger	-3.4	2	Togo	1.2	10
Nigeria	-20.7	5	Tonga	9.2	4
Norway	-18.1	2	Trinidad and Tobago	32.9	9
Oman	-17.3	7	Tunisia	-31.9	7
Pakistan	-12.2	4	Turkey	-9.7	9
Panama	-13.1	4	Turkmenistan	-18.9	3
Papua New Guinea	10.3	3	Uganda	-75.7	10
Paraguay	-12.8	7	Ukraine	-24	6
Peru	21.1	3	United Arab Emirates	52.2	2
Philippines	4.4	3	United Kingdom	-11.9	2
Poland	-4.2	2	United States	7.3	2
Portugal	9.3	2	Uruguay	19.5	17
Qatar	53.2	7	Viet Nam	19.8	2
Rep. of Korea	-5.2	5	Yemen	74.8	5
Romania	14	9	Zambia	-128.3	29
Russian Federation	3	1			

Note: The values in the column " Mean " (resp. " Std. Err. ") correspond to the averages (resp. standard errors) of the estimates over all the specifications (i.e. models, number of trade partners, and weighting systems). Positive (resp. negative) sign indicates an overvaluation (resp. undervaluation).

Appendix B. Evolutions of some fundamentals

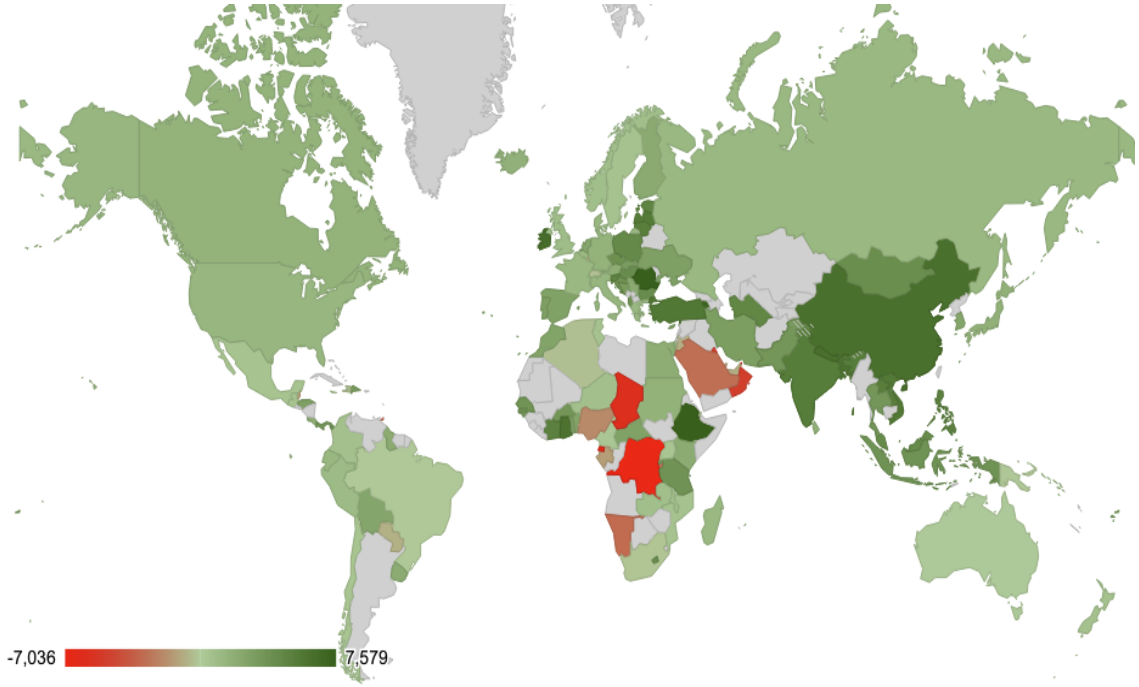


Figure B.1 — Economic growth in 2017

Note: Libya is excluded due to its 26% growth rate (outliers). Data —i.e. real GDP per capita in PPP terms— are from the World Development Indicators database (World Bank).

