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Is There any Rebalancing in the Euro Area?

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Highlights

- We estimate Fundamental equilibrium exchange rates for euro area countries since 2000.
- Estimated misalignments largely depend on output gap estimation.
- Greece appears massively overvalued without any significant progress since the crisis.
- Spain and Portugal have substantially reduced their misalignment.
- The Spanish and Portuguese rebalancing has found its counterpart in France and Italy, not in Germany.

RESEARCH AND EXPERTISE
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Abstract

We assess the evolution of real exchange rate misalignments within the euro area from a Fundamental Equilibrium Exchange Rate (FEER) approach. We test the robustness of the results by comparing three different estimations of the output gap. Whatever the output gap assumption, Southern countries were massively overvalued before the euro area crisis. However, the magnitude of the adjustment since is sensitive to the output gap. In particular, Greece has not registered any improvement considering an output gap that captures the financial cycle (10-15 years) instead of the business cycle (5 years). Spain and Portugal have significantly reduced their misalignment but against France and Italy instead of Germany. As a consequence, imbalances in the euro area have not reduced.

Keywords

Exchange Rates; Current Account Adjustment; Euro Area.

JEL

F31; F32; F36.

Is There any Rebalancing in the Euro Area?[1]

Benjamin Carton* and Karine Hervé†

1. Introduction

The crisis that appeared in the so-called "Southern" countries at the end of 2009 in the euro area has three interconnected dimensions: a large deleveraging that follows an unsustainable debt issued by the private or the public sector, the lack of competitiveness and growing doubts on the solvency of the banking or the public sector. The solvency problem is exacerbated by two factors. First, debts could de facto be considered as denominated in foreign currencies in a currency union. Indeed, there is no automatic bail-out by the ECB nor possible monetization. But there is also no way to stabilize the debt-to-GDP ratio of each country in a currency union as it would require a country-specific target for the evolution of nominal GDP. A country that has experienced a buyant price evolution is likely overvalued and may experience a relative price adjustment in the future. The deflator of GDP may increase less than in other countries and so its nominal GDP. Second, a significant part of the debt is held by non-residents who are more likely to trigger a sudden stop in external financing but the country doesn't have the ability to devalue (Gros, 2011).

A vicious circle appears between the solvency problem of the government and the balance sheet of the financial sector, mainly banks in the euro area. Any deterioration of the solvency of the government (perceived or real) triggers a loss in the market value of sovereign bonds. As a consequence, banks have to adjust their balance sheet (deleveraging). Either banks decrease credit to the private sector which is detrimental to growth and taxes, or they fire-sell assets including sovereign bonds. In the worse case, banks have to be bailed out with public funds. Above this stressed situation, these economies also face a huge reduction of private capital inflows (a sudden stop). The balance of payments equilibrium requires net "public" inflows in the form of large ECB liquidity provisions which are accounted for in TARGET2.

Therefore, the challenge for countries in crisis is to simultaneously rebalance their fiscal and external balances, without using the weapon of nominal devaluation. Indeed, some countries have experienced a large deterioration of their competitiveness during the 2000's. The origin of the deterioration varies across countries: a house bubble in Spain, a sharp drift in wages in

[1]The views expressed in this paper are those of the authors and do not necessarily reflect those of the Institutions to which they belong. The authors are very grateful to A. Bénassy-Quéré and V. Coudert for their comments.
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Greece fuelled by wage policy in the public sector and the lack of productivity gains in Portugal. In Greece, the remedy advocated by the "Troika" rests on three pillars: fiscal adjustment, structural reforms and wage reductions. The three pillars are not independent: by compressing demand, fiscal adjustment reduces imports (the trade balance is recovering) and prices (the real exchange rate depreciates). But the trade balance improvement may not be sustainable if it only rests on a fall in demand. Conversely, an upturn in the trade balance carried by a sharp depreciation of the real exchange rate, as observed in Ireland, can ease the burden of fiscal adjustment by reducing the contraction in demand. Therefore, it is essential to have an idea of the magnitude of the required adjustment of real exchange rates.

The aim of this paper is to estimate the intra euro area misalignments from a Fundamental Equilibrium Exchange Rate (FEER) approach in the vein of Williamson (1985) and to assess the adjustment effort that took place in each country of the euro area. A share of the current account adjustment in the southern countries is the result of large domestic demand contraction instead of competitiveness improvement. A sustainable rebalancing is a dual process of relative competitiveness (either price or productivity) and relative demand. The actual reduction of the current account deficit is therefore a poor measure of achieved competitiveness effort: imbalances may reappear as these countries will close their output gap. To assess if the recent current account reversals are sustainable, the estimation of the output gap is crucial. For instance, Greece may have seen no improvement of its competitiveness at all, five years after the beginning of the crisis.

The rest of the paper is organized as follows. Section 2 is devoted to the euro area crisis and the necessary relative price adjustment. Section 3 introduces the fundamental equilibrium exchange rate as a measure of the size of the required adjustments and proposes three different output gap measures. Section 4 presents the results of our estimations and a comparison with some other works. Section 5 concludes.

2. The crisis in the euro area

2.1. A twin deficit problem

The sovereign debt crisis in the euro area (substantial increase in market lending rates) occurs in countries that are characterized by high public deficits and debt levels, a lack of prospects for growth but also large current account deficits (see figure 1).

In summer 2011, financial markets have begun questioning the ability of some member states to repay their debts in a deteriorated macroeconomic environment. This apprehension of sovereign risk in some euro area countries led to a substantial increase in lending rates for countries deemed insolvent by the markets. As an illustration, the Greek bond yields began to loosen in September 2011 and 10-year rate, for example, rose by more than 2,000 basis points in six months.

These countries, which were no longer able to finance themselves on capital markets at reason-

able rates, then accepted financial assistance from the IMF and European authorities in exchange for a number of counterparts.They had to include a commitment to drastically reduce the government deficit and to implement structural reforms to reduce the structural deficit (retirement reforms, revenue mobilization) as well as to increase their potential growth (liberalizing labor market, rebuilding the industrial sector, increasing innovation efforts, improving the qualification of the labor force, etc.).

These structural reforms can only be beneficial in the medium-long term. In the short-term, current account improvement can be achieved only by reducing domestic demand and imports as well as lower prices, notably through wage compression. In a context of weak growth at the euro area level, the room for maneuver on domestic demand is narrow.

These countries face a dilemma: either they rapidly reduce their deficit at the risk of a sharp drop in growth or they reduce it more gradually but may not sufficiently control their debt dynamics and may loose the financial support of international institutions. Note that in this second case, if the European authorities do not implement the appropriate economic policies (continued loans to stressed countries in the short term and fiscal federalism in the longer term), the risk of the euro area break up cannot be excluded.

