The magnitude of euro area misalignments in 2017

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EXECUTIVE SUMMARY

The years preceding the 2008 crisis were marked by a deepening of internal imbalances in the euro area, as some countries (Germany, Netherlands, etc.) accumulated claims on others (Italy, Spain, Greece, Portugal, etc.). Subsequently the adjustments – through compression of internal demand and wage cost adjustments – have displaced the imbalances outwards, as the euro area developed a structural surplus in its trade with the rest of the world, without, however, resolving all the intra-zone imbalances.
The purpose of this article is to review the state of internal imbalances in the euro area, using equilibrium exchange rate modeling based on a fundamental equilibrium exchange rates (FEER) approach. Our approach consists of modelling the prices of the 11 largest economies in the euro area, taking into account intra-zone trade patterns, the sensitivity of trade balances to relative prices, and the position of the economies in the cycle, and by placing constraints on changes in the net external positions. We deduce targets for trade balances and relative prices that make it possible to estimate the intra-euro area misalignments over the period 2002-2017. These misalignments correspond to the variations in value-added prices that must be made simultaneously for all countries to reach their current-account target over a 20-year horizon.
Our results show that the imbalances have shrunk since 2008, but there is still a substantial misalignment between Germany and France: the relative nominal differential between these two countries at the heart of the euro area reaches a substantial 20% level in 2017. Among the 11 countries, the average deviation from the level of the euro, in absolute terms, also comes to 20% in 2017, down 28 points from its 2008 peak.
We also perform sensitivity tests for our results using various hypotheses (the adjustment horizon, output gaps, potential growth rates, real interest rates). These tests confirm the magnitude and robustness of the estimated misalignments.
These persistent imbalances now pose a double risk for the euro area: first, a risk of the euro's appreciation, which would in the medium term hit economic activity and lead to further increase in unemployment; and second, if this first risk materializes, one can expect an increase in the difficulties faced by countries whose real exchange rate is overvalued vis-à-vis the euro area average.

ABSTRACT

Using real equilibrium exchange rate modelling, we quantify adjustments within the euro area compatible with a current account equilibrium and a stabilisation of the net external positions of the euro area countries. Our estimates indicate that the imbalances have shrunk since 2008, but substantial misalignments remain, and the average (absolute) mismatch relative to the euro price level amounts to 10% in 2017. The imbalances now weigh on the external equilibrium of the euro area and are increasing the risk of a medium-term appreciation in the euro. These results are robust to hypotheses on the horizon of adjustment, potential growth, output gaps and real interest rates.

KEYWORDS

Equilibrium exchange rate, trade balance, price-competitiveness

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The magnitude of euro area internal misalignments in 2017

Introduction

The first years of the euro's existence, up to the crisis of 2007-2008, were marked by the widening of imbalances between the countries of Europe's so-called North (or core) and those of its South (or periphery). Germany and the Netherlands gradually ran up large current account surpluses, while Italy and Spain simultaneously went in the opposite direction, with significantly widening deficits. This was also true for France, though to a lesser extent. These current account imbalances were thus at the heart of the process that led to the crisis in the euro area from 2009: in the countries running deficits, the capital flows have not shifted to sectors that are gaining productivity and export capacity, but have instead fueled real estate bubbles or financed low-yielding sectors as well as real estate and consumer credit. The result was unsustainable run-ups in current account deficits, making an adjustment inevitable.

It was of course not possible to make improvements in current accounts by adjusting nominal exchange rates, while a default on the public debt was considered a last-resort solution, and was used only in part in the Greek case. An adjustment nevertheless did take place: from 2009, the deficits have subsided, and have almost disappeared since 2013. The compression of domestic demand, via the economic crisis and the subsequent fiscal consolidation policies, kicked off the adjustment. Rising unemployment, policies deregulating the labour markets, and deflationary pressure took over, allowing gains in price competitiveness and a slight rebound in exports in the countries hit hardest by the crisis (Portugal, Spain, Italy, Ireland and Greece).

However, a significant gap still exists between the countries of the North and South, particularly with respect to their radically differing situations vis-à-vis unemployment, meaning that it is premature to talk about reconvergence. Moreover, the reduction of trade deficits (Italian and Spanish) but not surpluses (German and Dutch) has seriously altered the relationship of the euro area to the rest of the world: while the zone's current account was almost balanced between 2001 and 2008, a significant surplus formed from 2012, reaching 3.5% of GDP in 2017. In other words, the imbalance that was internal to the euro area has shifted into an external imbalance between the euro area and the rest of the world, which ultimately calls for an appreciation of the euro against other currencies.

This study is intended to update the quantification of the adjustments that still need to be made to resolve the different current account imbalances within the euro area, based on an analysis using the concept of the real equilibrium exchange rate (see Villemot et al., 2018). This analysis is based on the idea that it is possible to calculate equilibrium real exchange rates within the euro area itself: while because of the

monetary union the nominal exchange rate between these countries does not change, relative price levels still allow for adjustments in the real exchange rate.

We also analyse the robustness of the results with respect to the assumptions underlying the valuation. The adjustments necessary to reduce the imbalances are calculated under the constraint of a stabilization of the net external position of each country at a level higher than the limit fixed by the Macroeconomic Imbalance Procedure (-35% of GDP). Their magnitude depends on the assumptions made over the horizon for stabilization of the net external position (NEP) on the real interest rates (which determine net interest flows with the rest of the world) and the potential growth rate (which indicates the ability to increase net credit or debt with the rest of the world while keeping the net debt-to-GDP ratio stable). We also study the sensitivity of the results to the assumption used for the output gap, which conditions the demand for imports, and thus the medium-term trade balance.

Our estimates confirm a decrease in the internal imbalances in the euro area since 2009, which has continued in 2017. Substantial misalignments remain: the average (in absolute terms) mismatch with the level of the euro was 10% in 2017, and the relative nominal differential between Germany and France is estimated at 20%, down 5 points compared to 2016. The sensitivity analyses of the results indicate a low sensitivity of the misalignment evaluations to the hypotheses retained over the horizon in question, the real interest rate, the potential growth rate and the output gap of each country, thus confirming our diagnosis.

Modeling equilibrium exchange rates in the euro area

The approach developed in this article uses the perspective of the fundamental equilibrium exchange rate (FEER) (Cline, 2008; Williamson, 1994). This approach involves two steps (Cline 2008, Williamson 1994). As a first step, an estimate is made of the equilibrium value of the current account (or trade balance), based on theoretical and empirical considerations. In a second step, the real exchange rate that makes it possible to reach this objective is calculated by means of a model of foreign trade using the volumes and prices of imports and exports; the price elasticities of the export and import volumes are the key parameters in this analytical framework.

This approach is the only one that allows for the design of a truly multilateral framework in which the imbalances of several countries can be analysed simultaneously, taking into account all the interdependencies and constraints of the existing general equilibrium (see Villemot et al., 2018). Among the different variants of the FEER method, the one developed here has the following characteristics, which distinguish it from the literature:

1. To take better account of the trade matrix within the zone and to integrate all the strategic interactions, our approach is based on a multi-country model of the euro area's 11 largest economies. In contrast, the rest of the world is not modelled, but is considered a residue, which means that our approach does not reflect the fact that some countries in the zone are trading more, relative to others, with China, for example. Our model accurately accounts for internal misalignments within the zone, but does not allow us to study a distortion in exchange rates between non-euro currencies.
2. We define the equilibrium current account as the one that stabilizes the net external position (i.e. the difference between the assets and liabilities of domestic residents vis-à-vis non-resident units) over a medium-term time horizon, under a constraint of maximum indebtedness. The idea is that it is not possible to accumulate too much external debt without creating a balance of payments crisis.[1] There is no theoretically defined maximum threshold, and we therefore impose an arbitrary lower limit for the net external position at -35% of GDP, corresponding to the standard defined by the European Commission's Macroeconomic Imbalance Procedure (MIP). Above this threshold, only the stabilization of the net external position is required; this may, however, require a reduction in the current account surplus for countries running large surpluses. The idea is that it is also not possible to accumulate too many assets (because they are the counterpart of liabilities), even if the stabilization constraint is arbitrary and restrictive.
3. We adopt a direct solution to the problem of the over-determination of exchange rates: as we are primarily interested in the euro area, the rest of the world is considered as a residue; in other words, the equilibrium constraint of the euro area determines by symmetry that of the rest of the world.