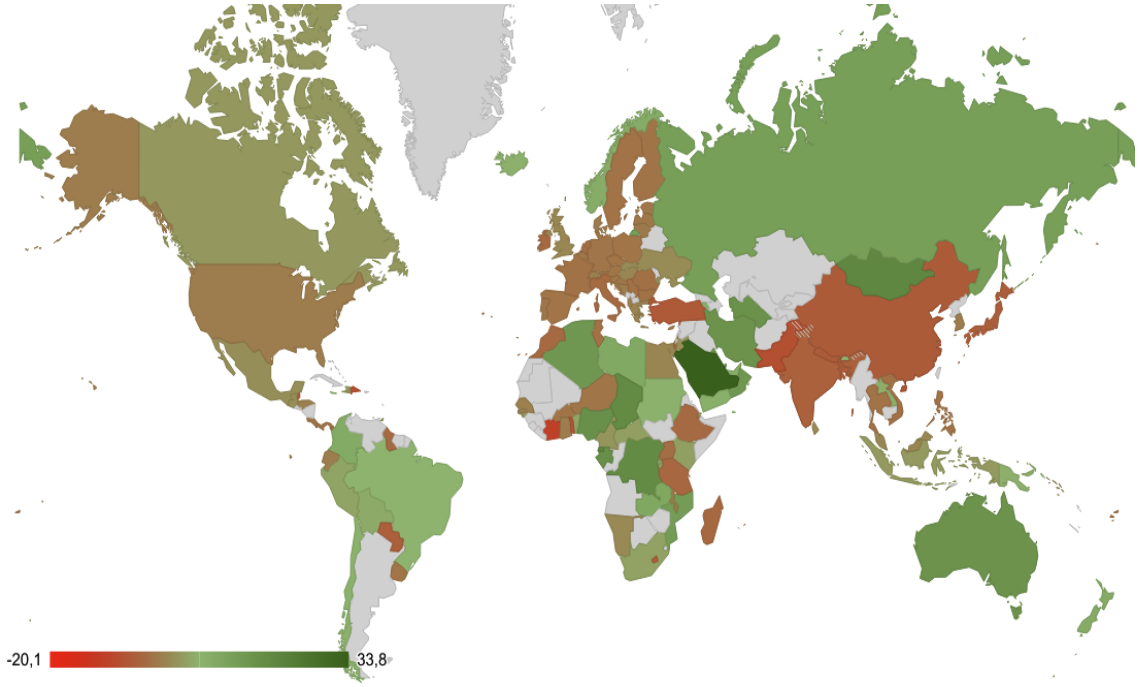


Figure B.2 — Change in the terms of trade

Note: Data are from the UNCTAD database.