2.2. The relative price adjustments

The dilemma faced by some countries is exacerbated because nominal devaluation, that could restore competitiveness without heavily increasing the burden of external debt, is impossible. In order to reduce both the public and the current account deficits and to avoid a growth collapse, an adjustment of relative prices in the euro area seems therefore necessary.

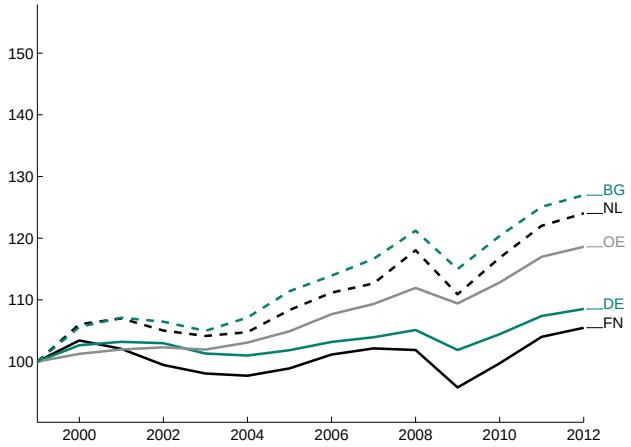
Until now, restrictive policies were only accompanied by a large drop in activity and the emergence of mass unemployment. The changes in real effective exchange rate calculated from the weights in bilateral and third markets and deflated by the price of exports (see Figures 1c and 1d) show that most countries of the euro area, with the exception of Germany, Finland and to a lesser extent France and Ireland, have experienced a deterioration of their competitiveness since the creation of the euro. While this latter was relatively contained for all Northern countries, for some countries of Southern Europe including Spain and Greece, it was substantial. This deterioration in competitiveness has not allowed countries that recorded large current account deficits early in the period to improve their situation. In Greece particularly it has been even highly unfavorable. Thus, the real effective exchange rate of Greece appreciated by almost 20% in the first part of the 2000's in line with a worsening of the underlying current account balance by nearly 4 percentage points of GDP.

After these huge losses of competitiveness in Southern countries, the idea is to adjust prices and wages and regain market share for exports. In summary, in the short term, the countries of the euro area have circumscribed room for maneuver and will have no choice but to make price adjustments if they do not want to leave the euro zone. Even if unconventional monetary

Figure 1 – Export of goods and services deflator

Level, 1999=100

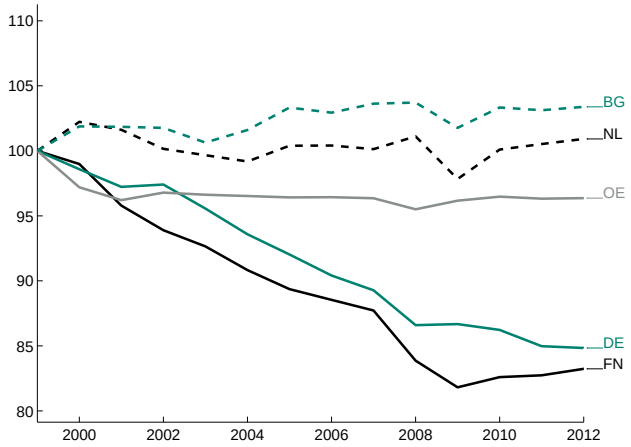
(a) Northern countries



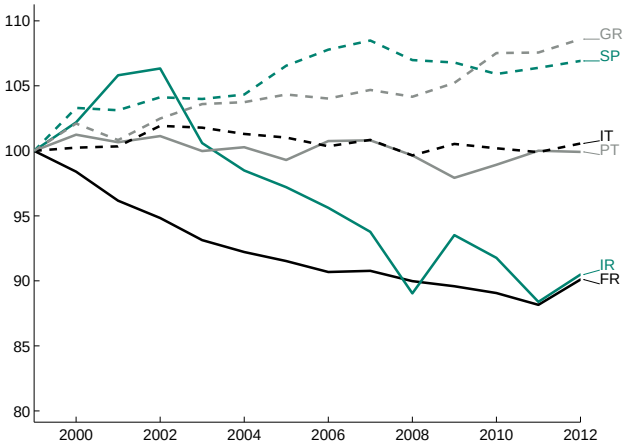
(b) Southern countries

Relative to (the rest of) 36 industrial countries, 1999=100

(c) Northern countries



(d) Southern countries



Source : AMECO.

measures, as the long-term refinancing operation (LTRO) or the outstanding monetary program (OMT) announcement, were successful and helped to maintain financial stability, these measures are only short term solutions and do not provide a coherent long term solution. Similarly, debt restructuring, which occurred for Greece the 9th of March 2012 certainly reduced the debt stock, but in the absence of price adjustment and efficient growth policy, this operation has not reversed the spiral of debt yet, and an official sector involvement is likely the next step.

3. The fundamental equilibrium exchange rate as a measure of the scale of required adjustments

There is an extensive literature concerning the estimation of equilibrium exchange rates. Two main approaches stand out. The first consists in estimating a long run relationship between real effective exchange rate of a country and its determinants called "fundamentals" (productivity, net foreign assets in particular), and then measuring the deviation between the current real exchange rate and its long-term value as predicted by the model. This first method has the advantage of being based on a robust econometric relationship. However, it is conservative in the sense that the behavior observed in the past are expected to remain valid. For example, the relationship is estimated over a period during which the country risk has been underestimated in Europe, distorting the relationship between net foreign assets and real exchange rate.

The second approach, proposed by Williamson (1985), relies on foreign trade equations. The idea is to calculate the real effective exchange rate, namely the Fundamental equilibrium exchange rate (FEER), that would reduce the underlying current account at a "target" judged sustainable. This assumes that the output gap (particularly large in the euro area today) is cleared and we have therefore simultaneously the internal (output at its potential level) and external balances (current account at its "target" level). This second approach is based on demand and price elasticities of international trade.

We belong here to the later that we apply for 11 member countries of the euro area (France, Germany, Italy, Spain, Netherlands, Finland, Portugal, Greece, Belgium, Austria and Ireland) and for the rest of the world. The method is presented and detailed in Carton and Hervé (2012).

