BANCA D'ITALIA

EUROSISTEMA

Questioni di Economia e Finanza

(Occasional Papers)

Adjusting the external adjustment: cyclical factors and the Italian current account

by Silvia Fabiani, Stefano Federico and Alberto Felettigh

July 2016

Number 346

BANCA D'ITALIA
EUROSISTEMA

Questioni di Economia e Finanza

(Occasional papers)

Adjusting the external adjustment: cyclical factors and the Italian current account

by Silvia Fabiani, Stefano Federico and Alberto Felettigh

Number 346 – July 2016

The series Occasional Papers *presents studies and documents on issues pertaining to the institutional tasks of the Bank of Italy and the Eurosystem. The* Occasional Papers *appear alongside the* Working Papers *series which are specifically aimed at providing original contributions to economic research.*

The Occasional Papers *include studies conducted within the Bank of Italy, sometimes in cooperation with the Eurosystem or other institutions. The views expressed in the studies are those of the authors and do not involve the responsibility of the institutions to which they belong.*

The series is available online at www.bancaditalia.it .

ISSN 1972-6627 (print)
ISSN 1972-6643 (online)

Printed by the Printing and Publishing Division of the Bank of Italy

ADJUSTING THE EXTERNAL ADJUSTMENT: CYCLICAL FACTORS AND THE ITALIAN CURRENT ACCOUNT

by Silvia Fabiani[*], Stefano Federico[*] and Alberto Felettigh[*]

Abstract

We investigate the role of cyclical factors in the adjustment of Italy's external balance from 2010, developing a model that infers the potential levels of domestic demand and of imports and exports from an exogenous measure of potential output, in an internally coherent fashion and also taking composition effects into account. According to our results, in 2015 Italy's cyclically-adjusted current account surplus came to about 0.5 percentage points of GDP; the overall external rebalancing of the Italian economy has largely been of a non-cyclical nature, with a positive contribution from the decline in the prices of energy commodities. By applying our methodology to the other major euro-area countries, we find that current account imbalances over the recent period are amplified when assessed in cyclically-adjusted terms.

JEL Classifications: E32, F32, F40.
Keywords: current account, business fluctuations, macroeconomic imbalances, output gap.

Contents

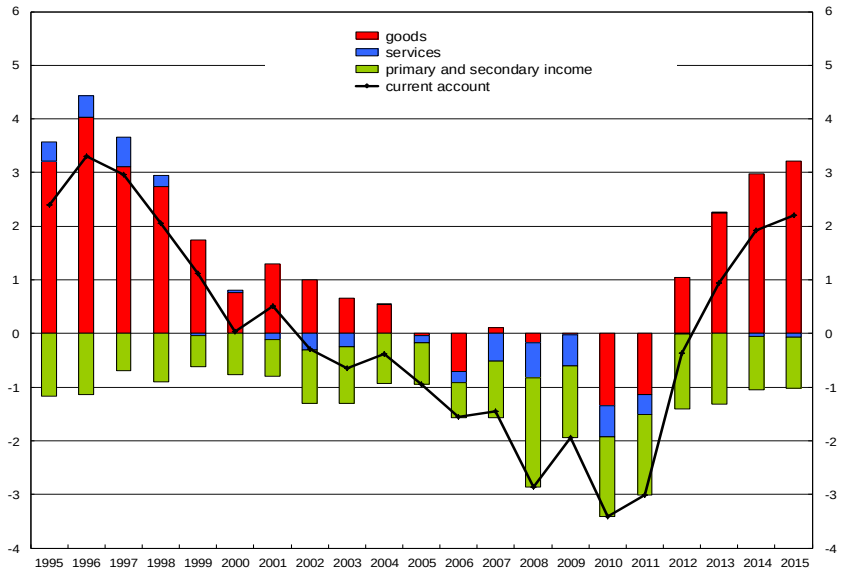
[*] Banca d'Italia, Directorate General for Economics, Statistics and Research.

1. Introduction

The growing current account deficit that the Italian economy had been recording since 2002 reached its peak[1] in 2010 and started receding thereafter. The overall improvement over the last five years was substantial: in 2015 the current account was in surplus for 2.2 percent of GDP. The adjustment, worth 5.6 percentage points of GDP, was mostly driven by the trade balance and in particular by its goods component, which increased by 4.7 points (Fig. 1). From a purely accounting point of view, the overall improvement was entirely driven by the growth in the value of exports (imports as a share of GDP stood at 27.1 per cent in 2010, at 27.0 in 2015; Fig. 2).

Figure 1: The Italian current account balance and its main components

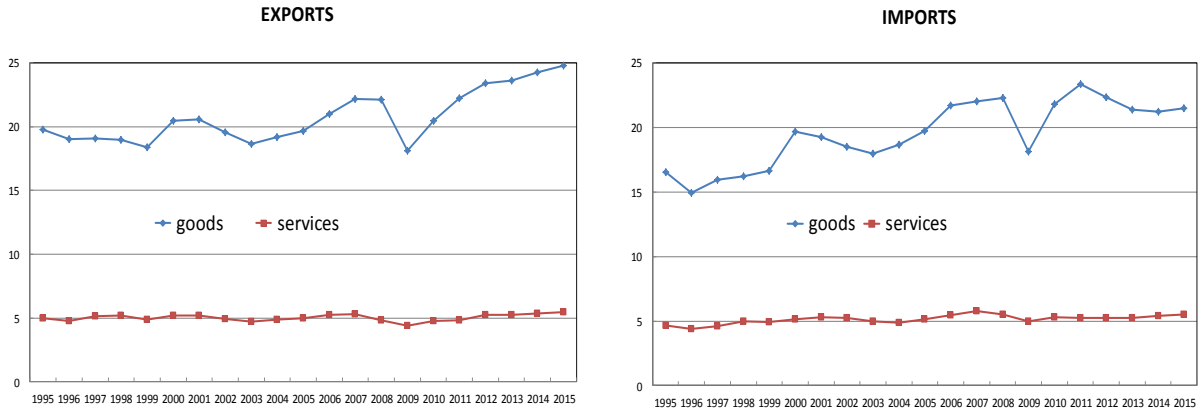
(as a percentage of GDP)



Source: Banca d'Italia; Istat for GDP.

Figure 2: The main components of the Italian trade balance

(as a percentage of GDP)



Source: Banca d'Italia; Istat for GDP.

1 In the currently available official time series, which starts in 1995. The post-WW2 peak was recorded in 1974 after the first oil shock.