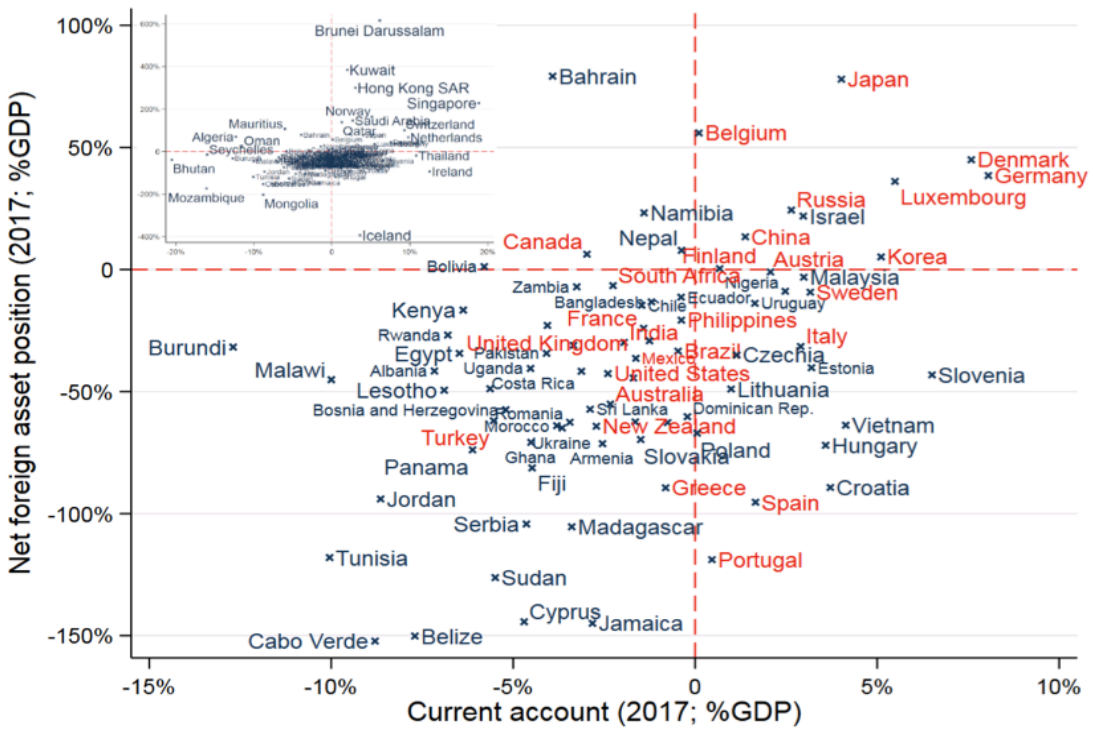


Figure B.3 — The current account balances and net foreign asset positions in 2017

Note: Data on the current account balances are from the International Monetary Fund.