3.1. Definition and advantages of the fundamental equilibrium exchange rate

The external equilibrium is defined as a level of the current account that closes the gap between domestic saving and investment when the economy is on a balanced growth path. This desired level of current account is also called "target". In the short term, current account equilibrium can be achieved by a change in domestic demand. But in the medium term, for the adjustment being consistent with a return of activity to its potential, the real effective exchange rate must

vary. The two conditions are given by

$$Y = \bar{Y} \qquad \text{(Internal equilibrium)}$$
$$CA(Y, FEER) = CA^{\text{target}} \qquad \text{(External equilibrium)}$$

This definition was originally used in the case of small open economies. When the idea of creating a European monetary union materialized, there were a plethora of misalignments estimations between European countries in order to assess adequate euro-adoption parities (Alberola et al., 2000; Barrell and Wren-Lewis, 1989; Borowski and Couharde, 1999; Wren-Lewis and Driver, 1998; Williamson, 1991). With the creation of the euro, this literature has dried. A few years later, the FEER have been used to assess exchange rate realignments consistent with resorption of global imbalances, particularly between industrialized and emerging countries. Today, with the euro area sovereign debt crisis, the debate on exchange rate misalignments in relation to the current account imbalances among member countries has reappeared.

This method has two merits in particular as regards the problem of global imbalances: it is, first, the only method that allows world trade consistency and secondly, it allows a translation in exchange rate terms of what should be a form of "global structural current account equilibrium", if the evolution of current accounts is compliant with the economic theory (i.e a deficit and not a current account surplus for all countries in catching up) and assuming full liberalization of capital flows.

3.2. The methodology

Initially, the FEER has been applied to a single country, its misalignment being calculated relatively to the rest of the world. The extension to a global model raises three main difficulties: (i) the current account target of the different countries are not necessarily consistent at the world level, (ii) the trade equations do not automatically lead to a balanced world trade, (iii) the N-1 independent bilateral exchange rates cannot provide saving investment balance of N countries (overdetermination).

In the case of a closed economy, the saving investment balance in the medium term is determined by an adjustment of interest rates. Transposed to the global economy, this solves two of the three difficulties: the current account targets are dependent on the world interest rate; they are compatible with each other since the saving investment balance in the world is ensured; the introduction in the model of the world interest rate as additional endogenous variable eliminates the problem of overdetermination. The methods used in practice differ from this principle.

The method used in this article addresses the three difficulties mentioned above and proposes innovative solutions (Carton and Hervé, 2012). The proposed solution to treated global consistency and overdetermination issues is an alternative to the work of Faruqee and Isard (1998) and involves minimizing the distance between the target current account ex ante and the ex post

Table 1 – Structural data for 2012

	X/Y	M/Y	ε_x	ε_m	ca^*	RIA	RPA
France	0.30	0.32	0.90	1.01	-0.3	2.4	3.7
Belgium	0.82	0.83	1.29	0.65	+2.3	1.2	1.3
Germany	0.52	0.46	0.69	0.85	+3.0	1.9	3.5
Italy	0.30	0.29	0.92	1.03	-1.8	2.6	3.5
Netherlands	0.82	0.73	0.92	0.67	+3.0	1.4	1.9
Ireland	1.07	0.83	0.97	0.60	-1.4	1.3	1.4
Finland	0.40	0.40	1.01	0.92	+3.0	2.0	2.7
Austria	0.56	0.53	1.00	0.80	+2.1	1.6	2.2
Spain	0.32	0.31	0.92	1.01	-3.0	2.5	3.4
Greece	0.25	0.28	1.02	1.06	-3.0	2.7	3.7
Portugal	0.39	0.39	0.97	0.93	-3.0	2.0	2.9

X/Y et M/Y denote export and import openness ratios,ε_x and ε_m denote export and import price elasticities, ca^* the current account target, RIA denotes the output gap variation that insures a 1% of GDP current account improvement assuming no relative price adjustment, and RPA denotes the required price adjustment.
Source : author's calculations

current account consistent with the estimated equilibrium exchange rate. In addition, global consistency of the trade model is ensured by imposing a constraint on the price elasticities of export equations.

The current account targets are selected according to an ad hoc criteria, as suggested by Cline and Williamson (2011). Countries cannot register surpluses or current account deficits above 3%. Under this rule, Spain, Portugal and Greece, must reach a target set at -3%, Germany, the Netherlands and Finland a target of 3% (see table 1). The other countries (i.e France, Belgium, Italy, Ireland and Austria) are assumed in our estimates to reach a target which is the average of their current account levels registered the last 10 years. As a result, the target is very close to zero for the euro area as a whole. The current account adjustments are therefore within the euro area countries and not vis-à-vis the rest of the world, even if this requires changes in market shares outside the euro area.

3.3. Trade parameters and other structural data

The calculations of the fundamental equilibrium exchange rate are very sensitive to trade price elasticities. As shown by various studies (Bayoumi, 1999; Hervé, 2001; Murata et al., 2000; Hooper et al., 1998; Marquez, 1990), trade elasticities vary widely according to the econometric method used and the scope of trade (manufactured goods, goods, goods and services, etc.).

In this paper, some trade elasticities are constrained to ensure the locking up of the model. The foreign demand elasticity of exports is fixed to unity because the foreign demand is a balanced sum of other countries' imports. The elasticity of imports to domestic demand and exports is

constrained to unity in the medium run, but is higher in the short run. The difference between the two concepts is the following: the registered current account is affected by the output gap in the short run i.e. by variations of exports and imports related to the business cycle. At this horizon, imports volume of each euro-area country varies with exports volume and domestic demand with a high elasticity, estimated at 1.6 (see Appendix A). The current account of the different countries is affected by the Euro area rebalancing (i.e. changes in relative domestic demand and relative prices in the medium run that ensure the external equilibrium) for which we assume an unit elasticity of imports to demand. The import price elasticities are not constrained and we use the elasticities of the IMF model, Multimod. On the opposite, price elasticities of exports are constrained by the condition of locking up in volume. These elasticities are not independent of each other because they measure changes in market shares of each country in world trade and the sum of all market shares must always sum to unity by definition.

Table 1 provides a summary of the various elasticities chosen for our estimates. Price elasticities of exports are generally close to unity, except for Germany (0.7). These elasticities are in the upper range of those used in most macro-econometric models. Price elasticities of imports vary between 0.7 and 1.4.

The country's openness also plays a key role in estimating the fundamental equilibrium exchange rate. In general, small countries are more open than the large ones; this is reflected in the euro area as Belgium, the Netherlands and Ireland have openness ratios above 60%. We also notice that Northern European countries (Germany, Finland and Austria) are more open than Southern countries (France, Italy, Spain, Greece and Portugal) .