The rebalancing of the external position took place during a phase of economic downturn characterised by a protracted decline of domestic demand. Between 2010 and 2015 the latter decreased by 8 per cent, with total consumption and gross fixed investment falling overall by 5 and 19 percentage points, respectively. This raises the issue of the role played by cyclical factors, domestic as well as international, in driving the reversal from deficit to surplus.

Assessing the nature of the adjustment has implications for its sustainability in the future. If the reversal of the Italian current account balance was driven by the cyclical slump in domestic demand, the surplus would be fated to be reabsorbed with economic recovery and eventually turn into deficit again.[2] This would not necessarily be a signal of adverse macroeconomic developments: external deficits (and surpluses) are the natural consequence of interactions between countries and in particular of cross-border financial flows associated with consumption smoothing over time, given different investment opportunities, demographic patterns and other "fundamentals". However, imbalances may be problematic and a concern for economic prospects if they become entrenched (see among others Blanchard and Milesi-Ferretti, 2012 and Obstfeld, 2012): in particular, any adverse change in foreign investors' willingness to finance a persistent current account deficit (a "sudden stop") may trigger sharp and disorderly corrections, possibly exacerbating an ongoing downturn.

Against this background, the identification of the determinants of the current account is definitely relevant for policy-making and has indeed attracted the academic interest, with a number of theoretical models flourishing in the literature after the pioneering works by Sachs (1981) and Buiter (1981), later extended by the classic inter-temporal approach of Obstfeld and Rogoff (1995). Several empirical applications of these models have drawn on the national accounting identity between the current account balance and the difference between national saving and investment and have suggested a variety of "fundamental" determinants of current account positions (among others, Faruquee and Debelle, 1996; Blanchard and Giavazzi, 2002; Chinn and Prasad, 2003; Gruber and Kamin, 2007; Ca'Zorzi et al., 2009).

Identifying the drivers of the current account balance is often a first step for a normative approach intended at defining its "equilibrium" level, broadly specified as the level coherent with a sustainable evolution of "fundamentals". In this paper we narrow the focus in order to investigate the role played by one single determinant: the country's (relative) position in the business cycle. Our scope is also different: we do not set off to identify a current account target with desirable properties, but content ourselves with estimating the cyclically-adjusted current account balance, namely the balance that would prevail if business cycles were removed. Compared to the estimation of equilibrium norms, our approach has the advantage of being less subject to the model uncertainty critique stemming from the large number of assumptions and calibrated parameters that are necessary to lay down a fully-fledged model of the economy.

While this is a trend-cycle decomposition exercise, we do not derive our results directly from filtering techniques but we develop an economic model and investigate the counterfactual scenario where GDP levels are at their potential at all points in time (our definition for the absence of business cycles). We opt for a simple model that is able to capture the main driving forces and is robust enough to support policy considerations. In particular, we treat potential output as

[2] Similar concerns about sustainability would also arise if an export-led rebalancing of the current account was driven by a temporary boom in demand from foreign partners.

exogenous, being aware that output gap estimates are in general subject to a large degree of uncertainty and can vary substantially depending on the methodology adopted.

Estimates of the cyclically-adjusted current account balance are systematically computed by international organizations, through a variety of methodologies.[3] The IMF, within its External Balance Assessment procedure, estimates the structural component of the current account on the basis of a reduced-form panel regression that relates the observed balance to a set of variables including both structural (non-cyclical) and cyclical factors, summarized by the domestic output gap relative to the world output gap (Phillips et al., 2013). A cyclical adjustment coherent with our definition can therefore be derived as the product of the relative-output-gap variable and its estimated coefficient, keeping the other fundamentals constant.

The methodology implemented by the European Commission (EC) considers imports and exports separately. Cyclically-adjusted (or potential) imports are defined as the level of imports that would prevail if domestic output were at its potential level. Symmetrically, potential exports are modelled as potential imports of all foreign partners; that is, potential exports of the home country are defined as the level of sales abroad that would prevail if all foreign partners' domestic output were at potential. Import and export gaps are assumed to be proportional, respectively, to the domestic and the foreign output gap (a weighted average of commercial partners' output gaps). The model is extremely simple, but probably captures almost all first-order effects at play.[4]

We build on the EC methodology to overcome an assumption we regard as untenable, that is the neglect of composition effects. Specifically, it is a fact that different components of aggregate demand activate imports with different intensities. In particular, there is a wide consensus that, in general, exports are the component with the highest import content. We thus posit a distinction between exports and domestic demand and develop a model that, given an exogenous estimate of potential output, endogenously determines the potential levels of domestic demand, exports and imports in an internally coeherent fashion.

A caveat on wording is in order: we prefer the term "cyclically-adjusted" balance, although the label "structural" is often used as a synonym even within simplified models that in fact do not account for the structural evolution of the economy. We deem that the label is not appropriate since our measure reflects both fundamental drivers and non-structural factors other than the business cycle (such as fluctuations in commodity prices and financial yields, although they may not be independent of the business cycle) that we do not control for. Clearly, our wording is not meant to suggest that the structure of the economy is irrelevant for the cyclically-adjusted balance.

Briefly anticipating the main results of our analysis, we estimate that Italy's cyclically-adjusted current account was in surplus for about 0.5 percentage points of GDP in 2015. In our assessment, the overall external rebalancing of the Italian economy since 2010 was largely of a non-cyclical nature, with a non-negligible contribution stemming from the decline of energy prices.

---

[3] The ECB does not publish its own estimates of the cyclically-adjusted current account; however, it devotes attention to the issue when monitoring internal and external imbalances in the euro area and in member states. See for instance the box "To what extent has the current account adjustment in the stressed euro area countries been cyclical or structural?" in the January 2014 ECB Monthly Bulletin.

[4] See Salto and Turrini (2010). The EC model disregards non-linearities, the role of distributional issues, capacity and borrowing constraints, income and price effects, but we deem these of a second-order magnitude, possibly even third-order when one considers the uncertainty surrounding potential output estimates.

Applying our baseline methodology to the other major euro area countries, we find that the extent of current account imbalances over the recent period is amplified in cyclically-adjusted terms; in this respect, we claim that the methodology adopted by the European Commission tends to overestimate the cyclically-adjusted balance for Spain, Italy and France, and to underestimate that of Germany.