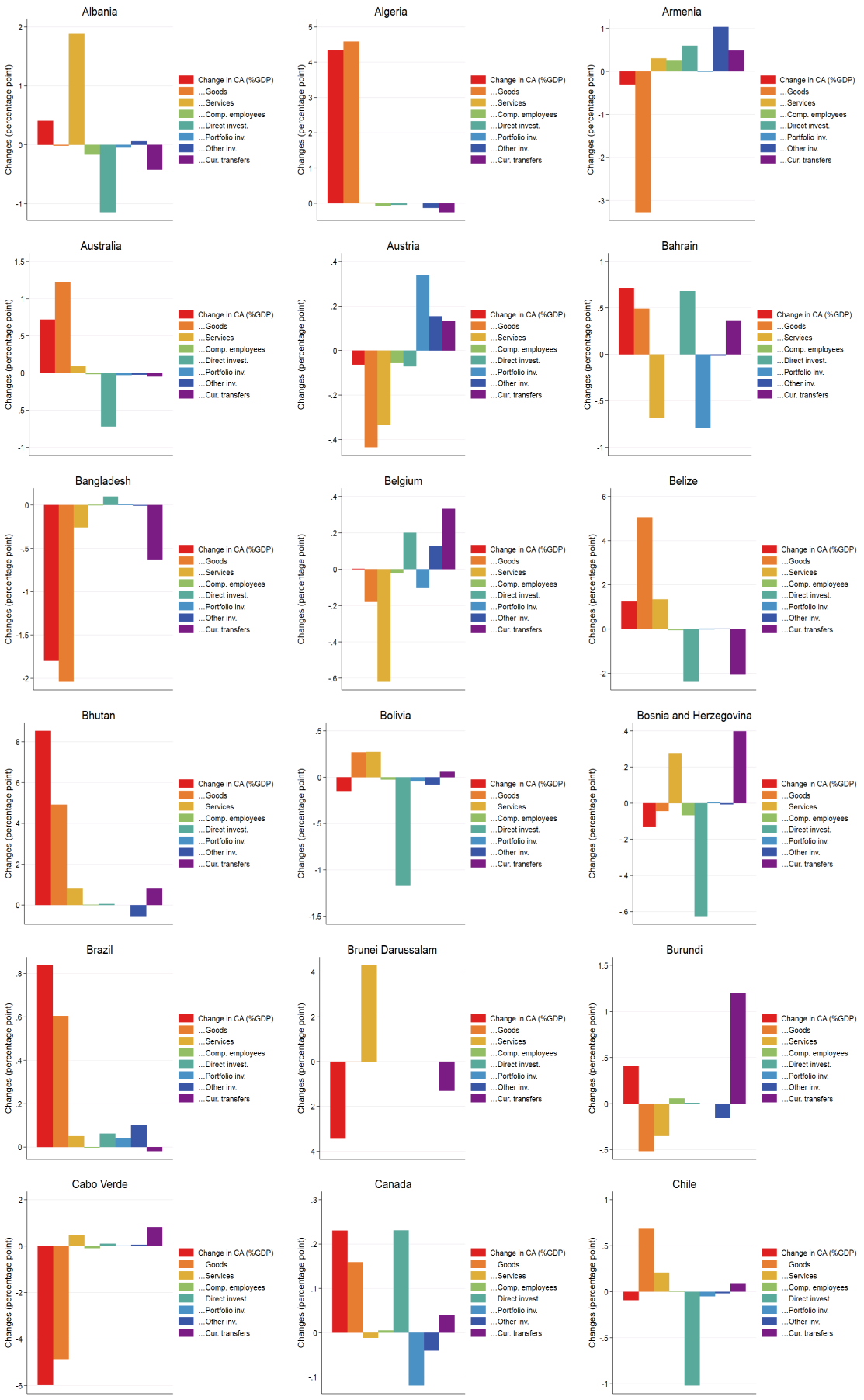
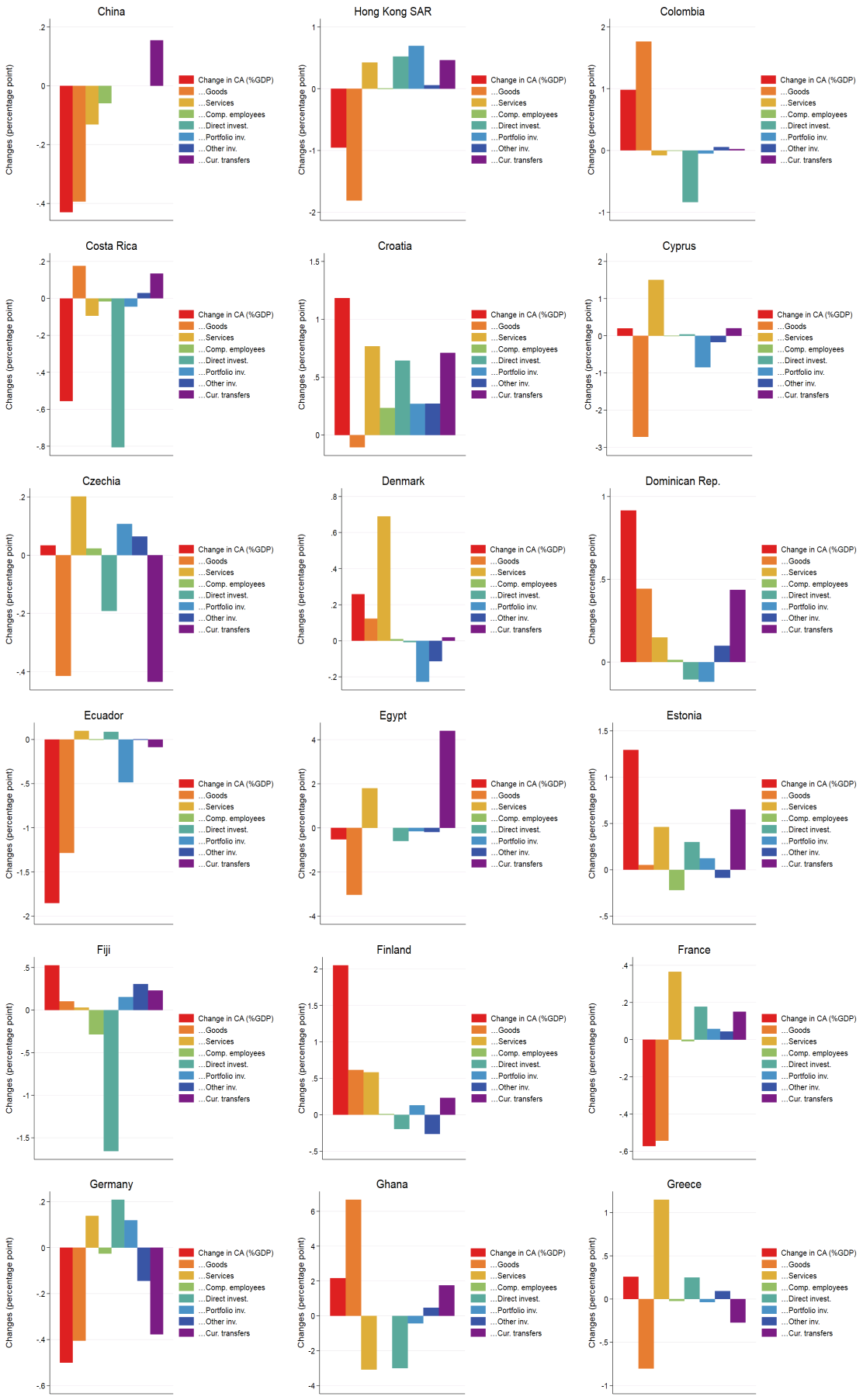