The model

The first step, given the targets for the net external positions, is to calculate the corresponding current balance targets. Let i be the country index, TB_i the trade balance as a ratio of the GDP of country i, CA_i the current account as a ratio of GDP, $NIIP_i$ the net external position (net international investment position) as a ratio of GDP, r the real interest rate, and π the inflation rate.

We can then calculate the share R_i of the current account (expressed as a ratio of GDP) that is not explained by trade or by interest payments on the external position:

$$R_{i,t} = CA_{i,t} - TB_{i,t} - (r + \pi)NIIP_{i,t-1} \quad (1)$$

[1] This is the argument used by the European Commission to justify integrating the net external position into the Macroeconomic Imbalance Procedure (European Commission, 2012).

This residual is not zero either because of transfers (sending of funds, cancellation of debt, etc.), because of errors or omissions, or because the assumption on the interest rate r does not correspond to the average effective rate of interest on the net external position.[2]

Then, given the potential growth g_i, the adjustment horizon h and the net external position target $\overline{NIIP_i}$, by neglecting the time index the trade balance target corresponds to:[3]

$$\overline{TB_i} = \frac{\overline{NIIP_i} - NIIP_i \left(\frac{1+r+\pi}{1+g_i+\pi}\right)^h}{\sum_{j=0}^{h-1} \left(\frac{1+r+\pi}{1+g_i+\pi}\right)^j} - R_i \qquad (2)$$

This trade balance target is such that, if the country adjusts to this new value today, then its net external position would reach the target in h years (provided, of course, that the assumptions on growth, the interest rate and the inflation rate are verified).

It should be noted that this calculation incorporates other assumptions. On the one hand, the residue R_i is assumed to be constant over time[4]; incidentally, this means that if the value chosen for r proves false, our interest rate calculations will be erroneous only on the difference between the initial external position and its target. On the other hand, we make the assumption that changes in the net external position are due solely to the accumulation of current account surpluses or deficits and not to valuation effects: this seems a reasonable assumption in so far as there is no regularity or trend in these valuation effects (see Pupetto and Sode, 2012, p.30 for more on this[5]). Finally, countries with very close net external positions may have very different adjustments once the respective values of the share R_i of the current account not explained by trade or interest payments on the international investment position differ.

We now describe the standard model that is the basis for our calculations. Imports and exports are considered to be functions of domestic or addressed demand as well as of relative prices with the elasticities describing imperfect competition. All endogenous variables denoted with lowercase letters represent log-deviations from a reference level (corresponding to the values observed at a reference date, end 2017 in the present case).

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2 In particular, it is necessary to integrate changes in the valuation of assets and liabilities into the dynamics of the external position, and the observed interest rate may make this difficult.

3 Cf. the appendix for the demonstration.

4 In other words, the target for the net external position is calculated for a given value of the residue.

5 That said, under the assumption of a persistent current account surplus in the euro area and a forthcoming appreciation of the effective exchange rate of the euro, there could be a significant depreciation of accumulated assets whenever these are denominated in a foreign currency (mainly in dollars). We do not quantify this phenomenon, but it could be of real importance.

The volume of exports x_i from country i depends on the addressed demand d_i^{EX} and the difference between p_i^{EX}, the index of prices of competitors on the export markets of country i, and p_i^X, the export prices of country i:

$$x_i = d_i^{EX} + \varepsilon_i^X (p_i^{EX} - p_i^X)$$

where ε_i^X is the price elasticity of the exports. The elasticity of exports to addressed demand is calibrated by unit, which means this involves a specification in terms of market shares.

Likewise, the volume of imports m_i from country i depends on the domestic production y_i and the difference between the prices of the domestic added value p_i^{VA} and the import prices p_i^M:

$$m_i = \omega_i y_i + \varepsilon_i^M \left(p_i^{VA} - p_i^M\right)$$

where ε_i^M is the price elasticity of the imports and ω_i is the elasticity of the imports to domestic production.

The addressed demand d_i^{EX} of country i is a function of the import volumes m_j of the trade partners and the production of the rest of the world y^{RoW} (this being the main determinant of the imports of the rest of the world):

$$d_i^{EX} = \sum_j wx_i^j \, m_j + wx_i^{RoW} \omega_{RoW} y_{RoW}$$

where wx_i^j is the share of country j in the exports of country i and ω_{RoW} is the elasticity of the imports of the rest of the world to production.

The price p_i^X of the exports of country i depends on the price of the domestic value-added and the price of competitors on the export markets:

$$p_i^X = (1 - \varepsilon_i^{PX}) p_i^{VA} + \varepsilon_i^{PX} p_i^{EX}$$

where ε_i^{PX} is the price elasticity to the prices of competitors on the export markets. Two polar opposite cases can be distinguished. If $\varepsilon_i^{PX} = 1$, then the producers of country i adjust entirely to the competitor prices, possibly to the detriment of their own margins. Or on the contrary, if $\varepsilon_i^{PX} = 0$, then the producers concern themselves solely with maintaining their margins, possibly to the detriment of their price-competitiveness.

Likewise, the price p_i^M of imports from country i depends on the price of the domestic value-added and of a price index p_i^{EM} of the exporters to country i:

$$p_i^M = (1 - \varepsilon_i^{PM}) p_i^{VA} + \varepsilon_i^{PM} p_i^{EM}$$

where ε_i^{PM} is the price elasticity to the prices of competitors on the domestic market. Once again two contrary cases can be distinguished: if $\varepsilon_i^{PM} = 0$, then the margins are the sole adjustment variable, whereas if $\varepsilon_i^{PM} = 1$ then the margins are maintained and the adjustment is made to the detriment of price-competitiveness.

Adjustment of the trade balance and value of the price elasticities

Consider only the adjustments related to the movements of relative prices ($d_i^{EX} = \omega_i y_i = 0$). The simplified model is written, after taking into account the exchange rate:

$$x_i = \varepsilon_i^X(\tilde{p}_i^{EX} + s - p_i^X)$$

$$m_i = \varepsilon_i^M\left(p_i^{VA} - s - \tilde{p}_i^{EM}\right)$$

$$p_i^X = (1 - \varepsilon_i^{PX})p_i^{VA} + \varepsilon_i^{PX}(\tilde{p}_i^{EX} + s)$$

$$p_i^M = (1 - \varepsilon_i^{PM})p_i^{VA} + \varepsilon_i^{PM}(\tilde{p}_i^{EM} + s)$$

$$TB_i = x_i - m_i + p_i^X - s - \tilde{p}_i^{EM}$$

where $\tilde{p}_i^{EX}$ (resp. $\tilde{p}_i^{EM}$) is the price of the exports of competitors (resp. imports) expressed in foreign currency and s is the exchange rate quoted indirectly (an increase in s indicates a higher exchange rate and a depreciation of the domestic currency).

According to the Marshall-Lerner condition, following a depreciation of the exchange rate, the trade balance improves if the price elasticities of the imports and the exports in volume meet the following condition:

$$\frac{\partial TB_i}{\partial s} = \varepsilon_i^X + \varepsilon_i^M - 1 > 0$$

This condition supposes a full pass-through of exchange rate fluctuations on the prices of exchangeable products expressed in the currency of the country of destination (generally called the "complete exchange rate pass-through condition"), i.e. $\varepsilon_i^{PM} = 1$ and $\varepsilon_i^{PX} = 0$. In other words, following a depreciation of the exchange rate, the prices in local currency of imported products rise in the same proportion, while the prices of exported products, expressed in local currency, remain unchanged (the entire depreciation is passed onto the selling price expressed in the currency). However, numerous studies conclude that the transmission of exchange rates to prices is not complete (Menon, 1995; Campa & Goldberg, 2005; Bussière & Peltonen, 2014; Leigh & al., 2017). The Marshall-Lerner condition is then generalized:

$$\frac{\partial TB_i}{\partial s} = \varepsilon_i^X.(1 - \varepsilon_i^{PX}) + \varepsilon_i^{PX} + \varepsilon_i^{PM}.(\varepsilon_i^M - 1) > 0$$

The positive effect of a depreciation of the exchange rate on the trade balance via exports is increased if $\varepsilon_i^X - \varepsilon_i^X.\varepsilon_i^{PX} > 0$. When the exchange rate depreciates, exporters may increase their margins by a fraction of the amount of the depreciation. If the sensitivity of the volume of exports to their price is sufficiently high, the negative impact of a hike in the export prices (in national currency) of ε_i^{PX} is more than offset

by the rise in the volume of exports linked to the reduction in their price (in foreign currency).