The structure of the paper is the following. Section 2 describes the model, while Section 3 comments our baseline findings for Italy. Section 4 reports the results of an extensive sensitivity analysis. The evidence for the other main euro-area countries is presented in Section 5. Section 6 concludes.

2. An internally consistent model

During a cyclical downturn, a country's current account balance typically improves along with its trade balance because imports shrink as internal demand weakens. However, if the cyclical outlook simultaneously worsens for the country's main trading partners, also their imports and consequently the home country's exports are affected. Movements in the current account balance hence depend to a large extent on the *relative* position of the domestic economy in the global business cycle, namely on the *relative* size of the country's recession or boom. We take the output gap as a summary measure of an economy's cyclical stance and follow the EC in defining the cyclically-adjusted current account balance as the one which would prevail if the output gap of a country and of its trade partners were at zero, and therefore both domestic demand (driving a country's imports) and external demand (driving a country's exports) were at their potential.

The broad idea is to correct the *trade balance*, as a percentage of nominal GDP, for the effect that closing the (exogenously given) home and the foreign output gaps would have on trade volumes, everything else constant. The ceteris paribus clause refers, in particular, to import prices, export prices and the GDP deflator. An important caveat is that, in line with the EC approach, no adjustment is made to the other components of the current account; in other words, the cyclically-adjusted current account balance is obtained by adding the cyclically-adjusted trade balance to the unadjusted income balance.

For ease of exposition, assume that only two countries exist (home and foreign), where the foreign country (denoted by a superscript F) is in fact a weighted average of commercial partners (with weights given by their share in the home country's nominal goods exports[5]). The main variables of the model are defined as follows:

Y and Y^*: current and potential GDP of the home country, in real terms;

y : output gap of the home country, expressed as a fraction of potential output;

X and X^*: current and potential exports of the home country, in real terms;

M and M^*: current and potential imports of the home country, in real terms.

Nominal variables will be denoted as the product of the real counterpart and the corresponding price index.

[5] The geographic composition of overall exports tends to be very similar to that of merchandise exports, which is easily computed from publicly-available data sources.

Crucially, home imports and exports are assumed to be isoelastic: the logic of the model is easier to explain when they are postulated to be isoelastic to home and foreign GDP, respectively, with exogenously-given constant long-run elasticities θ_M and θ_X. This is the approach followed by the European Commission, which is not exactly the one we take in our model, but it is a convenient first step into our exposition.

Thanks to the isoelasticity assumption, it is then straightforward to define potential exports (imports): if closing the output gap in year *t* would have required year-*t* foreign (home) GDP to be 1 percent higher, exports (imports) would have been θ_X (θ_M) percent higher. Starting with the export side, potential exports in real terms are obtained as:

$$X^* \coloneqq X + \Delta X = X\left(1 + \frac{\Delta X}{X}\right) = X\left(1 + \theta_X \frac{\Delta Y^F}{Y^F}\right) = X\left(1 + \theta_X \frac{-y^F}{1+y^F}\right), \qquad [1]$$

where the operator Δ indicates the difference between potential level and current level (a variation between different states of the economy, rather than the usual variation between adjacent periods), and the relation:

$$\frac{\Delta Y^F}{Y^F} = \frac{-y^F}{1+y^F}$$

follows from the definition of the foreign output gap $y^F = (Y^F - Y^{*F})/Y^{*F}$.

Cyclically-adjusted nominal exports are now defined as nominal *potential* exports divided by nominal *unadjusted* GDP:[6]

$$x^{adj} \coloneqq \frac{p_X X^*}{p_Y Y} = \frac{p_X X}{p_Y Y}\frac{X^*}{X} = x\frac{X^*}{X}. \qquad [2]$$

Equation [2] states that, thanks to the assumption that prices are unchanged, cyclically-adjusted nominal exports are simply obtained by multiplying the unadjusted export share on GDP (computed in nominal terms on actual national-account data, variable *x*) by the ratio of potential to actual real exports.

In conclusion, equations [1] and [2] deliver the following relation:

$$x^{adj} = x\left(1 - \theta_X \frac{y^F}{1+y^F}\right). \qquad [3]$$

When home imports are assumed to be isoelastic to home GDP, a similar expression determines cyclically-adjusted nominal imports[7]:

$$m^{adj} = m\left(1 - \theta_M \frac{y}{1+y}\right). \qquad [4]$$

The logic of this approach is neat but it is unduly simplified, especially on the import side. Imports are activated by demand, rather than GDP, and it may be misleading not to distinguish between components of demand in order to allow for different import intensities. A recent

---

6 Since exports, imports and the current account are usually reported as a percentage of (unadjusted) GDP.

7 This is the approach followed by the European Commission, which makes however a further slight simplification: the percentage variation needed by actual GDP to close the output gap is set equal to the output gap itself. This is an approximation we choose to avoid: the output gap being expressed as a fraction of potential GDP, with an output gap of, say, -5 per cent, actual GDP needs to increase slightly more than 5 per cent in order to reach its potential level. This is what the terms $1/(1+y^F)$ and $1/(1+y)$ in equations [3]-[4] are capturing.

contribution by Bussière et al. (2013) has popularized what is a long-standing tradition in the Bank of Italy quarterly econometric model of the Italian economy (see Banca d'Italia, 1986): imports are best modelled as being activated by a geometric weighted average of the various demand components, with weights reflecting the relative import contents. Bussière and co-authors name such activation variable as IAD (Import intensity-Adjusted Demand); they show that it outperforms GDP in explaining the evolution of imports in a panel of 18 countries. Importantly for the case at hand, they also present rolling-window estimates confirming that the assumption of a stationary, time-invariant long-run elasticity of imports appears to be reasonable only in the case of the IAD variable, whereas the long-run elasticity of imports to GDP shows an increasing trend.[8]

We implement a reduced-form version of the IAD approach: while the original version considers four components of demand (private consumption, public consumption, investment, exports), we content ourselves with isolating the component that typically shows the highest import intensity, namely exports, from overall domestic demand (DD). Also recent work by the ECB implements such distinction in estimating trade elasticities (Christodoulopoulou and Tkačevs, 2014).