Figure B.4 — Changes in the current account and its components

Note: The changes are expressed in percentage points of GDP. Data are from the Balance of Payments Statistics (BOPS; IMF). "Cur. Transfers" —i.e. current transfers— are obtained doing the difference between the current account and the sum of the other components. Hence, in case of missing data, it corresponds to the balance of the current transfers and the missing components.



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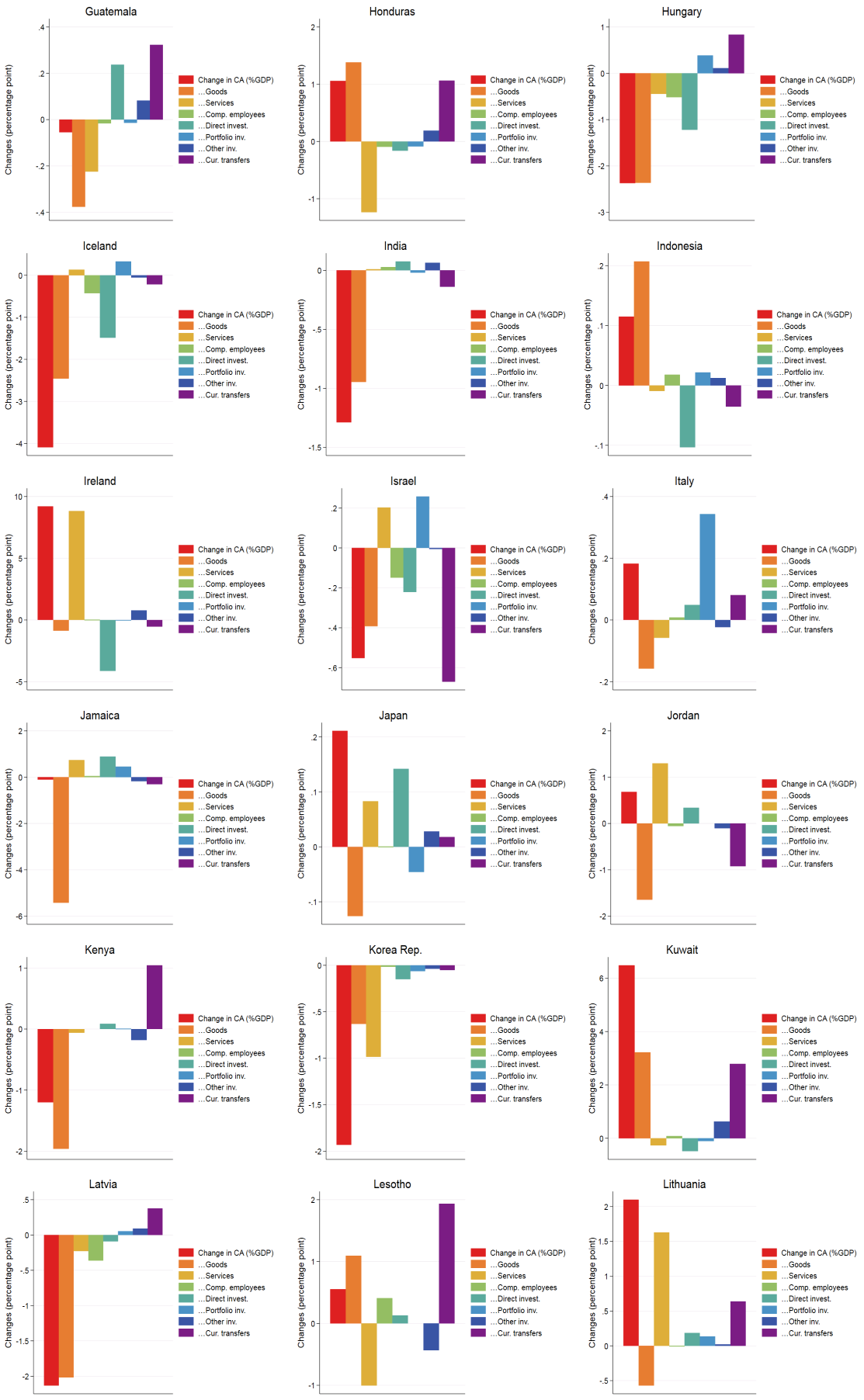