The required price adjustment (RPA) is the real effective exchange rate depreciation required to improve the current account of a country by one percentage point of GDP, assuming domestic and foreign demands adjust to preserve internal equilibrium. Countries with a weak RPA have a strong sensitivity of their current account to exchange rate variations. Thus for these countries, a small correction of the exchange rate is sufficient to bring the current account back to its target. According to the retained trade elasticities, improving the current account by 1 percentage point of GDP would require a depreciation of the real effective exchange rate between 1.3% (Belgium) and 3.7% (France and Greece).

For some countries, the gap between the current account target and the underlying current account, that is to say the current account adjusted by past exchange rate variations and relative output gap, is considerable (see Table 3). As an illustration, in 2007-2008, Greece's current account recorded a deficit of nearly 15% of GDP. Depending on the output gap estimation, the underlying current account was comprise between -8.5% and -12.5% (see Figure B.2 in Appendix B). With a target set at -3%, the remaining gap was roughly 5.5 and 9.5 percentage points of GDP which corresponds to a depreciation comprise between 20% and 35% (5.5 or 9.5 $\times$ 3.7).

3.4. Estimation of the output gap

The FEER methodology explicitly assumes that each economy should close its output gap. The estimation of the latter has a direct impact on the equilibrium exchange rate: a country with a highly negative output gap will have a depreciated equilibrium exchange rate. Current misalignments are therefore function of current output gaps.

Without any change in relative prices and external demand, a reduction of internal demand in one country improves its current account and widens its output gap. We evaluate the required internal adjustment (RIA) as the ratio of the resulting variation of the output gap to the resulting variation of the current account, i.e. the variation of the output gap resulting from a variation of the internal demand that improves the current account by 1% of GDP. The RIA measures the sensibility of exchange rate misalignment to the estimated output gap. Table 1 gives the values of the RIA and the RPA. In the case of the Greek economy, an underestimation of the output gap amounting 1% of GDP translates into a 0.4% (= 1 / 2.7%) of GDP underlying current account deficit that requires a 1.4% (= 3.7 / 2.7%) additional real equilibrium effective exchange rate depreciation.

The RPA and RIA give the sensitiveness of the FEER to potential GDP estimations. In the following, potential GDP estimations rely on an HP filter with the annual dataset of the WEO data base (historical from 1990 to 2012 and forecast from 2013 to 2018). However, we use three different measures

OG1 an HP filter with a smoothing parameter of 100 on annual data

OG2 an HP filter with a smoothing parameter of 2000 on annual data

OG3 OG2 plus a constant such that OG3 is equal to OG1 in 2005.

OG1 is the traditional business-cycle view of the output gap: a typical cycle lasts 5 years. Using this method, the potential growth is close to zero in Italy and Portugal and negative (-0.8%) in Greece between 2007 and 2018 (see Table 2). This measure of potential growth implicitly assumes large variations of the equilibrium employment rate. We therefore use OG2 with a higher smoothing parameter in order to catch not only the business cycle, but also part of the financial cycle (Borio et al., 2013). This method magnifies the boom and bust in most of countries and also stretches the duration of cycles (about 10-15 years). With this measure, the potential growth in Greece amounts 0.5% during the 2007-2018 period instead of -0.8%. Finally OG3 is more in line with a production function approach. By construction, OG2 is null on average over the entire period such that some countries registered positive output gap by more than 10%. This feature seams unreasonable. Furthermore, the financial cycle implies mis-allocation of factors that may imply a loss of output on average. In order to correct for these drawbacks, OG3 is defined as OG2 plus a constant chosen such that OG3 and OG1 are equal in 2005 for each country (2005 is the year during which OG2 has its highest value for most of countries). The different measures of the output gap are given in Figure B.1 in Appendix B.

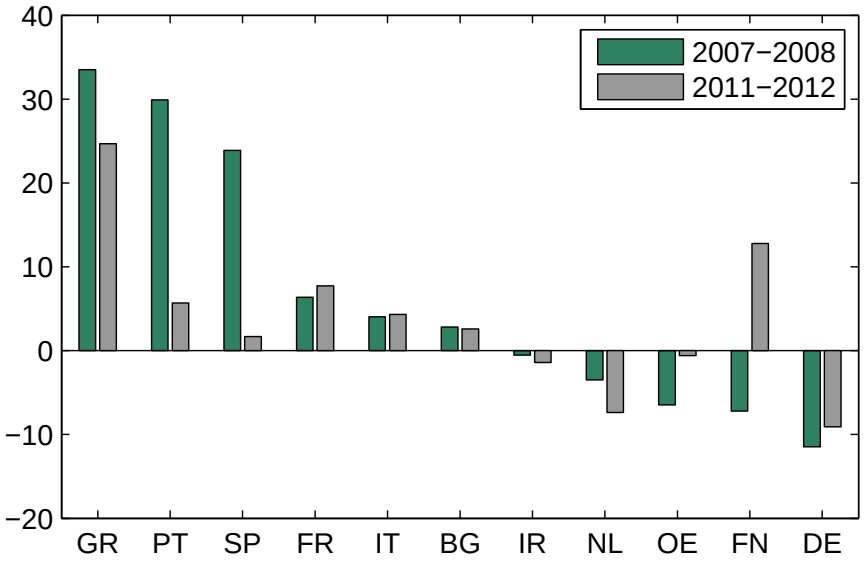
Table 2 – Potential growth depending on the ouput gap estimation

		FR	BG	DE	IT	NL	IR	FN	OE	SP	GR	PT
1991-2006	OG1	1.9	2.0	1.4	1.3	2.6	6.4	2.8	2.3	3.0	2.8	2.2
	OG2	1.6	1.8	1.4	1.0	2.2	5.3	2.5	2.1	2.5	2.0	1.7
2007-2018	OG1	0.9	1.0	1.2	-0.1	0.9	1.3	1.1	1.3	0.5	-0.8	-0.1
	OG2	1.2	1.4	1.3	0.3	1.4	2.9	1.8	1.7	1.4	0.5	0.6

Table 3 – Underlying current account minus the target (percentage of GDP)

	2003-2004			2007-2008			2011-2012		
	OG1	OG2	OG3	OG1	OG2	OG3	OG1	OG2	OG3
FR	1.2	1.6	1.3	-1.4	-1.1	-1.6	-2.0	-2.1	-2.7
BG	0.9	1.3	0.9	-3.2	-2.7	-3.3	-2.7	-2.5	-3.2
DE	0.4	0.1	0.5	4.2	3.6	4.1	4.3	4.2	4.6
IT	0.4	1.2	0.5	-0.9	-0.5	-1.3	-0.9	-1.0	-1.9
NL	3.2	4.5	3.3	2.0	2.9	1.6	5.8	5.7	4.4
IR	4.4	11.0	4.7	-0.7	4.0	-2.9	2.9	2.3	-4.9
FN	3.2	4.5	3.1	2.5	3.9	2.2	-5.1	-4.9	-6.8
OE	-0.5	0.1	-0.5	2.2	2.7	2.0	-0.3	-0.2	-1.0
SP	-1.5	-0.1	-1.7	-6.0	-4.2	-6.1	0.1	0.5	-1.2
GR	-3.2	-0.8	-3.6	-9.0	-5.6	-9.3	-5.9	-5.8	-8.8
PT	-4.6	-2.9	-4.4	-8.7	-7.7	-9.4	-1.8	-2.2	-3.6