In short, we posit that real imports are isoelastic to the reduced-form IAD variable, which is a convex combination of exports and domestic demand (in log-terms); we can then approximate the growth rate of imports as

$$\frac{\Delta M}{M} = \theta_M^{IAD} \frac{\Delta IAD}{IAD} = \theta_M^{IAD} \left[\omega_X \frac{\Delta X}{X} + (1 - \omega_X) \frac{\Delta DD}{DD} \right],$$

where θ_M^{IAD} is the constant long-run elasticity we calibrate using the estimates in Bussière et al. (2013) and ω_X is the weight of exports in building the IAD variable.[9] The basic intuition and the algebra are unaffected when we turn to interpreting the operator Δ as the difference between potential levels and current levels; we obtain that potential imports are defined as

$$M^* := M + \Delta M = M + \theta_M^{IAD}\, \omega_X \frac{M}{X} \Delta X + \theta_M^{IAD} (1 - \omega_X) \frac{M}{DD} \Delta DD,$$

which can be simplified to

$$M^* = M + \eta_D (DD^* - DD) + \eta_X (X^* - X) \qquad [5]$$

by defining parameters

$$\eta_X := \theta_M^{IAD}\, \omega_X \frac{M}{X}, \quad \eta_D := \theta_M^{IAD} (1 - \omega_X) \frac{M}{DD}.$$

What does "potential imports" mean in this IAD-based context? Closing our model helps answering the question. We start with imposing the usual national-account identity, then use equation [5] to substitute out M^*:

$$Y^* = DD^* + X^* - M^* = DD^* + X^* - [\, M + \eta_D (DD^* - DD) + \eta_X (X^* - X) \,].$$

---

8 A vast literature finds that elasticity of world trade to world GDP is increasing over time, or at least it was until the 2009 Great Trade Collapse (see for instance Freund, 2009).

9 Bussière et al. (2013) compute the import intensity of each IAD component from three waves of TiVa tables (inter-country input-output tables compiled by the OECD), use linear interpolation to construct quarterly series (intensities for the post-2005 period are held constant at their 2005 values), then normalize them so that they sum to unity. We borrow their weight for exports and use the complement for domestic demand.

This equation defines potential domestic demand DD^*, given parameters η_D and η_X, trade flows M and X from national accounts, potential output as determined by the exogenous domestic output gap[10] and potential exports as obtained from equation [1] above, given the exogenous foreign output gap. Once DD^* is solved for, equation [5] can be used to determine potential imports M^* as

$$M^* = M + \eta_D(1-\eta_D)^{-1}(Y^* - Y) + (X^* - X)(\eta_X - \eta_D(1-\eta_D)^{-1}(1-\eta_X)). \quad [6]$$

Such sequential solution to our model[11] clarifies the role of composition in determining potential imports: these are defined as the level that would prevail if domestic and foreign output were *jointly* at their potential level, *simultaneously* determining (home) exports and domestic demand, which are the two components of aggregate demand that activate imports, each with a specific intensity. From a different viewpoint, entertaining the notion that the potential levels of domestic output, exports and imports can be determined, as in the EC model, independently of the level of domestic demand that is being defined residually is not fully coherent on the one hand, and econometrically implausible on the other hand, given the evidence provided by Bussière et al. (2013) on the role of composition effects. In our model, instead, the relative weight of potential domestic demand and potential exports matters for the determination of potential imports and these three components are coherent with potential output, as determined from an exogenously estimated output gap.[12]

Symmetrically with the case of exports, the ratio between potential and actual imports in real terms is sufficient to pin down cyclically-adjusted nominal imports (nominal potential imports as a percentage of nominal unadjusted GDP):

$$m^{adj} := \frac{p_M M^*}{p_Y Y} = \frac{p_M M}{p_Y Y}\frac{M^*}{M} = m\frac{M^*}{M}, \quad [7]$$

where m is the unadjusted import share on GDP (computed in nominal terms on national-account data).

Finally, the cyclically-adjusted current account balance, divided by GDP, is defined as

$$ca^{adj} := x^{adj} - m^{adj} + uib, \quad [8]$$

where *uib* denotes the balance of payments' unadjusted (primary and secondary) income balance, as a percentage of GDP. Our cyclical adjustment only concerns the trade balance, as in the vast majority of the literature, and takes prices as given. We shall later propose a gauge of how fluctuations in energy prices also affect the observed current account balance.

Two final observations are in order. Firstly, since we model potential exports and potential imports in an asymmetric way, our solution for imports benefits from exports being derived from a more straightforward model (involving only the foreign output gap). It would be possible to model also potential exports as being determined by foreign domestic demand *and* foreign imports (with distinct elasticities), but in this case a recursive solution would require working with a

---

10 $Y^* = \frac{Y}{1+y}$.

11 Y^* and X^* are firstly solved for, then is DD^* and lastly M^* is determined.

12 A related strand of research takes a different perspective and tries to take into account the sustainability of the current account (or rather, of the trade balance) in estimating potential output: see for instance Darvas and Simon (2015).

simultaneous-equation model that encompasses all partner countries' as well as the home economy. This is beyond the scope of our paper and would require the calibration of a very large set of parameters (some of which not immediately available in the empirical literature). However, we do not expect such extension to impact on our results significantly, since it would only affect them via (the composition of) the foreign output gap, which is anyway an average over a large set of countries.[13]

Secondly, the fundamental logic behind our model – as well as the European Commission's – is that in order to isolate the non-cyclical component of the trade balance in year *t* it is sufficient to close only the contemporaneous (domestic and foreign) output gaps, as opposed to setting to zero the entire time series (up to year *t*) of output gaps. The second option is theoretically sounder, since trade flows tend to display persistence and are naturally modelled as dynamic phenomena, but it would be tedious and complex to implement.[14] The compromise that we borrow from the literature is to focus on contemporaneous output gaps only, while persistent effects are captured in a reduced-form fashion by using (calibrated) *long-run* elasticities of trade (to the relevant activation variables). The two approaches are equivalent only if output gaps are constant through time (and a sufficiently long time span is considered).

3. Baseline results

Our baseline results derive from the model presented in the previous section, and in particular equation (3) for exports, equations (6) and (7) for imports and, finally, equation (8) for the overall cyclically-adjusted balance; the relevant parameters are calibrated using the empirical findings of Bussière et al. (2013). Specifically, we set θ_X – the elasticity of home exports to foreign GDP – equal to the long-run elasticity of imports to GDP in their cross-country panel regression. As for θ_M^{IAD}, we set it equal to the long-run elasticity of imports to the domestic IAD variable in their country-specific dynamic regression. For Italy we thus pick θ_X =1.896 and θ_M^{IAD}=1.592.