When the exchange rate depreciates, the impact on the price of imported products, expressed in local currency, may be less than the change in the exchange rate. This is the case if part of the price increase is absorbed by, for example, lower margins for intermediate (importing) firms. The negative effect of the depreciation on the trade balance may be reduced by the adjustment of import prices if $\varepsilon_i^{PM}.(\varepsilon_i^M - 1) > \varepsilon_i^M - 1$.

Now consider the adjustment of relative prices within the euro area. This has the effect on the trade balance:

$$\frac{\partial TB_i}{\partial p_i^{VA}} = -\varepsilon_i^X.(1-\varepsilon_i^{PX}) - \varepsilon_i^M.\left(1-(1-\varepsilon_i^{PM})\right) + (1-\varepsilon_i^{PX}) - (1-\varepsilon_i^{PM})$$

$$\frac{\partial TB_i}{\partial p_i^X} = -\varepsilon_i^X.(1-\varepsilon_i^{PX}) - \varepsilon_i^M.\varepsilon_i^{PM} - \varepsilon_i^{PX} + \varepsilon_i^{PM}$$

$$\frac{\partial TB_i}{\partial p_i^X} = -\varepsilon_i^X.(1-\varepsilon_i^{PX}) - \varepsilon_i^{PX} + \varepsilon_i^{PM}.(1-\varepsilon_i^M) = -\frac{\partial TB_i}{\partial s}$$

An increase in national prices results in a deterioration in the trade balance, in the same proportions as an appreciation of the exchange rate.

Definition of the solution

The index of the prices of competitors on the export markets of country i is defined by:

$$p_i^{EX} = \sum_j wc_i^j p_j^X + wc_i^{RoW} e$$

where e is the effective nominal exchange rate of the euro, and where the weights wc_i^j are calculated by double weighting (Durand and Giorno, 1987). We assume here that the export prices (in foreign currency) of countries outside the euro area are constant, which amounts to saying that e is interpreted as the export price in euros of competitors outside the euro area.

The index of exporters' prices to country i is defined by:

$$p_i^{EM} = \sum_j wm_i^j p_j^X + wm_i^{RoW} e$$

where wm_i^j is the share of country j in the imports of country i.

Given changes in exports, imports, prices and output, the percentage point change in the ratio of the trade balance to GDP can be calculated as:[6]

6 Recall that endogenous variables denoted with lowercase letters represent log-deviations from a reference level. X_i, M_i and TB_i are expressed as a ratio of GDP.

$$\Delta TB_i = X_i(p_i^X + x_i) - M_i(p_i^M + m_i) - TB_i\left(p_i^{VA} + y_i\right)$$

The solution of the model is defined by a vector $x, m, p^{VA}, p^X, p^M, p^{EX}, p^{EM}, d^{EX}$ satisfying the equations of the model, under the constraint that the trade balances reach their target (i.e. $\Delta TB_i = \overline{TB_i} - TB_i$ for all countries) and given the assumptions about changes in production and exchange rates (in our central scenario, output gaps are assumed to close, so that the changes in output y are equal to the opposite of the output gaps calculated for 2017, and the exchange rate of the euro is assumed to be constant, i.e. $e = 0$).

Finally, given a solution to the model, the changes in the real effective exchange rate (REER) can be calculated for each country:

$$reer_i = p_i^{VA} - \left(\sum_j \left(\frac{wm_i^j + wx_i^j}{2}\right) p_j^{VA} + \left(\frac{wm_i^{RoW} + wx_i^{RoW}}{2}\right) e\right)$$

It is easy to show that the variation in the real effective exchange rate thus obtained is independent of the assumption made on the nominal exchange rate e (in other words, our model respects the principle of monetary neutrality[7]; on the other hand, of course, the nominal value-added prices p_i^{VA} obtained depend on the nominal exchange rate).

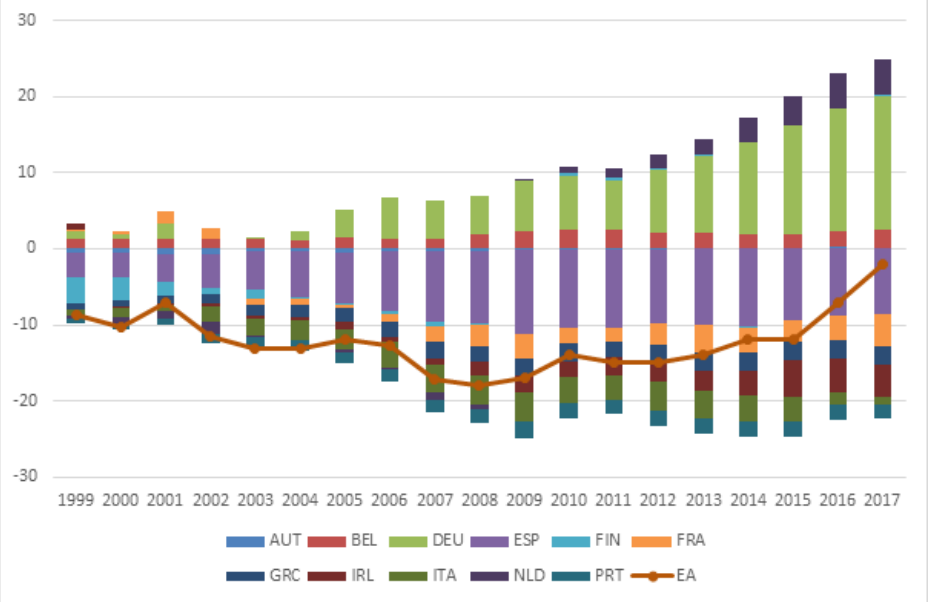
Data and calibration of the model

The model includes the 11 most important countries, in terms of weight in the euro area's GDP. The data on the net external position (see Figure 1), the current account balance (see Figure 2) and the trade balance come from Eurostat (year 2017). Data for the output gaps come from the OECD (2017, *Economic Outlook*, no. 103). The weightings for the exports and imports are calculated from the CEPII's CHELEM database (year 2013).

7 This result is based on the assumption that a change in the nominal exchange rate of the euro affects the value-added prices in the same way between countries: the feedback of the exchange rate on the value-added price via its impact on consumer prices, which feeds back onto wages, and thus on the value-added price, is presumed identical. However, it could be differentiated between countries, given the composition of the goods and services consumed in imports and the wage indexation mechanisms specific to each country.

Figure 1: Net external positions in the euro area

As % of euro area GDP



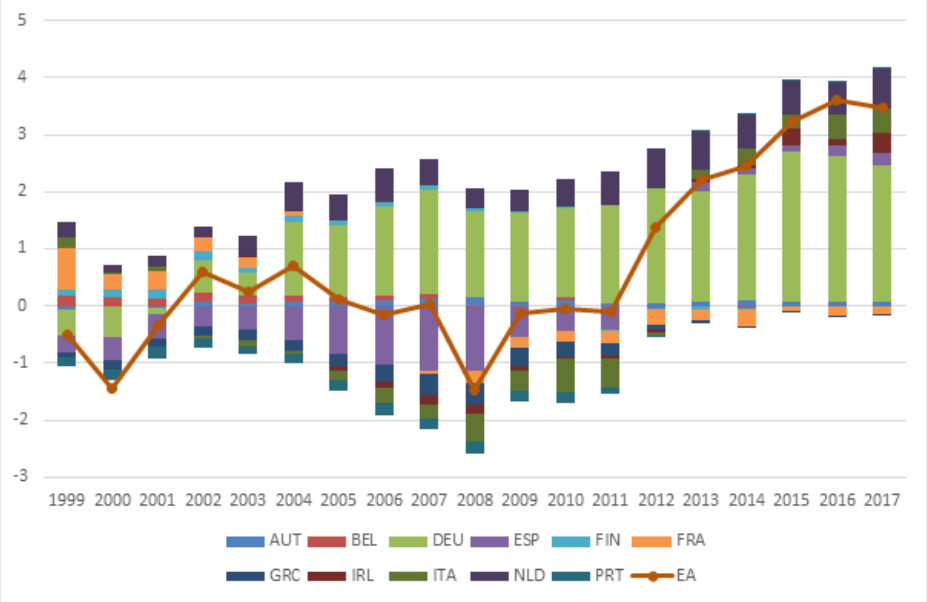
Source: ECB, Eurostat.