Figure 2 – Real Effective misalignments for OG1



Source : author's calculations

4. Results

4.1. The required adjustments of relative prices

The evolution of exchange rate misalignments between the 2007-2008 period (just before the peak of the financial crisis and the emergence of the euro area sovereign debt crisis) and the current days (2011-2012) are presented in Figure 2 where the underlying current account is estimated using OG1 (see also Table B.1 in Appendix for results with the three OG estimations).

Unsurprisingly, Greece was the most overvalued in the 2007-2008 period: it was close to 35%. On the last period, it has fallen only slightly, remaining around 25%. Indeed, Greek current account deficit has significantly decreased between the two periods (by around 9% of GDP, see Figure B.2 in Appendix). However, this current account improvement results more from a sharp contraction of domestic demand than a restored competitiveness: the underlying current account has improved much less (by around 3% of GDP).

Figure 2 also shows a marked overvaluation in Spain and Portugal in 2007-2008, but in these cases a substantial correction occurred since: the underlying current account has improved by 6% and 7% respectively. Accordingly, the estimated real exchange rate misalignment is now less than 10% for both countries.

Italy and France had experienced less buoyant public (as in Greece) or private debt increase (eg Spain) before the crisis. Nevertheless, both countries have registered a continuous deterioration in their export performance. Today, the Italian and French real effective exchange rate

overvaluation is lower than 10%. In both countries, the deterioration in current account seems to have its origin in the lack of adaptation of the production system to globalization. In the case of France, the deterioration of the underlying current account since the beginning of the 2000's reached 5% of GDP and has been larger than the deterioration of the actual one. The increasing gap between German and French trade performance is clear using the estimation of value added flows underlying trade flows: whereas the share of imported value added in domestic final demand is similar in the two countries and stable during the last decade (around 20% in both countries), the share of exported value added had diverging path: starting from 20% in 2000 in both countries, its raises to 25% in Germany and drops to 16% in France in 2009 (OECD–WTO Trade in Value-Added database).

Among the northern countries of the euro area, the undervaluation reached more 10% in 2007-2008 only in Germany. However, no sign of rebalancing appeared since in that country. Netherlands, Austria and Finland had experienced different evolutions: undervaluation in Netherlands has lightly increased, Austria is back to equilibrium whereas Finland is now overvalued by more than 10%. The latter is now registering current deficits: the 2009 global trade crisis has damaged its market shares outside the euro area.

4.2. How sensitive are misalignments to output gap estimations?

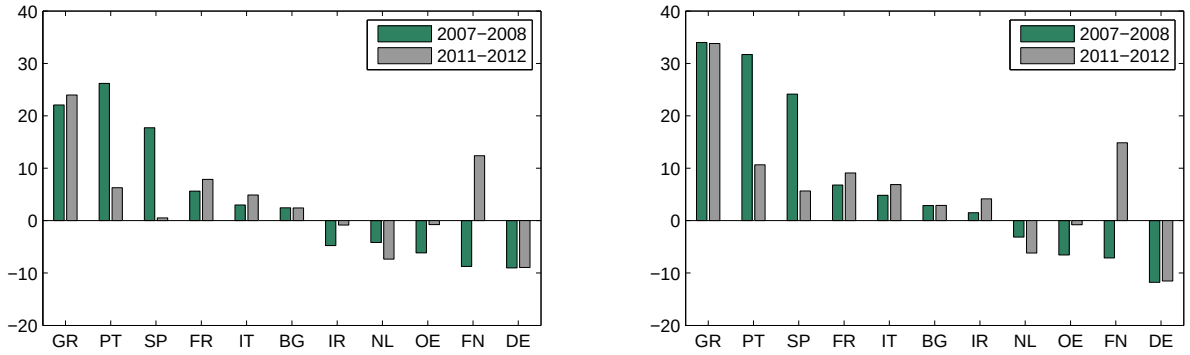
The smoothing parameter used in the HP filter for OG1 is typical of business cycles. As mentioned in the previous section, it implies a negative potential growth rate in Italy, Portugal and Greece. We challenge this unrealistic result by increasing the smoothing parameter up to 2000. The output gap delivered by this new method exhibits ups and downs of much larger magnitude. In the case of Greece, the output gap fell by 25% between 2007 and 2012 instead of 15% for OG1. The two methods also deliver large differences for Portugal, Ireland and Spain.

In these countries, a larger output gap drop mecanically results in a smaller improvement of the underlying current account and in a lower reduction of the misalignment between 2007-2008 and 2011-2012. Figure 3 shows the exchange rate misalignment with the OG2 output gap estimations. Overall, OG2 results into smaller misalignments both in 2007-2008 and in 2011-2012 compare to OG1.

Given the new value of the output gap, the improvement of the Greek current account is entirely due to the collapse of the domestic demand. The competitiveness of the economy did not improve at all. This result does not support the effectiveness of the Troika comprehensive approach, whose objectives explicitly included structural reforms and wage cuts in order to boost competitiveness, or its implementation by Greek authorities (Gordon et al., 2013).

Spain an Portugal had improved there underlying current account, but by a lesser extent: around 3.5% and 5.5% respectively (instead of 6% and 7% with OG1). However, the two countries are still slightly overvalued (less than 10%) because they were estimated less overvalued in 2007-2008 (18% for Spain and 26% for Portugal).

Figure 3 – Real Effective misalignments for OG2 (left) and OG3 (right)



Source : author's calculations

Comparing to OG1 estimation, France and Italy experience a larger deterioration of their underlying current account and thus a more pronounced increase of their overvaluation. However the diagnostic for these two countries remains. In Germany, the underlying current account surplus is increasing between 2007-2008 and 2011-2012 showing no sign of rebalancing there.