The European Commission sets both θ_X and the elasticity of imports to GDP (θ_M) to 1.5, drawing from unspecified empirical results. Notice that the elasticity of imports to GDP typically tends to be higher than that to the domestic IAD (see Bussière et al., 2013).[15]

The key exogenous variable is the output gap: to this end, for Italy we use the measure computed by Banca d'Italia as the average of estimates based on four different approaches: a Bayesian unobserved component method, a univariate time-varying autoregressive model, a production function approach and a structural VAR (Bassanetti et al., 2010).

Output gap estimates are in general subject to a large degree of uncertainty and can vary substantially depending on the methodology adopted.[16] Indeed, compared to the measures

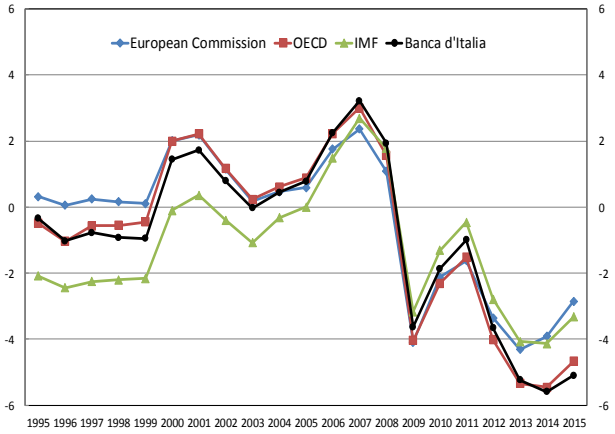
[13] That is, the effect that closing the output gap in individual foreign partners has on the domestic economy would probably change in a idyosincratic fashion; however, the (weighted) averaging of foreign variables would significantly dampen such differences.

[14] Conceptually, one would need to work with dynamic elasticities (capturing the impulse response function after a shock to GDP), close the output gap in year *t* and map the reaction of trade flows in every year *t+k*, *k≥0*.

[15] Our model endogenously determines the ratio between ΔM (the difference between potential and actual imports) and ΔY (the change in GDP necessary for closing the domestic output gap); however, this concept is time-varying and has a short-run interpretation and therefore cannot be directly compared to the calibration chosen by the European Commission, which is a long-run elasticity.

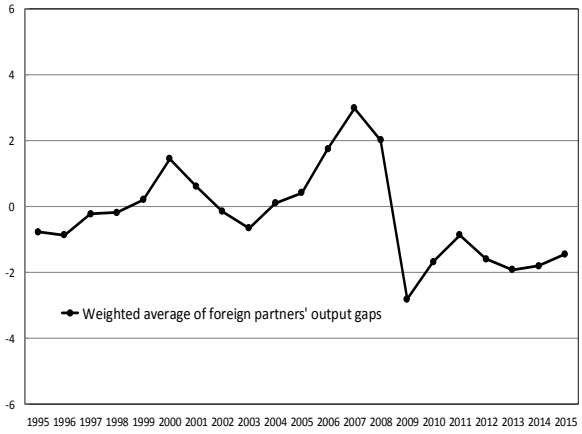
computed for Italy by the major international organizations, our indicator depicts a significantly larger cyclical slack over the last few years than that estimated by the EC and the IMF, whereas it is broadly similar to the one estimated by the OECD (Fig. 3).

Figure 3: The Italian output gap *(%)*



Source: Banca d'Italia, AMECO, OECD, IMF.

Figure 4: The foreign output gap *(%)*



Source: Our elaborations on AMECO, OECD and IMF data.

Taking the most recent observation as an example, according to the Banca d'Italia measure actual GDP was about 5 percentage points lower than its potential level in 2015, as against an estimated gap of around 3 per cent according to the EC and the IMF. Clearly, this different assessment of the cyclical stance is going to have a non-negligible impact on the adjustment of the current account (see section 4 for more details). In particular, implicit in the EC estimates of the output gap (Havik et al., 2014) is a decline of Italian potential GDP which, as noted by Cottarelli (2015), "means that an economy would shrink even under normal cyclical (demand) conditions, something puzzling even for countries with non-trivial structural problems like Eurozone countries".

On the foreign side, our output gap variable is a weighted average of the output gaps of 45 commercial partners[17]; each of these output gaps is in turn computed as the average of the measures produced by the EC, the OECD and the IMF, in order to reduce the bias that may stem from the use of a specific estimation approach (Fig. 4).

Figure 5 summarizes our main results: according to our baseline estimates, the cyclically-adjusted current account balance deteriorated gradually since 1996, became negative at the turn of the century and reached its minimum level in 2010; it started recovering thereafter, returning into positive territory in the last biennium. In 2015 it was in surplus for 0.5 percentage points of GDP.

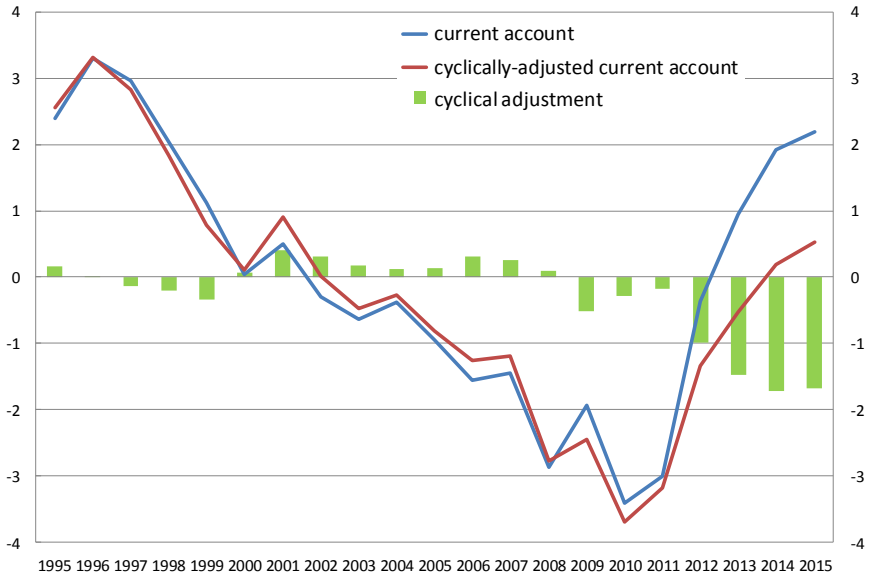
---

16 Modern business-cycle theory decomposes output into transitory and permanent stochastic components, the latter being associated with the notion of potential output. Accomplishing the decomposition requires making assumptions about the structure of the economy and/or the stochastic properties of the unobserved time series, implying that any decomposition is model-dependent. Several models have been proposed in the literature: (i) univariate time-series models; (ii) structural macroeconomic models that determine the level of output compatible with non-accelerating inflation/wage rate of unemployment (NAIRU/NAWRU); (iii) the production-function approach, identifying potential output with the full employment of productive inputs.