The inflation rate π is set at the European Central Bank target, i.e. 2%. In the central scenario, the real interest rate r is fixed at 1% and the horizon h is equal to 20 years.

The target for the net external position $\overline{NIIP_i}$ for each country, which is used to calculate the TB_i, is equal to the country's net external position in 2017 (i.e. the target is to stabilize this position), except whenever this is less than -35%, in which case the target is -35%. This target corresponds to the limit set in the Macroeconomic Imbalance Procedure (European Commission, 2012).

Figure 2: Euro area current account

As % of euro area GDP



Source: Eurostat.

The elasticity of imports from the rest of the world to production is calibrated to unity.

Finally, Table 1 gives the hypotheses for potential growth *g*, for the elasticity of imports to domestic production ω_i, as well as for the values used for the price elasticities of export and import volumes and prices (respectively, $\varepsilon^X, \varepsilon^M, \varepsilon^{PX}$ and ε^{PM}).

Table 1: Potential growth and elasticities of foreign trade

	g	***output gap***	ω_i	ε^X	ε^M	ε^{PX}	ε^{PM}
Germany	1.02%	1.3%	0.87	0.65	0.80	0.27	0.82
Austria	1.39%	-0.5%	0.66	0.60	0.16	0.18	0.51
Belgium	1.50%	-0.8%	0.80	0.47	0.28	0.57	0.79
Spain	1.40%	-3.1%	0.94	1.20	1.10	0.44	0.68
Finland	1.57%	-1.7%	0.74	0.60	0.31	0.57	0.79
France	1.20%	-1.1%	1.00	0.62	0.66	0.55	0.62
Greece	1.00%	-11.6%	0.59	0.47	0.37	0.41	0.40
Ireland	1.85%	2.6%	1.00	0.60	0.33	0.28	0.51
Italy	0.20%	-1.7%	0.92	1.13	0.80	0.45	0.43
Netherlands	1.30%	-0.5%	0.47	0.60	0.28	0.41	0.36
Portugal	1.04%	-3.6%	1.00	0.47	0.56	0.77	0.79

Source: potential growth and elasticity of imports to domestic demand: OFCE estimates; price elasticity of export and import volumes and prices: OFCE estimates for Germany, Spain, France and Italy; Pain *et al.* (2005) for the other countries.

The price elasticities of the export and import volumes and prices used imply that the general Marshall-Lerner condition is true for all countries. The price elasticities of the selected exports are lower than those estimated in the literature on microeconomic data. The work on company data leads to export price elasticities of close to 5, and to export elasticities to customs tariffs of close to 2 (Bas et al., 2017; Fontagné et al., 2017). However, these microeconomic elasticities relate to changes in relative prices for a firm, under the assumption that the prices of other competing firms from the same country of origin remain constant. However, exchange rate shocks affect the exporting firms in the same country indifferently, which necessarily implies lower export price elasticities (Fontagné et al., 2017). But our case corresponds well to the situation in which all the companies from the same country are affected by the same movement of relative prices vis-à-vis the other countries of the euro area, taken one by one. In this sense, the price elasticities of exports used here are therefore lower. They are also compatible with the price-elasticity estimates of exports at the exchange rates estimated by Fontagné et al. (2017) for France.

What internal adjustments for the euro area countries?

Table 2 gives the level of the nominal imbalances internal to the euro area as calculated with the model and the data presented above, at the end of 2017.

Table 2: NIIP, current account balance and nominal adjustments necessary in 2017 (relative to the euro area average)

	NIIP	Current account balance	Adjustment
Austria	5%	1.9%	8%
Belgium	56%	-0.2%	−18%
Germany	59%	8.0%	11%
Spain	-81%	1.9%	−6%
Finland	6%	0.7%	−5%
France	-20%	-0.6%	−9%
Greece	-141%	-0.8%	−30%
Ireland	-156%	12.5%	21%
Italy	-7%	2.8%	−2%
Netherlands	70%	10.2%	11%
Portugal	-106%	0.5%	−11%

Source: OFCE calculations

From the point of view of the model, these adjustments correspond to the changes in the price of value-added that must be made simultaneously for all countries to reach their current account target. These adjustments are presented in relation to the euro

area average, in order to focus on internal imbalances in the zone. It ignores the fact that the euro area as a whole runs a large surplus, which puts pressure on the appreciation of the euro.

The model indicates four possible situations between the starting position (a positive or negative NIIP) and the adjustment to be made (undervaluation or overvaluation relative to the euro area average). The first two are standard, and the other two are less common. They correspond to the cases where:

1- The country had a negative NIIP in 2017 and must become more competitive with its euro area competitors to stabilize its NIIP at its 2017 value (modulo the floor of -35% of GDP). This is the case for Greece, Portugal, Spain, France and Italy.

2- The country had a positive NIIP in 2017 and must lose competitiveness compared to its competitors to stabilize the NIIP at its 2017 value. This is the case for Austria, Germany and the Netherlands.

3- The country had a positive NIIP in 2017 but is nevertheless overvalued compared to the euro area average and must become more competitive. Finland and Belgium are in this situation. For both countries, once the closure of the output gap and the current account residual are taken into account, the current account needs to improve to stabilize the NIIP at its 2017 level.

4- The country had a negative NIIP in 2017 but is nevertheless undervalued compared to the euro area average. This is the case of Ireland. In this case, despite taking into account the closure of the output gap and the residual current account (-14.9% of GDP in 2017), the current account needs to worsen to stabilize the NEP at -35% GDP. It should be remembered that Ireland's trade balance was 32.1% of GDP in 2017, resulting in the NIIP’s spontaneous upward momentum.

The critical point is the substantial mismatch between Germany and France. Germany is thus in a situation of strong undervaluation, whereas France is overvalued, such that the relative nominal differential between these two core countries of the euro area reaches the substantial level of 20%.

As for Greece, despite the sacrifices already made, it needs a relative depreciation of 30%: even if the Greek current account is now close to equilibrium, its output gap is very deep, and the improvement is therefore largely cyclical. The other Southern European countries (Spain, Italy and Portugal) are now in a more favorable situation and are slightly overvalued. In contrast, the so-called Northern countries, such as the Netherlands and Austria, are undervalued, but to a lesser extent than Germany.

Our results are generally in line with recent studies that propose measuring imbalances using various methods. These different methods include the BEER method in the case of the CEPII, the FEER method for Saadaoui, a combination of methods and staff

judgments for the IMF – which have in common the characteristic that the long-term stabilization of the NEP is not necessarily ensured. This can lead to discrepancies between these assessments and ours. In addition to the uncertainty surrounding the valuations, other sources of differences concern the measurement of real exchange rates (indices of consumer prices versus value-added prices), the number of countries considered or the pattern of trade between countries. Despite the differences in methods and starting points, all the countries considered are overvalued compared to Germany (Table 3), and the France-Germany gap also remains close to 20% for Saadaoui (2018) and the IMF (2018).