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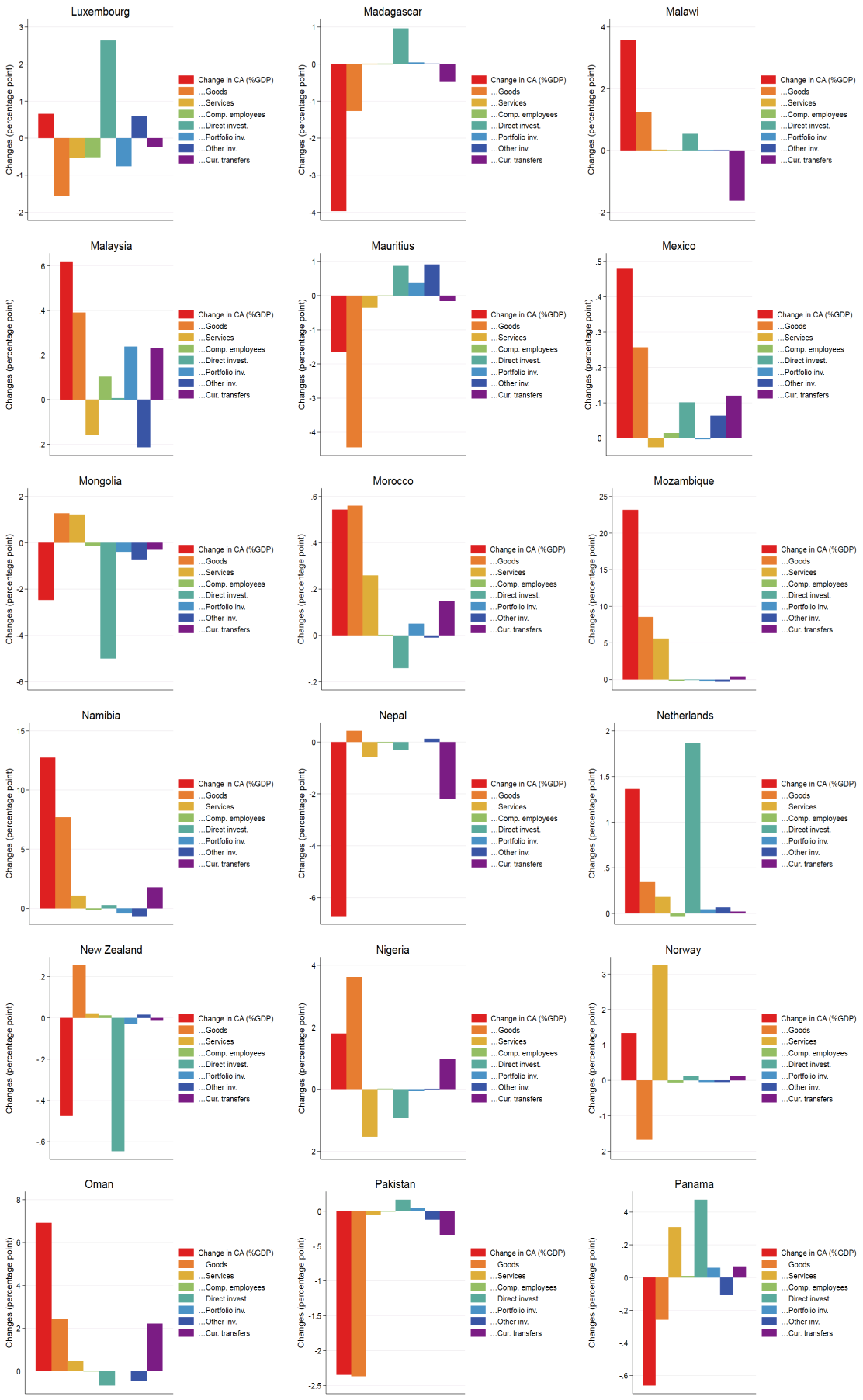