The rebalancing pictures in the euro area drawn by the two estimations of the output gap differ. Using OG1, rebalancing is at work in every country but at different pace: rapidly in Portugal and Spain, slowly in Greece and Germany. In the middle of the process, France and Italy do not rebalance significantly. Using OG2, rebalancing is at work but only between Spain and Portugal in one hand (improving their competitiveness) and France and Italy in the other hand (with a deterioration of their competitiveness). Neither Greece (the most overvalued country) nor Germany (the most undervalued country) are engaged in rebalancing.

OG3 estimation supports the most pessimistic view on current imbalances as southern countries exhibit huge negative output gaps (-20% in Greece, -18% in Ireland, -10% in Spain and Portugal, -7% in Italy and -5% in France, see Figure B.1). Greece is still overvalued by more than 30%, Portugal, Spain, France and Italy between 5 and 10% (see Figure 3, right panel).

4.3. Measuring overall rebalancing within euro area countries

To have a synthetic view of the effort that took place within the euro area to reduce exchange rate misalignments, we construct an indicator of total misalignment as follows:

$$\mathcal{I} = \sum_{i \in EA} \alpha_i \left| M_i - \bar{M} \right|$$

where α_i is the share of the country i in the euro area GDP, M_i the real effective misalignment of country i and $\bar{M}$ the average misalignment of euro area countries (i.e. misalignment vis-a-vis the rest of the world).

Table 4 – Total intra euro area misalignments

	2003-2004	2007-2008	2011-2012
OG1	6.5	17	14.5
OG2	7.5	13	13.5
OG3	7	17	17.5

Intra euro area misalignments has developped during the first decade of the monetary union so total intra euro area misalignments were quite marked, from 7% to around 15% just before the crisis (see Table 4). While with OG1 they have narrowed a little, with more consistent output gap assumptions the pictures drawn by our estimations is severely pessimistic: total intra euro area misalignments have not reduced since the crisis, they would even have risen a bit. More preciselly, overvaluation have shared out between already overvalued countries but no rebalancing between overvalued and undervalued countries happened.

4.4. Comparison with other estimations

There are few estimates of exchange rate misalignments within the euro area in particular from the FEER approach. For comparison, we present Cline and Williamson's estimates (Cline and Williamson, 2011). Unfortunately they give results for only six countries of the euro area in their article (Germany, Greece, Portugal, Italy, Spain and Ireland).

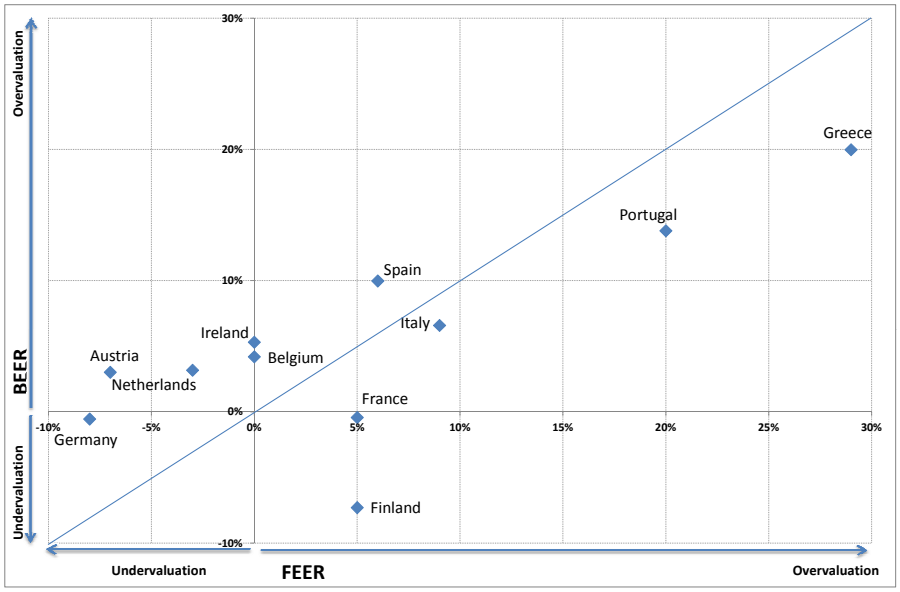
Contrary to our methodology, the two authors assume that the underlying current account is equal to the actual current account. This assumption is not neutral. For instance, with identical targets, the required current account adjustment reaches 9 percentage points of GDP for Greece in this paper, while for Cline and Williamson the adjustment is only 5.4. Furthermore, as explained in Carton and Hervé (2012), the methodology differs in several ways, including solving the problem of overdetermination of the model, and can therefore cause gaps between results.

Despite many differences, the results are relatively close and point to the same direction (see Table 5). Portugal and notably Greece appear to be strongly overvalued with respectively 10-20% and 25-35%. Italy and Spain would be very little overvalued: lower than 10%). Conversely, Germany would be slightly undervalued (5-10%). Ireland would be closed to equilibrium.

In order to test the robustness of equilibrium exchange rate calculations, it is relevant to compare the misalignments estimated using different methods. We then compare our results for 2010 with those of Coudert et al. (2012), calculated from a long-term relationship between real effective exchange rate and two of its fundamental determinants: the net external position and relative productivity (measured as the ratio between GDP per capita in purchasing power parity and the average per capita GDP of trading partners).

The results are shown in Figure 4. Overall, both methods yielded the same qualitative diagnoses:

Figure 4 – Comparison between BEER and FEER approaches



Source : author's calculations and Coudert et al.(2012)

overvaluation in Greece, Portugal, Spain and, to a lesser extent in Italy, and exchange rates are close to balance for Austria, Belgium, Ireland, Finland, France and Netherlands; undervaluation for Germany. However, the degree of overvaluation is much lower at Coudert et al. (2012), which is typical given their method.

Table 5 – Comparison of FEER's estimation for 2011

	This paper (OG1)		Cline and Williamson	
	$\overline{\text{CA}} - \text{CA}^*$	$\text{FEER} - \text{FEER}^*$	$\overline{\text{CA}} - \text{CA}^*$	$\text{FEER} - \text{FEER}^*$
Greece	9.0	35.4	5.4	27.0
Ireland	-2.3	-2.1	0.0	0.0
Italy	1.9	7.2	0.5	2.0
Portugal	4.4	12.9	5.6	20.7
Spain	1.1	5.5	0.8	3.5
Germany	-3.7	-8.9	-2.0	-5.4

Source : author's calculations, Cline and Williamson (2011)

5. Conclusion

Euro area countries that face a sovereign debt crisis are also characterized by large current account deficits. When they are unable to finance their external deficit, they are in front of a balance of payments crisis. Two solutions are possible: a sharp contraction in domestic demand that would reduce imports and / or an improvement in price competitiveness in order to gain market share for exports. Weakening domestic demand has the advantage of rapidly improving the current account but weighs on the country's activity. Also, in a highly deteriorated economic environment, as for most of the euro area countries, such a process may delay the reduction of the fiscal deficit. Restoring price competitiveness appears to be a more relevant plan. The proposed structural reforms to improve competitiveness through productivity gains, reduce current account deficits and boost economic growth may not prove beneficial before many years.