Table 3: Nominal adjustments necessary in 2017 – Comparisons (relative to Germany)

Adjustment necessary	OFCE	CEPII EQCHANGE (Average Currency Misalignments)	Saadaoui 2018 (N=2016)	IMF (2018)
Austria	-3%	-21%	na	na
Belgium	-29%	-11%	na	-21%
Germany	0%	0%	0%	0%
Spain	-17%	-17%	-2%	-22%
Finland	-16%	-4%	-24%	na
France	-20%	-5%	-21%	-19%
Greece	-41%	-21%	-21%	na
Ireland	10%	-1%	-4%	na
Italy	-13%	-12%	-14%	-20%
Netherlands	0%	-5%	na	-5%
Portugal	-22%	-20%	-2%	na

Sources: Cepii, EQCHANGE; IMF (2018); Saadaoui (2018); OFCE calculations

To put these differences in historical perspective, Table 4 traces the evolution of our measure of nominal misalignment since 2000.

Despite some short-term oscillations due to the instability of the current account data, it can be seen that the indicator is consistent overall, in line with developments within the euro area.

Table 4: Nominal adjustments necessary, 2000-2017
(relative to the euro area average, in %)

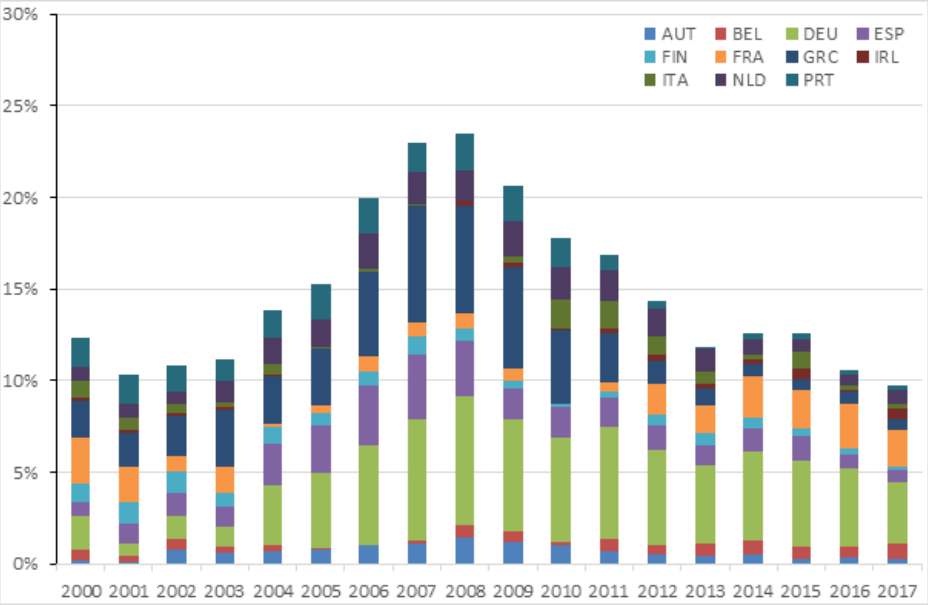
	AUT	BEL	DEU	ESP	FIN	FRA	GRC	IRL	ITA	NLD	PRT
2000	5	17	-6	-7	59	12	-60	14	5	11	-54
2001	4	8	-2	-10	72	9	-56	10	4	11	-55
2002	28	15	4	-12	76	4	-61	9	-3	10	-50
2003	21	8	4	-9	47	6	-72	8	-1	19	-45
2004	23	9	12	-18	53	1	-64	5	-3	22	-53
2005	27	1	15	-20	35	2	-69	2	0	24	-61
2006	34	-1	20	-23	42	4	-81	-2	-1	31	-59
2007	38	3	25	-24	53	3	-90	0	1	26	-53
2008	51	-14	26	-20	36	4	-87	-11	0	25	-61
2009	41	-13	23	-12	20	3	-85	-13	-2	29	-59
2010	35	3	21	-12	11	0	-78	-6	-8	27	-53
2011	20	-15	22	-13	-14	-2	-69	-9	-8	26	-33
2012	16	-11	18	-11	-24	-7	-44	-18	-5	22	-21
2013	14	-14	15	-10	-25	-6	-36	-14	-4	18	-8
2014	16	-16	17	-11	-24	-9	-32	-9	-1	13	-14
2015	8	-15	16	-11	-19	-9	-27	24	-5	10	-15
2016	10	-13	15	-7	-13	-10	-32	2	-2	9	-11
2017	8	-18	11	-6	-5	-9	-30	21	-2	11	-11

Source: OFCE calculations

It is interesting to note that Italy, although generally classified among the peripheral countries, has not suffered any major misalignment (greater than 10%) from the point of view of our methodology; this is because its current account stayed close to equilibrium, and its net external position was only slightly negative (the private sector holds a lot of foreign assets, which offsets the holding of public debt by foreigners).

Figure 3 reports the average (weighted by GDP) of the absolute value of the misalignments reported in Table 4. The contribution of each country to this average is highlighted. This graph can be interpreted as a summary measure of the level of internal misalignments in the euro area, with the contribution of each country.

Figure 3: Indicator of nominal intra-euro area misalignments, with the contributions per country



Source: OFCE calculations

It emerges from this exercise that the nominal misalignments within the zone initially decreased the very first years; Germany was then slightly overvalued, which led it to practice a strategy of competitive disinflation, which brought it back initially to the euro area average. The imbalances reached a low in 2001, before gradually increasing to reach a historic peak in 2008, at the time the global financial crisis broke out. The adjustment effort of the Southern countries (Portugal, Spain, Italy, Ireland and Greece) is then very clear, since they contributed only 25% to the indicator in 2017 against more than 50% between 2001 and 2007. This adjustment is not due simply to the contraction in demand, since the indicator calculated here corrects relative output gaps. It stems mainly from the effects of competitiveness induced by the contraction of wage costs. The indicator is however dependent on the output gaps used.

As for the Northern countries, even if the adjustment is also visible, it is much less substantial, with the result that Germany today is the main contributor to intra-zone imbalances (34% in 2017, following 41% in 2016). France was not part of the general trend towards reconvergence and has seen its position deteriorate almost continuously since 2011, despite measures such as the CICE tax credit that was supposed to address this problem; this outcome can be explained by the greater speed of adjustment in the Southern countries, which has neutralized French efforts, and the weakness of imports by the main partners (Germany first of all).

Although the chart shows a historically low level of internal misalignments in 2017, their absolute level remains high. Indeed, the value of the indicator (10%) can be understood as the average misalignment with respect to the level of the euro, in absolute value. Between two countries taken at random, a difference of 20% is therefore the norm, and

this is precisely the order of magnitude of the Franco-German misalignment. Centrifugal pressures linked to competitiveness differentials have certainly decreased, but they have not disappeared, and persist within the historic heart of the zone.

Sensitivity tests

In this section, we carry out several tests of the sensitivity of the results to the assumptions used for calculating the misalignments in the euro area. These tests include the time horizon used to calculate the adjustment, the level of real interest rates, the level of the output gaps and the potential growth rates used for each country. These tests show that the measurement of the misalignments is generally robust to the hypotheses adopted. They complement the results of the tests conducted on the value of the elasticities retained for the imports, exports, import prices and export prices (see Villemot et al., 2018).

The sensitivity to the adjustment horizon

Our measure of the misalignments depends on the horizon chosen to calculate them. We have justifiably chosen a horizon of 20 years, which seems sufficiently distant to allow the adjustments to be realized. Nevertheless, at this horizon, the net external position of each country only "passes" by this target value. The question therefore arises, at this horizon, as to whether the NEP target is still distant from its very long-term target (its stationary state), or whether it can be considered as a first approximation that each country's NEP has stabilized, with most of the adjustment having been made in the first 20 years.

We calculate the misalignments for the different horizons $h = \{20, 50, 100, 1000\}$ considered. The results are shown in Table 5. The nominal adjustments relative to the euro area average are not very sensitive to the time horizon for most countries. The France-Germany gap thus falls to 19% for a 100-year horizon, compared to 20% at 20 and 50 years.