17 This is the largest set of countries we were able to find data for. Compared to the set that enters the European Commission model, we add the BRICs and Hong Kong.

Figure 5: Italy's cyclically-adjusted current account

(as a percentage of GDP)



Source: our estimates on Banca d'Italia, Istat, AMECO, OECD and IMF data.

Overall, until 2011 the development and the size of the adjusted measure closely mirrored that of the actual current account, pointing to cyclical factors playing a relatively minor role. This regularity came to a halt afterwards: during the recent deep and prolonged recessionary phase the effects of the economic slack on the current account balance increased in magnitude (standing around 1 and a half percentage point of GDP in 2015). Such pattern mirrors that of the relative output gap that emerges from Figures 3 and 4.

Our estimates suggest that the overall external rebalancing of the Italian economy since 2010 was largely of a non-cyclical nature: indeed, the cyclically-adjusted current account balance improved by 4.2 percentage points of GDP, accounting for roughly three quarters of the overall observed correction (5.6 points).[18]

Since our model is based on the cyclical correction of exports and imports, we can compute the contribution of the two components to the overall adjustment and analyze the role they played over time, with a particular focus on the latest recession.

The adjustment of imports tends to be systematically larger than that of exports throughout the period (Fig. 6a). However, whereas until 2011 the difference between the two cyclical components was at most equal to half a percentage point of GDP, over the last four years it increased to 1.5 percentage points on average, indicating that the effect of the domestic slack on the observed performance of imports was significantly larger than the effect of our trading partners' cyclical stance on Italian exports.

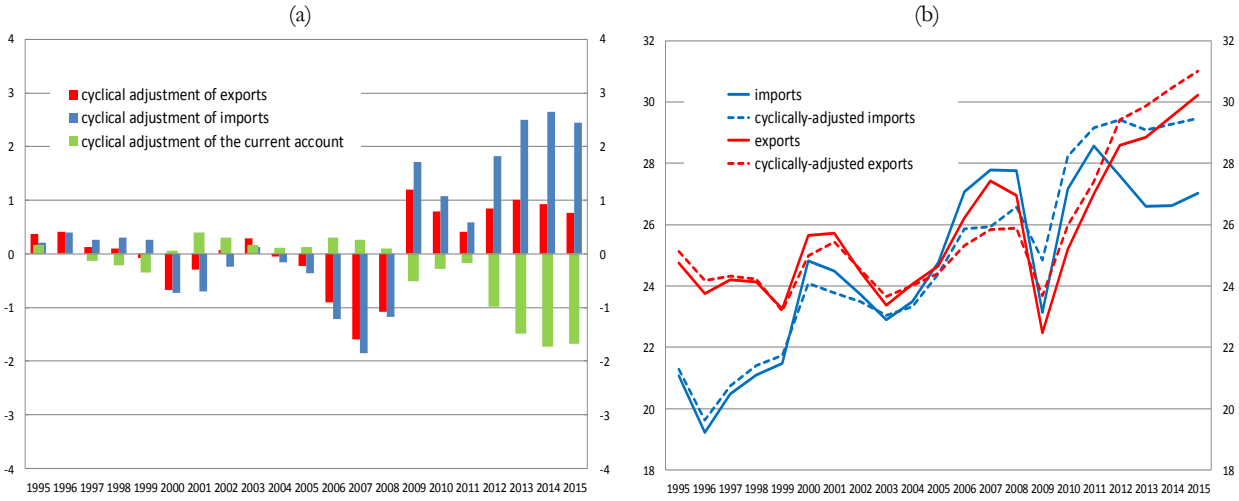
The overall improvement in the adjusted current account balance since 2010 (4.2 percentage points of GDP) was mainly driven by the contribution of the cyclically-adjusted export

[18] A further adjustment would also remove specific temporary factors. In the case of Italy, fiscal subsidies for photovoltaic equipment strongly inflated imports in 2010 and 2011, contributing to an increase in the current account deficit by about 0.5 percentage points of GDP in each of the two years. After taking this factor into account, the 4.2 percentage point improvement shrinks to 3.7 points.

performance (5.0 points); a positive contribution also came from the (unadjusted) income balance (0.4 points), whereas the increase of cyclically-adjusted imports subtracted 1.3 points (Fig. 6b).

Figure 6: Cyclical adjustment of exports and imports

(as a percentage of GDP)

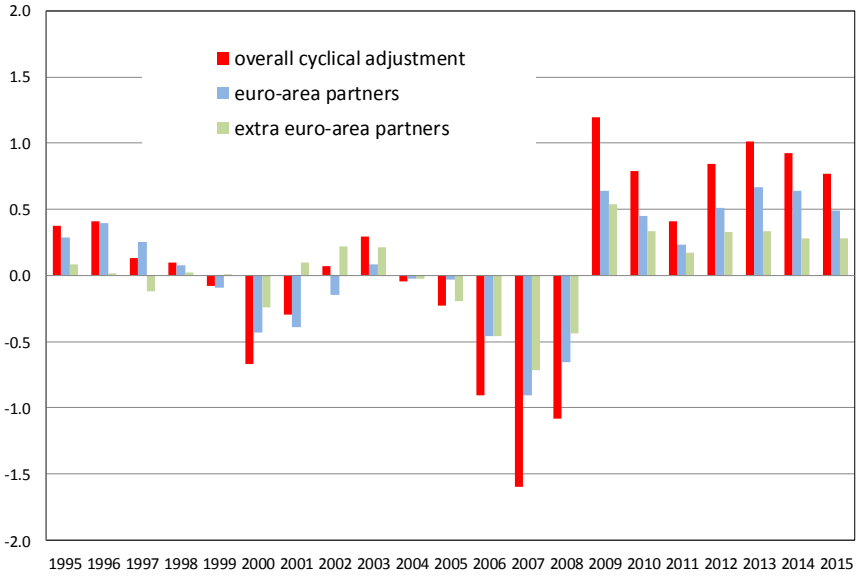


Source: our estimates on Banca d'Italia, Istat, AMECO, OECD and IMF data.