In a monetary union, restoring competitiveness in a short term, can't be done by a nominal exchange rate devaluation. The adjustment must take place through inflation differentials. In this paper, we proposed estimates of real effective exchange rate to measure the magnitude of required price adjustments.

We have tested the robustness of the calculations using three different output gap estimations. It results that, whatever the output gap assumption, Southern countries appeared massively overvalued before the euro area crisis (between 20 and 35%). However, the magnitude of the adjustment that took place since is sensitive for its part on the output gap. It is notable that Spain and Portugal have significantly reduced their misalignment but at the expense of France and Italy instead of Germany, as it should have been consistent in theory. As a consequence, imbalances in the euro area have not reduced. While some improvement seems to have occurred in Greece with an output gap assumption that captures a pure business cycle (5 years), it is not anymore the case when considering the financial cycle (10-15 years).

What is the future of Greece? Considering OG1 as a benchmark, the country has closed one third of its misalignment in four years. We can then expect a total adjustment by 2020. But the output gap reaches -10% and its potential growth is estimated at -0.8%. Thus, in 2020, Greece will enjoy a GDP level higher by 3.5% than in 2012 (i.e. 0.4% yearly growth rate on average). In this scenario, price adjustment lasts 12 years, and GDP is still lower than its peak by more than 15%: painful reforms for a poor outcome. Now considering OG3, competitiveness adjustment hasn't started yet. With a output gap estimated around -20% today and a potential growth about 0.5%, Greece may expect a GDP level 24% higher than today by 2020, i.e. recovering the level of 2007. However, this recovering scenario is not compatible with external equilibrium as the current account will be highly deteriorated: painful reforms for an unsustainable outcome. In both cases the future of Greece is bleak.

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Appendix

A. Demand elasticities

The trade model relies on imports and exports equations. To evaluate the underlying current account, we estimate the short run elasticity of imports to domestic demand and foreign demand (exports) through the following equation:

$$\Delta \ln(M_{i,t}) = \gamma \left[a_i \Delta \ln(X_{i,t}) + (1 - a_i) \Delta \ln(A_{i,t}) \right] + c_i + \epsilon_{i,t}$$

where M, X and A denote imports of goods and services, exports of goods and services and domestic demand in volume. γ is the estimated elasticity of imports to demand, which is assumed identical across countries, and a_i is the estimated country-specific share of processing trade in imports. The equation is estimated with annual data from 1993 to 2011 for the 11 euro area countries using AMECO databases (See Table A.1).

Table A.1 – short-run demand elasticity of imports

parameter	val	se	parameter	val	se
γ	1.59	0.03	a_{bg}	0.52	0.11
a_{ge}	0.66	0.08	a_{ir}	0.37	0.08
a_{gr}	0.63	0.05	a_{sp}	0.56	0.08
a_{fr}	0.56	0.09	a_{it}	0.66	0.08
a_{nl}	0.50	0.11	a_{oe}	0.56	0.09
a_{pt}	0.71	0.08	a_{fn}	0.66	0.07

The share of processing trade in imports is higher than the share of exports in total final demand. This basic fact is consistent with the presence of non-tradable goods in domestic demand. We then compute, for each country, the implied share of non-tradable goods in domestic demand and take the weighted average across countries, estimated at 0.4. This share can not be directly compared with usual estimations of the share of non-tradable goods in domestic demand as each component of domestic demand (private consumption, public consumption, private investment and public investment) is weighted according to its share in domestic demand volatility instead of its share in domestic demand level: more volatile, investment is over-weighted.

B. Output-gaps and underlying current accounts

Figure B.1 – Three estimations of the output-gap (% of potential GDP)