The results are, however, more sensitive for Spain (reduction of the misalignment vis-à-vis the average of the euro area of 2 points when reaching a horizon of 100 years), and especially Greece, Ireland and Portugal. For Spain, Greece and Portugal, the lengthening of the horizon eases the adjustment needed to stabilize the NEP at -35% of GDP: from a dynamic point of view, the current account needed to reach the target may be smaller as the date is pushed back on which the target is to be reached. For Ireland, which has a more favourable starting position (undervaluation), it is necessary instead to accentuate the appreciation relative to the other euro area countries to stabilize the NEP at -35% of GDP.

However, since the gap is relatively small for Spain, and the other three countries together account for only 6% of the GDP of all the countries concerned, a change in the time horizon does not change the overall assessment of misalignments at the euro area level.

Table 5: Nominal adjustments necessary in 2017 according to the horizon adopted (relative to the average of the euro area)

$h =$	20	50	100	1000
Austria	8%	7%	7%	7%
Belgium	−18%	-19%	-19%	-19%
Germany	11%	10%	9%	9%
Spain	−6%	-4%	-4%	-3%
Finland	−5%	-6%	-6%	-6%
France	−9%	-10%	-10%	-10%
Greece	−30%	-12%	-5%	1%
Ireland	21%	27%	29%	31%
Italy	−2%	-3%	-3%	-4%
Netherlands	11%	10%	9%	9%
Portugal	−11%	-3%	0%	2%

Source: OFCE calculations

Misalignments – not very sensitive to real interest rates

The trade balance target $\overline{TB_i}$ that is compatible with a stabilization of the net external position depends on the value used for the real interest rate (see equation 2). A change in the real interest rate therefore modifies the trade balance target by two channels. First, it modifies the flow of future net interest: a rise in the real interest rate implies an increase in the net inflows of interest if the net investment position (NEP) is positive, and an increase in net outflows if the NEP is negative, which changes the target. Then, in equation (2), the calculation of R, *i.e.* the share of the current account that does not depend on the trade balance and on the net interest flows on the NEP (see equation 1), also depends on the interest rate. By modifying R, this also modifies the adjustment needed: a rise in the real interest rate has a positive or negative impact on R based on the sign of the NEP. R varies negatively with the real interest rate if the NEP is positive (which decreases the trade balance target), and conversely if the NEP is negative.

In order to test the sensitivity of the results to the calibration of R, we calculate the adjustments needed to reduce the imbalances in the euro area for different values of the real interest rate, between -1.5% and 3%. The results, presented and commented on below, indicate that the relative price adjustments are not very sensitive to the hypothesis on the real interest rate, except for the Southern countries.

Table 6: Adjustments in the trade balance needed based on the real interest rate, 2017 (as % of GDP)

Real interest rate	AUT	BEL	DEU	ESP	FIN	FRA	GRC	IRL	ITA	NLD	PRT
-1.5%	-1.7	2.1	-6.3	-1.6	-0.5	0.0	3.3	-10.2	-2.9	-8.0	0.8
-1%	-1.7	2.1	-6.3	-1.7	-0.5	0.0	3.0	-10.6	-3.0	-8.0	0.6
0%	-1.7	2.1	-6.2	-2.0	-0.5	0.0	2.4	-11.3	-3.0	-7.9	0.2
1%	-1.7	2.1	-6.2	-2.3	-0.5	0.0	1.9	-11.9	-3.0	-7.9	-0.2
2%	-1.7	2.2	-6.2	-2.5	-0.5	-0.1	1.4	-12.6	-3.0	-7.9	-0.5
3%	-1.7	2.2	-6.2	-2.7	-0.5	-0.1	0.9	-13.1	-3.0	-7.9	-0.8

Source: OFCE calculations

Table 6 traces the trade balance adjustments according to the real interest rate used. An increase in the real interest rate results in a positive change in the adjustment for countries with a positive NEP in 2017 (Austria, Belgium, Germany, Finland and Netherlands), and a negative variation for countries with a negative NEP (Spain, France, Greece, Ireland, Italy and Portugal). In the first case, if the country has to improve its trade balance, it increases the effort to be made (e.g. Belgium), while it decreases it if the country has to degrade its trade balance (e.g. Germany). In the second case, the opposite is true: a country that has to improve its trade balance sees the effort it needs reduced (Greece), whereas the adjustment is higher in absolute value for a country needing to reduce its trade balance (Spain, Ireland and Portugal).

The relative price adjustments are reduced when the real interest rate rises for the countries that need to lose competitiveness and have a positive NEP (Austria, Germany and Netherlands, see Table 7). Countries needing to gain relative competitiveness will see their adjustments increase when their NEP is negative, except in the case where they must reach -35% of GDP (Spain, Greece, Ireland and Portugal): in this case the increase in R will prevail over the rise in the outward net interest flows in the dynamics of the NEP, facilitating the adjustment for these countries.

Table 7: Nominal adjustments needed based on the real interest rate, 2017
(relative to the euro area average, in %)

Real interest rate	AUT	BEL	DEU	ESP	FIN	FRA	GRC	IRL	ITA	NLD	PRT	indicator of nominal intra-euro area misalignments
-1.5%	8.9	-17.3	11.8	-7.5	-4.1	-8.5	-36.9	17.4	-1.3	11.5	-14.4	10
-1%	8.7	-17.4	11.6	-7.3	-4.2	-8.6	-35.5	18.1	-1.4	11.4	-13.7	10
0%	8.5	-17.7	11.3	-6.9	-4.4	-8.7	-32.8	19.3	-1.6	11.1	-12.3	9.8
1%	8.3	-17.9	11.1	-6.4	-4.6	-8.8	-30.1	20.5	-1.8	10.9	-10.9	9.7
2%	8.1	-18.1	10.8	-6	-4.7	-8.9	-27.5	21.7	-2	10.6	-9.7	9.6
3%	7.9	-18.3	10.6	-5.7	-4.9	-9	-25	22.8	-2.1	10.4	-8.5	9.4

Source: OFCE calculations

The output gaps – what impact on the misalignments?

The current account adjustments since 2009 have been driven in part by a contraction in domestic demand in the euro area countries. The combination of, first, the financial crisis of 2008-2009, and then the economic crisis following the synchronized fiscal austerity policies of 2011-2013, resulted in a deep and lasting worsening of the output gap in the euro area. According to the OECD, these had still not been closed as of 2017, except in Germany and Ireland. They are also still wide in Greece (-11.6%), Portugal (-3.6%), Spain (-3.1%), Finland and Italy (-1.7%), and France (-1.1%). In our central scenario, we assume that the output gaps have been completely closed in the medium term, which weighs on imports and hits the trade balance, reinforcing the adjustment to be made in terms of price-competitiveness for the countries needing to improve their trade balance.

However, part of the widening of output gaps could in fact be permanent: they could be closing due not to an increase in demand, but to a drop in supply in the medium term. The strong adjustment in the Southern countries, wage adjustments in particular, could have a lasting impact on domestic demand, limiting the negative effect on imports. In order to evaluate the impact of a mechanism like this on the euro area adjustments needed, we evaluate the adjustments according to several assumptions about the degree of closure of the output gaps, from a complete closure (central scenario) to a complete absence of closure (which amounts to considering that the output gaps are already closed). The results are presented in Table 8. They confirm the intuitive notion that the less the output gaps were closed, the lower the relative

nominal adjustment for all countries (but the higher the structural unemployment). The indicator of the nominal misalignments within the euro area is thus reduced by two points. Among the countries whose price-competitiveness effort relative to the euro area average is greater than 10% in absolute value, the adjustment would be reduced by around 40% for Greece, Ireland and Portugal when the output gap is not closed in comparison with the central scenario.

Our model thus implies that an underestimation of the level of the output gaps in the euro area would have as a corollary an underestimation of the internal misalignments in the zone.

Table 8: Nominal adjustments based on the closure of the output gap, 2017
(relative to the euro area average, in %)

% of closure of the OG	AUT	BEL	DEU	ESP	FIN	FRA	GRC	IRL	ITA	NLD	PRT	indicator of nominal intra-euro area misalignments
0%	8.2	-17.4	8.4	-4.6	-1.7	-8.1	-19.1	12.9	-0.9	10.4	-6.4	7.7
25%	8.2	-17.5	9.1	-5	-2.5	-8.3	-22	14.7	-1.1	10.5	-7.6	8.2
50%	8.3	-17.7	9.7	-5.5	-3.2	-8.5	-24.8	16.6	-1.4	10.6	-8.7	8.7
75%	8.3	-17.8	10.4	-6	-3.9	-8.6	-27.5	18.6	-1.6	10.7	-9.8	9.2
100%	8.3	-17.9	11.1	-6.4	-4.6	-8.8	-30.1	20.5	-1.8	10.9	-10.9	9.7

Source: OFCE calculations.