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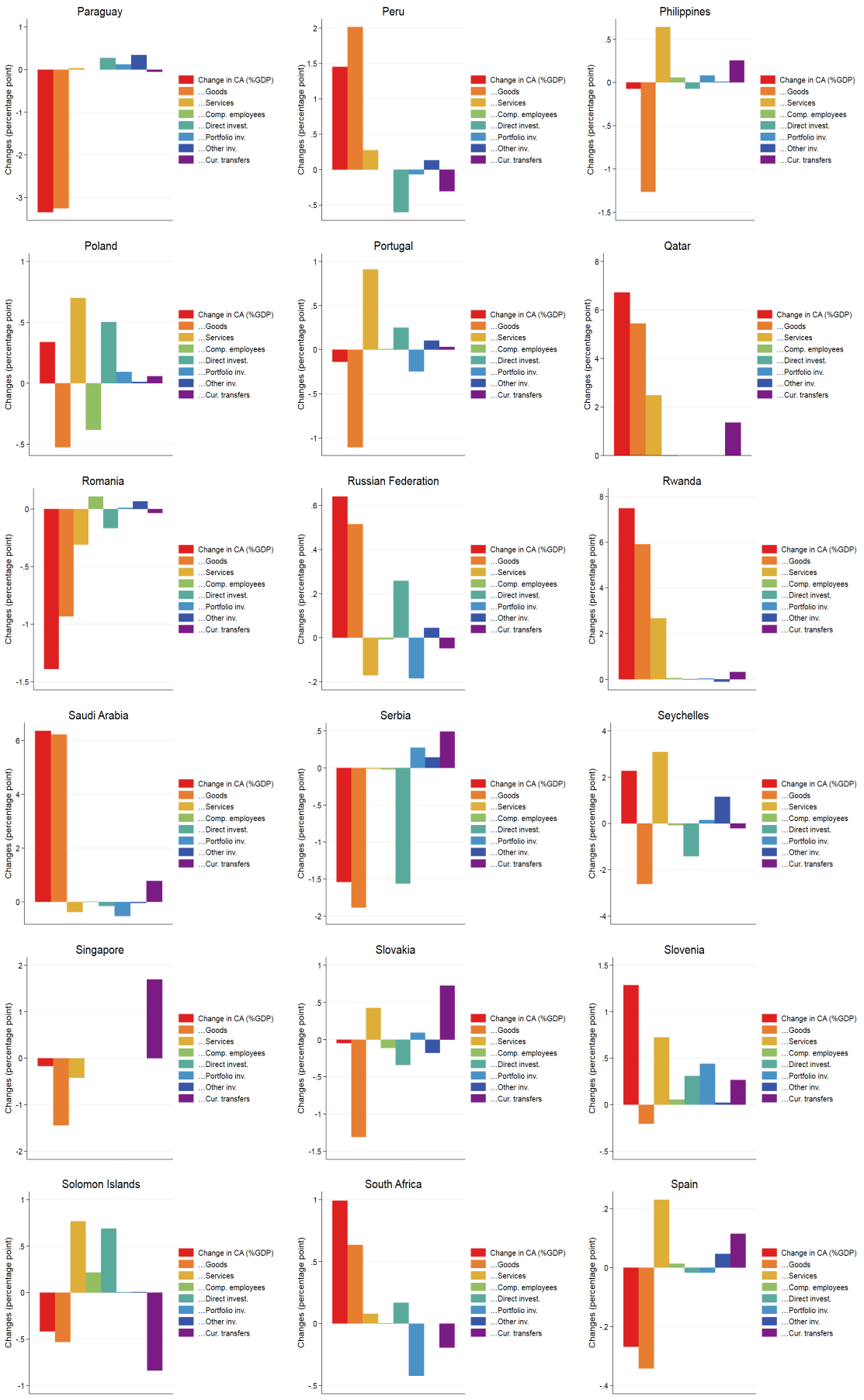