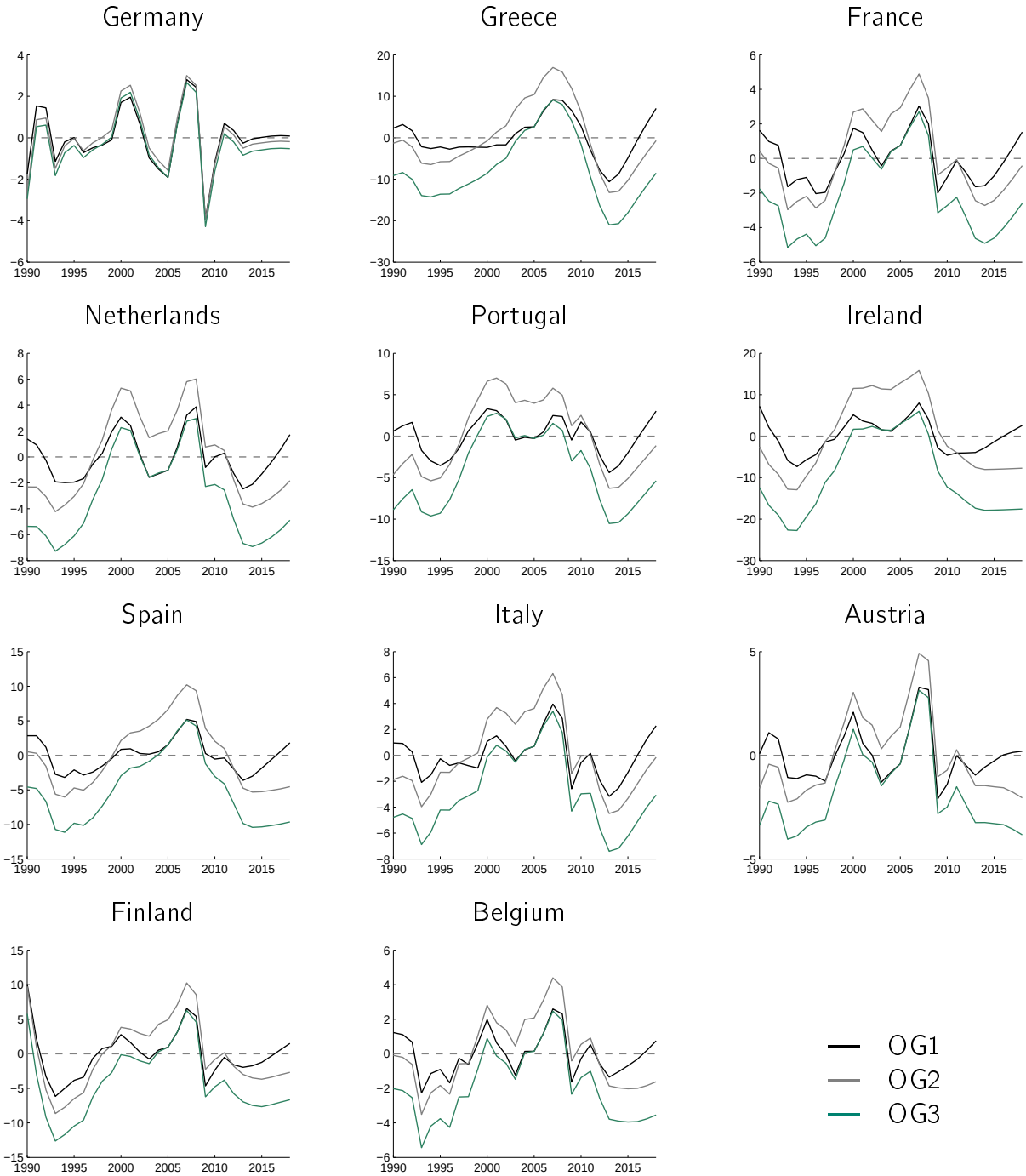

Figure B.2 – Actual and underlying current accounts (% of GDP)

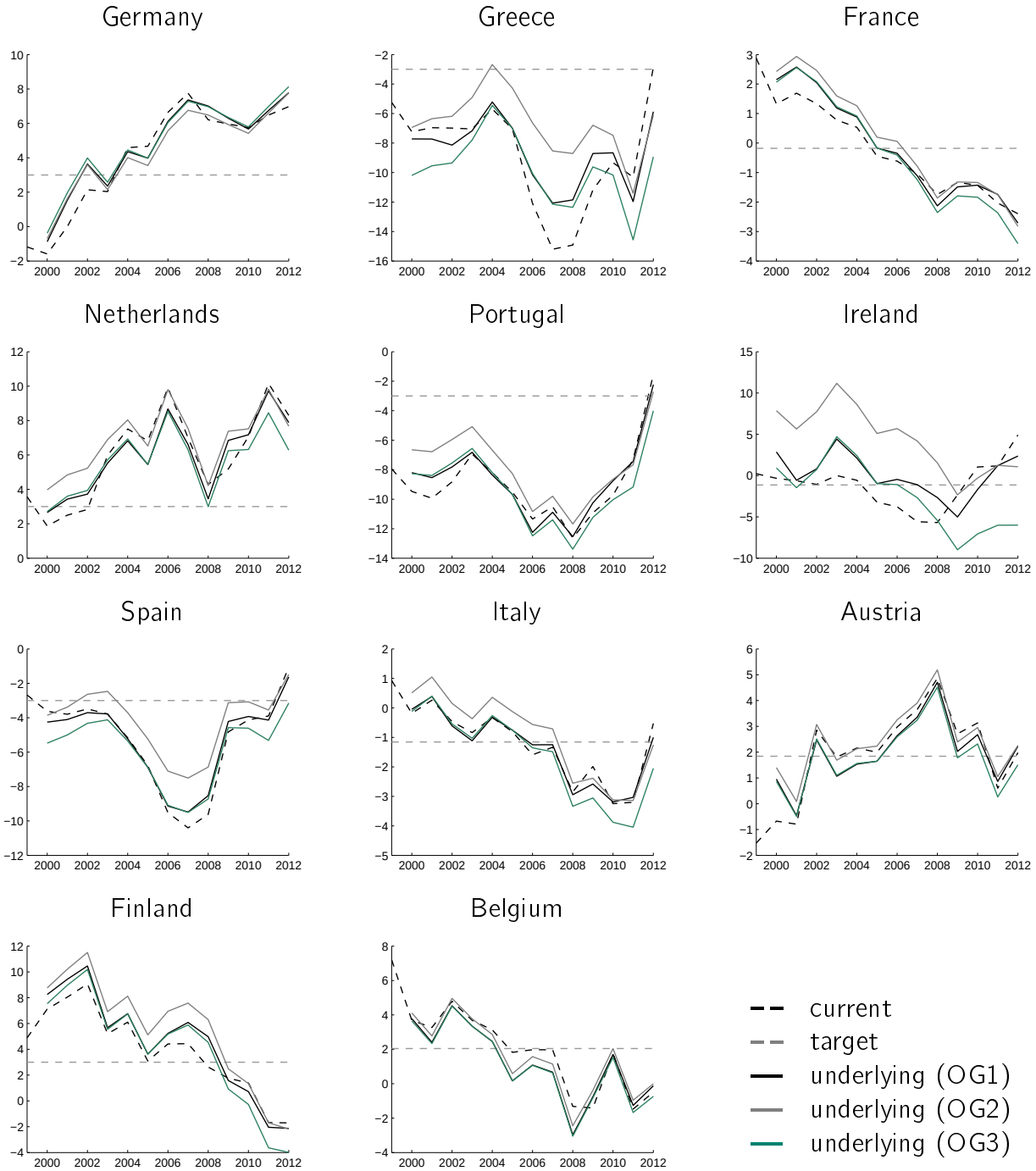

Table B.1 – Real exchange rate misalignement (percentage)

	2003-2004			2007-2008			2011-2012		
	OG1	OG2	OG3	OG1	OG2	OG3	OG1	OG2	OG3
FR	3.7	4.7	3.8	-6.4	-5.6	-6.8	-7.7	-7.9	-9.1
BG	1.5	1.8	1.5	-2.8	-2.5	-2.9	-2.6	-2.4	-2.9
DE	0.3	-1.9	0.7	11.5	9.0	11.8	9.1	9.0	11.5
IT	0.8	2.7	0.9	-4.0	-3.0	-4.8	-4.3	-4.9	-6.9
NL	4.7	6.0	5.0	3.5	4.2	3.1	7.4	7.3	6.2
IR	4.2	10.3	4.4	0.5	4.8	-1.5	1.4	0.9	-4.1
FN	6.8	8.1	6.5	7.2	8.7	7.1	-12.8	-12.4	-14.9
OE	-1.6	-1.7	-1.5	6.5	6.2	6.6	0.6	0.8	0.8
SP	-7.0	-2.0	-7.9	-23.9	-17.7	-24.2	-1.7	-0.5	-5.7
GR	-16.1	-7.3	-18.2	-33.5	-22.1	-34.0	-24.7	-24.0	-33.8
PT	-16.5	-10.6	-16.0	-29.9	-26.2	-31.7	-5.7	-6.3	-10.7