Higher potential growth reduces misalignments

The measurement of intra-euro area misalignments also depends on the potential growth rate used for each economy (equation 2). An increase in the potential growth rate affects the targeted trade balance positively if the NEP is positive, and negatively if it is negative. A higher potential growth rate would then have the effect of reducing the adjustments required for Austria, Germany, Spain, France, Greece, Italy, the Netherlands and Portugal. Among these countries, those with a positive NEP must reduce their trade balance. An increase in the potential growth rate increases the trade balance target, reducing the effort required. The mechanism is the reverse for countries with a negative NEP in this group: they need to improve their trade balance, and an increase in potential growth reduces the trade balance target, and thus the effort required. This also has the effect of reducing misalignments throughout the euro area (Table 9). In the end, only Belgium, Finland and Ireland should increase their efforts in

case of higher potential growth, which is consistent with the fact that these three countries are not in the standard situation.[8]

Since there is a great deal of uncertainty about potential growth levels following the last decade of the crisis, we also conduct a more generalized sensitivity study of the impact of the potential growth rate on nominal misalignments, using Monte Carlo simulations. We vary the potential growth rate of each country by +/- 1 point around the value used in the central scenario (see Table 1) according to a random draw using a uniform law. We carried out 20,000 draws and calculated the density of the indicator of nominal misalignments within the euro area (see Figure 4). In 90% of cases, the indicator of nominal misalignments is between 9.0 and 10.4. It is thus generally well concentrated around its average, in spite of the random drawing scheme retained.

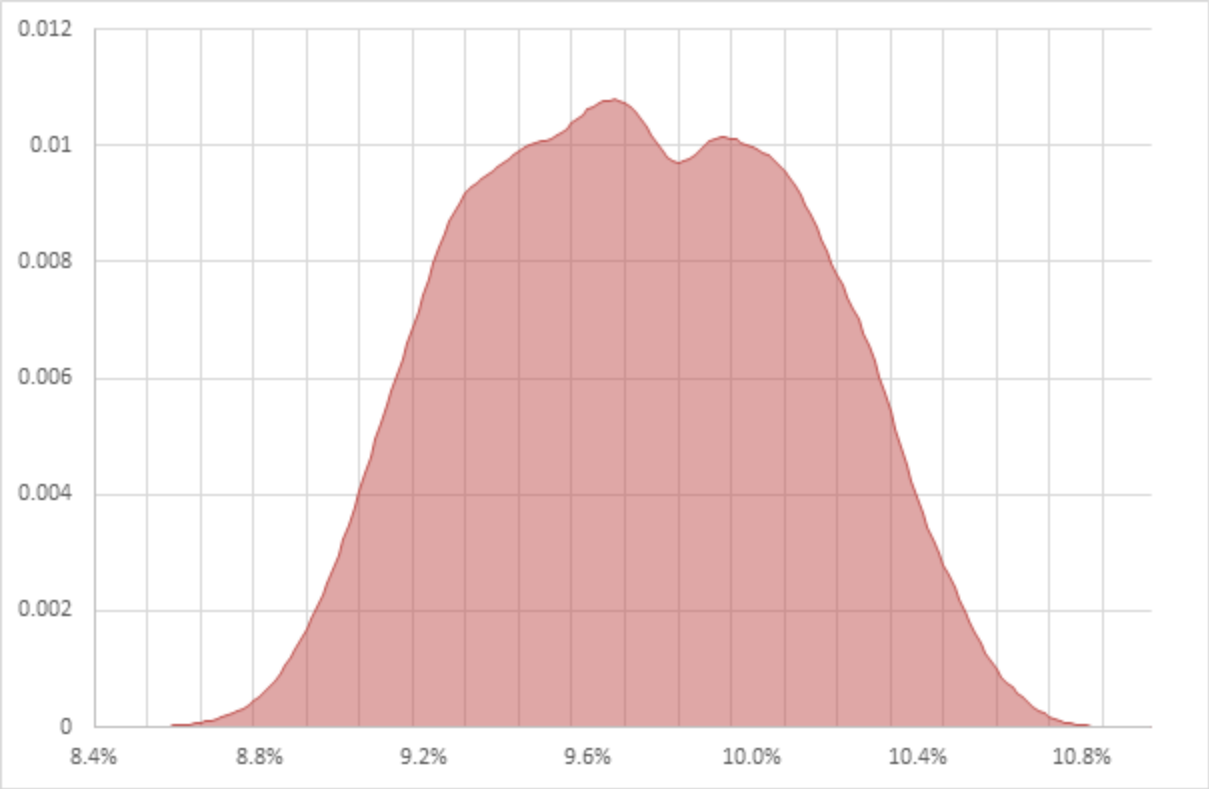
Table 9: Indicator of the nominal intra-euro area misalignments
(relative to the euro area average, in %)

Gap with potential growth rate p/r to the central scenario	Indicator
-1%	10.9
-0.5%	10.3
0%	9.7
+0.5%	9.1
+1%	8.6
+2%	7.5

Source: OFCE calculations

[8] Finland and Belgium had a positive NEP in 2017 but are overvalued compared to the euro area average, and need to increase their trade balance. Ireland is in the opposite situation. For these countries, an increase in the potential growth rate therefore reinforces the adjustments to be made.

Figure 4: Density of nominal adjustments based on the potential growth rate



Source: OFCE calculations

External adjustment

While the imbalances internal to the euro area have decreased, this has taken place at the cost of the appearance of an external imbalance. The current account surplus in the euro area is now higher than that of China, both in value and as a share of GDP. In a system of floating exchange rates – the parity of the euro vis-à-vis other currencies being fixed by the market – it is illusory to hope to sustain such a surplus over the long term. Even if for the moment the monetary policy differential on the two sides of the Atlantic makes it possible to maintain the status quo, the inevitable normalization of the ECB's policy will lead to an appreciation of the euro.

Our equilibrium exchange rate model can be used to estimate the long-term target for the euro-dollar exchange rate. More specifically, it is possible to calculate the appreciation of the euro that would be necessary to bring the euro area's current account back to equilibrium, given the price elasticity of trade in the different countries in the zone, as well as the geographical distribution of their trading partners.

We estimate that the euro should appreciate vis-à-vis the dollar by 24% compared to its 2017 level, which corresponds to an equilibrium exchange rate of 1.36 USD for one

euro. There is therefore substantial room for the euro's appreciation. Two factors, however, continue to dampen the euro's rise: first, the differential in monetary policies, with real rates higher in the United States than in the euro area; and second, the fiscal stimulus enacted by the Trump administration, which is putting upwards pressure on the dollar, and therefore pushing the euro down.

It should be noted that an eventual appreciation of the euro carries risks for the euro area, despite the progress made in terms of nominal reconvergence between the member countries. On the one hand, this would slow the rise in inflation, which is likely to remain low, limiting the manoeuvring room of the European Central Bank. But above all, a lack of internal rebalancing – that is to say, if the hierarchy of current balances within the zone is maintained at its current level – would lead to the reappearance of current account deficits in the South, and would further increase the current deficit of France, which could wind up in a very delicate situation.

Conclusion

In this article, we consider the issue of current account imbalances within the euro area. We update the estimates of the nominal adjustments needed to stabilize the net positions, and we perform a set of tests for robustness to the hypotheses underlying the estimation. The method does of course have its limits, with the resorption of imbalances taking place based only on relative prices, with no room for non-cost competitiveness or for the valuation effects of gross positions, but it has the advantage of being explicit and reproducible. This helps in numerous ways.

First, the dynamics of net positions are taken into account, with each country's potential growth nuancing the sustainability of a current account imbalance. The robustness tests indicate that an increase in the euro area's potential growth would relieve the efforts needed to reduce imbalances.