Finally, the cyclical adjustment of exports over time can be broken down into its intra-euro-area and extra-area components (Fig. 7). As expected, the results show that since 2009 the cyclical slack of euro-area partners has been weighting on our export developments much more than that of the rest of the world, with the first component reaching roughly twice the size of the second one over the last three years.

Figure 7: Cyclical adjustment of exports: euro-area and non euro-area trading partners

(as a percentage of GDP)



Source: our estimates on Banca d'Italia, Istat, AMECO, OECD and IMF data.

3.1 The role of energy prices (on the import side)

Our cyclically-adjusted estimate of the current account does not take into account fluctuations in commodity prices. Over the last two years, the sharp fall in energy prices has significantly benefited the Italian balance, both in cyclically-adjusted and in unadjusted terms. In order to isolate the role played by this factor, we have computed the cyclically-adjusted current account balance net of (cyclically-adjusted) energy imports. This simple exercise disregards: (i) fluctuations in commodity prices other than energy (like metals or agricultural supplies); (ii) energy exports (which however represent a small share of Italian exports); (iii) the impact of energy prices on manufacturing prices; (iv) the impact of energy prices on *non-energy* exports (we assume that the transfer of purchasing power from oil-exporting to oil-importing countries, or vice versa, does not change the overall profile of foreign demand for Italian goods and services).

We make the simplifying assumption that the energy share in cyclically-adjusted imports is the same as in unadjusted imports (namely, we assume that energy and non-energy imports move at the same rate when closing the output gap). The results are however very similar if we employ a more sophisticated method that estimates the elasticity of energy imports to GDP on the basis of the National Energy Balance (Bilancio energetico nazionale[19]), which is the official accounting document published by the Ministry of Economic Development that records the *volume* of production, imports, exports, change in inventories and internal consumption of all forms of energy.[20] The elasticity of energy imports to GDP using the "National Energy Balance" approach is smaller than the elasticity implied by the "proportionality" approach. The differential effect on cyclically-adjusted imports is however very small, the main intuition being that so are (unadjusted) energy imports as a share of GDP (less than 5 per cent).[21]

Net of energy imports, we estimate the cyclically-adjusted current account balance to be at 3.5 percent of GDP in 2015, i.e. 3 percentage points larger than the overall cyclically-adjusted current account balance (Fig. 8). In contrast to the latter, which shows a fairly constant improvement since 2010, the former records a sharper adjustment between 2010 and 2012, while it remains unchanged over the following two years and decreases slightly in 2015. We estimate cyclically-adjusted energy imports to decrease from 4.2 percent of GDP in 2010 to 3.0 in 2015, thus suggesting that almost 30 per cent (1.2 out of 4.2 percentage points) of the improvement in the cyclically-adjusted current account balance since the 2010 trough is due to lower energy imports.[22] The role of this component becomes instead predominant if we focus on the post-2012 period, when oil prices in euros fell by almost 45 percent: the decrease in cyclically-adjusted energy imports (from a peak of 5.3 percent of GDP in 2012 to 3.0 percent in 2015) is actually larger than the 1.9 p.p. improvement of the cyclically-adjusted current account in the same period.

---

19 http://dgsaie.mise.gov.it/dgerm/ben.asp.

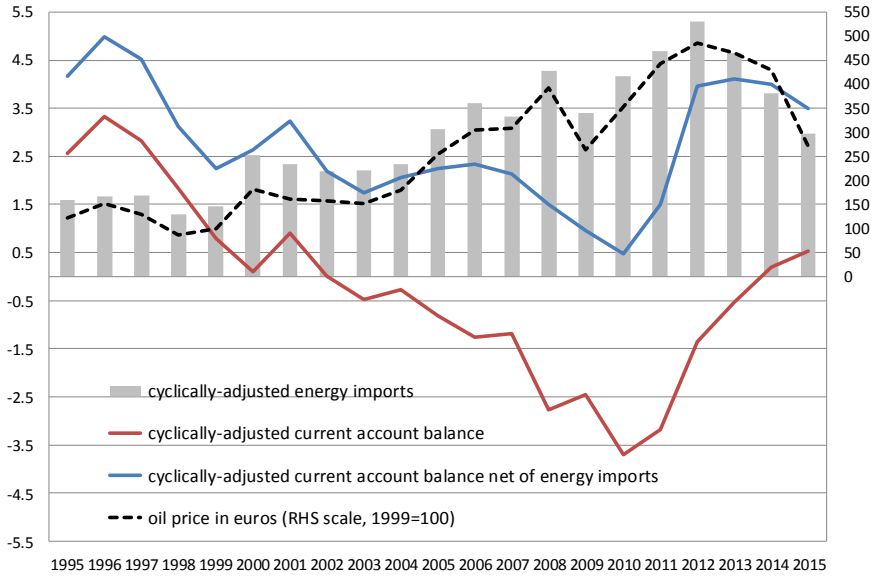
20 Essentially, energy sources (natural gas, carbon…) are converted into petroleum based on the relative calorific power. The usual accounting identity holds: resources (production and imports) equal uses (internal consumption, exports and change in inventories).

21 In fact, also the cyclical adjustment of energy imports is small, as a share of GDP. According to our baseline model, the cyclical adjustment of total imports is equal to 2.4 percent of GDP in 2015, when energy imports represented only 10 percent of total imports (of goods and services). The cyclical adjustment of energy imports is therefore equal to 0.24 p.p. of GDP in our baseline model.

22 The main driver of the decrease in the value of energy imports was the sharp fall in prices. An additional, although much smaller, contribution came from the significant investments in renewable (mainly photovoltaic) energy. According to preliminary estimates that focus exclusively on the production of electricity, the contribution from renewable energy sources decreased energy imports each year by 0.1-0.2 percent of GDP on average since 2012.

Figure 8: Cyclically-adjusted current account balance net of energy imports

(as a percentage of GDP; index 1999=100 for oil prices)



Source: our estimates on Banca d'Italia, Istat, AMECO, OECD and IMF data.

Notice that our approach does not take a stand on the trend component of (equilibrium) energy prices, so that figures on the current account balance corrected for the business cycle *and the commodity-price cycle* cannot be inferred. We only propose a methodology for netting *changes* in the cyclically-adjusted current account balance from the effects of fluctuations in commodity prices.[23] Lastly, it is not possible to assess to what extent the contribution of falling energy prices to the estimated improvement of the current account balance is permanent rather than purely transitory, given the uncertainty surrounding the future equilibrium level of oil prices.