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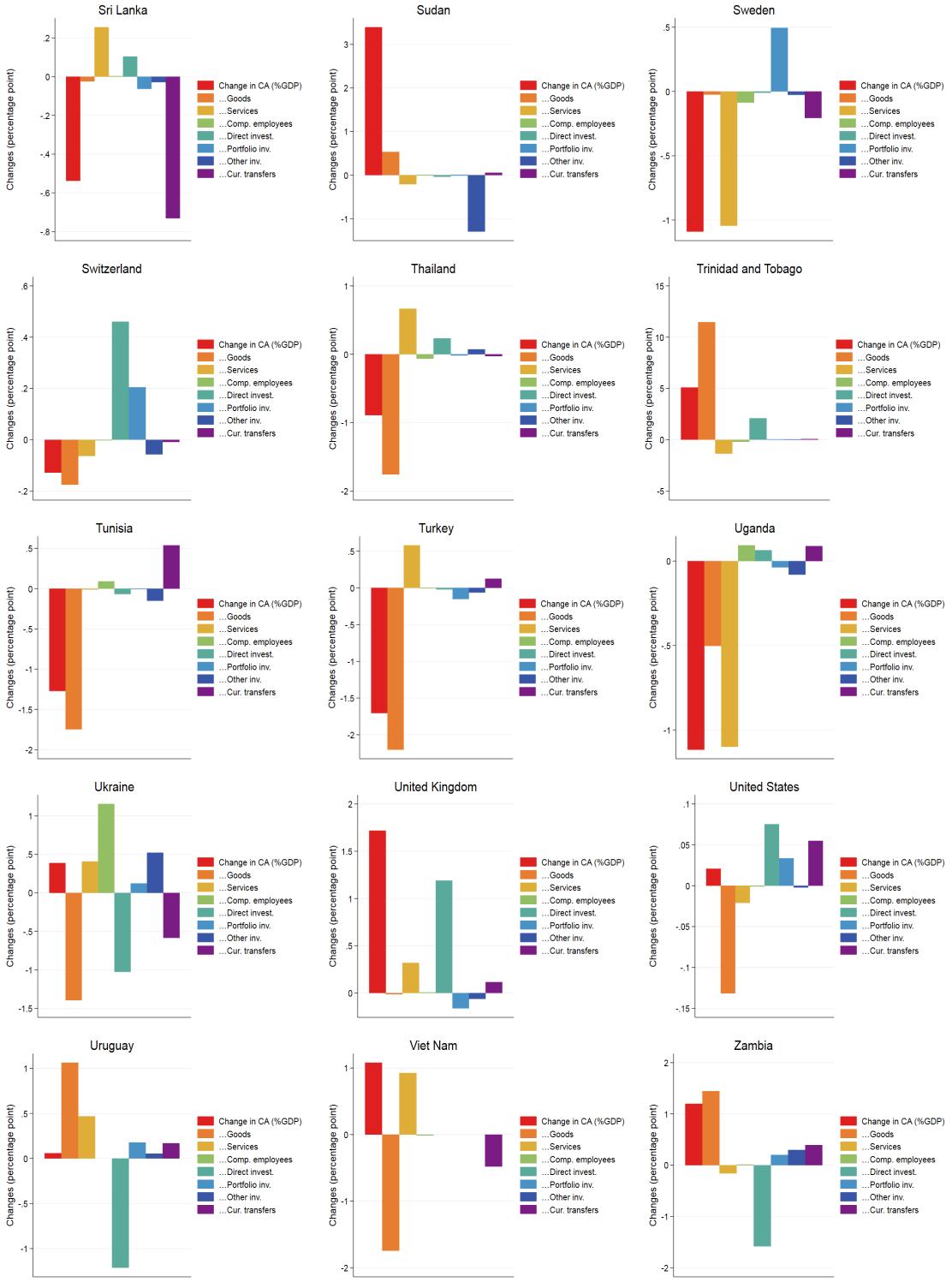

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