Then we correct for the position in the cycle of each country as well as its partners. Thus, we do not consider that current account improvements achieved by a reduction in domestic demand are sustainable. The sensitivity analyses nevertheless indicate that a partial closure of the output gaps would reduce intra-zone imbalances in terms of price competitiveness, while shifting these onto structural unemployment in the Southern countries.

We also study the sensitivity of our valuation of imbalances to the value adopted for the real interest rate. The extent of intra-euro area imbalances would decrease with a higher real interest rate. This result is contingent on our simple modelling of net interest flows in the current account and must be considered with caution; future developments are needed to better integrate this dimension into our modelling of imbalances in the euro area.

Finally, we modify the metric for appreciating current accounts by integrating the sensitivity of exports and imports to relative prices. The final measure that we build is more representative of the magnitude of the imbalances than the initial data, that of the current balance. The diagnosis is then that preceding the crisis a major imbalance had formed between the countries of the South and those of the North. While the euro area had a balanced current account, large imbalances had accumulated within the euro area. Although we cannot say from our analysis that this was the trigger for the crisis, it was probably an aggravating factor. The fixed exchange rates between the euro area countries and the accumulation by some countries (Germany, the Netherlands) of claims on others (Spain, Italy) and in particular on certain small countries (Greece, Portugal) contributed to the sharp rise in sovereign and private rates after the 2008 crisis began. Without the possibility of adjusting exchange rates, a private and public default might seem inevitable. The indicator constructed shows, however, that these imbalances have been absorbed, and not only by the contraction of internal demand. The wage cost differentials within the euro area, but probably other factors that we do not directly identify, may have contributed to the recovery in internal balances.

Since 2012, the issue of internal imbalances in the euro area has changed. On the one hand, the euro area's current account balance is now in surplus, and almost all its members are in equilibrium or in surplus. Clearly, the accumulation of claims by some euro area countries on others is no longer happening, but instead the accumulation by some euro area countries on other countries around the world. This time the exchange rate (actual, weighted by accumulated gross assets) can serve as an adjustment variable. Thus, the euro's appreciation would reduce the current account surplus of the euro area and depreciate the value of assets, which are probably accumulated in foreign currency. On the other hand, France now appears to be the last country in the euro area running a significant deficit. Relative to the other euro area countries, and although we correct for output gaps, it is France that is contributing (negatively) most to the imbalances with Germany (positively). If the euro appreciates, it is likely that France's situation would further deteriorate and that we would find a situation of the accumulation of a net internal position, but this time between France (on the debtor side) and Germany (the creditor). This would not be comparable to the situation before 2012, since France is a bigger country than Greece or Portugal and therefore the question of sustainability would be posed in very different terms. In other words, the net accumulated position on the French side would in absolute terms be more than 20 GDP points, but much lower than the net negative positions reached by Greece and Portugal. On the other hand, the resorption of this imbalance by price adjustments would be of an order of magnitude such that, given the relative price differentials that are likely to remain between France and Germany, it would take several decades to achieve it. Other factors could however intervene and accelerate this process, but it is striking that, all things considered, since 2012, while France has undertaken an expensive reduction of wage costs by the CICE tax credit and the Responsibility Pact, on the one hand, and Germany introduced a minimum wage and has experienced a

more unrestrained wage dynamic in a labor market close to full employment on the other hand, the relative imbalance between France and Germany, expressed in the adjustment of relative prices, has not changed.

Three consequences can be drawn from this analysis:

1. The imbalance that has set in today will be resolved only with difficulty, and any measure to speed it up is welcome. Continuing moderate growth in nominal wages in France, stimulating the growth of nominal wages in Germany, encouraging the distribution of Germany's added value in favor of wages, persisting in the appreciation of the minimum wage – these are all channels that we have mentioned in various iAGS reports. A "reverse" social VAT, or at least a reduction of VAT in Germany, would also be a way to reduce Germany's national savings and, by accompanying this with an increase in German social security contributions, to increase the competitiveness of the other euro area countries.

2. The pre-crisis internal imbalance has become an external imbalance in the euro area, which is creating pressure for the euro's appreciation. The order of magnitude is consequent: it will weigh on the competitiveness of the different euro area countries and will lead to the difficulty experienced before 2012 re-appearing in a new form.

3. The appreciation of the euro caused by the current account surpluses of some euro area countries is generating an externality for these countries. Due to the different responses of their current accounts to a change in relative prices, Italy and Spain (see Villemot et al., 2018) will see their current account balance react the most, while that of Germany will react the least. In other words, the appreciation of the euro, relatively, will degrade the current accounts of Italy and Spain more than it will that of Germany, and this will re-establish a state of internal imbalance almost comparable to what existed before 2012. This externality and the lower sensitivity of Germany's current account balance to relative prices argue for reducing imbalances by boosting Germany's internal demand, i.e. reducing its national savings. The tools for this could include a boost to public investment, a cut in direct personal income taxes, or a faster rise in the minimum wage relative to productivity and inflation.

References

Bas, M., Mayer, T. and Thoenig, M., 2017, "From micro to macro: Demand, supply, and heterogeneity in the trade elasticity", *Journal of International Economics*, 108, 1-19.

Cline, W. R., 2008: "Estimating Consistent Fundamental Equilibrium Exchange Rates", *Peterson Institute Working Paper*, no. WP08-6, Peterson Institute for International Economics.

Couharde, C. et al., 2018: "EQCHANGE: A world database on actual and equilibrium effective exchange rates", International Economics.

http:/dx.doi.org/10.1016/j.inteco.2018.03.004

IMF 2018: “External Sector Report: Tackling Global Imbalances amid Rising Trade Tensions”, Washington, DC, July.

Fontagné, L., Martin, P. and Orefice, G., 2017, “The International Elasticity Puzzle Is Worse Than You Think”, *CEPII Working Paper*, no. 2017-03 CEPII.

Pupetto, L. and Sode, A., 2012: *Ajustement extérieur et effets de valorisation*, Documents de Travail de la DG Trésor, French Ministry of the Economy, no. 2012/03.

Saadaoui, J., 2018: “Internal Devaluations and Equilibrium Exchange Rates: New evidences and perspectives for the EMU”, *Applied Economics*, 50:59, 6364-6381, DOI: 10.1080/00036846.2018.1486019.

Villemot S., B. Ducoudré and X. Timbeau (2018): “Taux de change d’équilibre et ampleur des désajustements internes à la zone euro”, *Revue de l’OFCE*, 155, 303-334.

Williamson, J., 1994, *Estimating Equilibrium Exchange Rates*, Peterson Institute Press.

Appendix

As the net external position is defined at the end of the period, and Y being the nominal GDP, the current account is equal to the variation in the net external position:

$$NIIP_t.Y_t - NIIP_{t-1}.Y_{t-1} = CA_t.Y_t \quad (A1)$$

Where:

$$NIIP_t - \frac{NIIP_{t-1}}{(1+g+\pi)} = CA_t \quad (A2)$$

Starting from equation (1), this becomes:

$$NIIP_t - \frac{NIIP_{t-1}}{(1+g+\pi)} = \overline{TB} + (r+\pi) + NIIP_{i,t-1} + R_t \quad (A3)$$

With $\overline{TB}$ the target of the trade balance such that, if the country adjusts to this new value from today, the net external position would reach the level $\overline{NIIP}$ in h years.

Re-arranging (A3) gives:

$$NIIP_t = \frac{1+r+\pi}{(1+g+\pi)} NIIP_{t-1} + \overline{TB} + R_t \quad (A4)$$

Where:

$$\overline{TB} = \frac{\overline{NIIP} - NIIP_t \left(\frac{1+r+\pi}{1+g_i+\pi}\right)^h}{\sum_{j=0}^{h-1} \left(\frac{1+r+\pi}{1+g_i+\pi}\right)^j} - R \quad (A5)$$

With R assumed constant over time.

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The Paris-based Observatoire français des conjonctures économiques (OFCE), or French Economic Observatory is an independent and publicly-funded centre whose activities focus on economic research, forecasting and the evaluation of public policy.

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