4. Robustness and comparison with other models

Estimates of the cyclically-adjusted current account are, in general, subject to considerable uncertainty: they depend on the magnitude of the output gaps, on the value attached to trade elasticities as well as on the modelling approach.

In order to evaluate the sensitivity of our estimates to alternative assumptions, we perform an extensive set of robustness exercises. Specifically, we estimate several variations of our baseline model, which involve alternative assumptions on: (i) the domestic output gap (replacing the Bank of Italy estimate with the average of the estimates by the European Commission, the IMF and the OECD); (ii) the import elasticity (using estimates derived from alternative specifications by Bussière et al., 2013, or estimates by Christodoulopoulou and Tkačevs, 2014); (iii) the foreign output gap, replacing gross-export weights with "activation" weights that, taking into account the

[23] Our methodology however is fit for assessing the impact of keeping energy prices fixed. In fact, one can infer from Figure 8 the change in cyclically-adjusted energy imports between an initial year T_1 and a final year T_2. Adding such change to the cyclically-adjusted current account balance for year T_2 is indeed an estimate of what the balance would have been if business cycles were removed and energy prices were kept fixed at their year-T_1 level.

role of global value chains, capture the ability of domestic demand in each trading partner to activate Italian exports.[24]

We also consider two alternative modelling approaches. The first is the one followed by the European Commission, whose sensitivity is also assessed on the basis of different estimates of output gaps and trade elasticities.

The second is a back-of-the-envelope calculation (a rule of thumb) we derive from the regression-based approach used by the IMF in the context of the External Balance Assessment (Phillips et al., 2013). Using annual data for 49 countries, which account for about 90 percent of global GDP, the IMF runs a pooled GLS regression of the current account balance on a wide set of explanatory variables. These variables include "traditional" current account regressors (such as the lagged level of net foreign assets, the relative level of per worker income, the rate of GDP growth, natural resources and demographical variables), financial factors (such as the reserve currency status and financial center dummies), policy-related regressors (such as the cyclically-adjusted fiscal balance, health expenditure and capital controls) and cyclical/temporary factors (the relative output gap and the commodity terms of trade gap). The relative output gap is defined as the difference between the domestic output gap and a weighted average of foreign output gaps (weights are given by each country's GDP share on world GDP). The IMF regression suggests the following rule of thumb: on average, a 1 percentage point increase in the *relative* output gap is associated, other things constant, with a decline of the current account by about 0.4 percent of GDP.[25] By using this coefficient, which is statistically significant, an estimate of the cyclically-adjusted current account balance can therefore be computed without requiring any assumption on the level of trade elasticities.

Table 1 summarizes the combinations we have experimented with.

The results of the sensitivity analysis are reported in Figure 9, which compares our baseline estimates with the upper and lower bounds derived from the robustness exercise, and in Table 2, which shows the 2010-15 time series of the cyclically-adjusted current account balance obtained from each method.

The range of estimates, which is a measure of the uncertainty concerning the magnitude of the cyclical adjustment, is very narrow in the first decade (less than 0.5 p.p. of GDP on average until 2005), it then grows to 1 p.p. between 2006 and 2009 and finally, after decreasing slightly in the subsequent biennium, it becomes considerably larger as of 2012, reaching 2.4 percentage points of GDP in 2015. The wider range in the most recent years might also reflect the dispersion of output gap estimates due to the well-known end-of-period bias in trend-cycle decompositions. Notably, our baseline results tend to lie halfway between the upper bound and the lower bound of the range of estimates.

---

[24] For instance, domestic demand in China activates Italian exports both directly (shipments from Italy to China) and indirectly: consider for instance exports of intermediate goods from Italy to Germany, where they are assembled into final goods that are being produced for meeting demand in China.

[25] The notion of "cyclically-adjusted current account balance" behind estimates published by the IMF includes also a correction for the commodity price cycle (capturing terms-of-trade effects) which we disregard here.

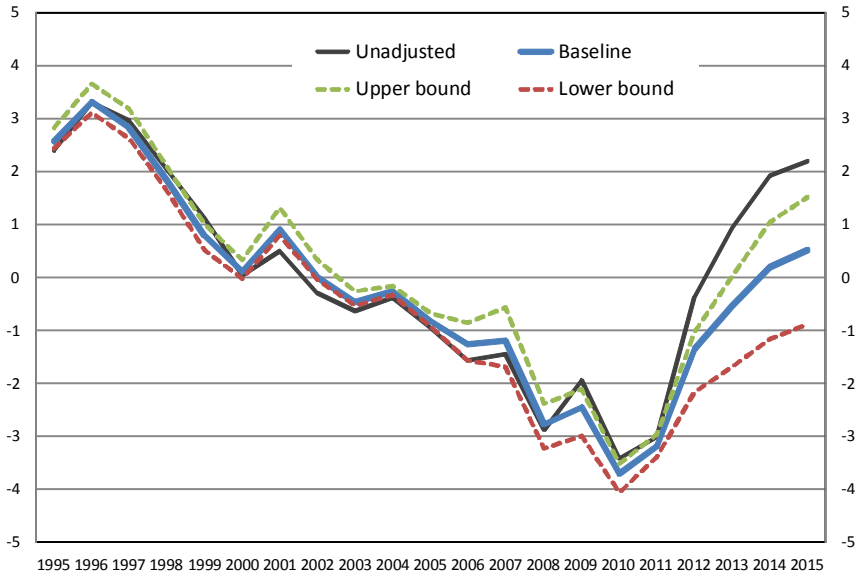
Table 1: Sensitivity analysis

	Model	Domestic output gap (y)	Foreign output gap (y^F)	Import elasticity	Export elasticity
Baseline	Our model	Bank of Italy	Average (EC, IMF, OECD); export weights	θ_M^{IAD} from Bussière et al. (2013), country-specific	Bussière et al. (2013)
Robustness #1	Our model	Average (EC, IMF, OECD)	Average (EC, IMF, OECD); export weights	θ_M^{IAD} from Bussière et al. (2013), country-specific	Bussière et al. (2013)
Robustness #2	Our model	Bank of Italy	Average (EC, IMF, OECD); export weights	θ_M^{IAD} from Bussière et al. (2013), panel of countries	Bussière et al. (2013)
Robustness #3	Our model	Bank of Italy	Average (EC, IMF, OECD); export weights	θ_M^{IAD} from Bussière et al. (2013), altern. IAD	Bussière et al. (2013)
Robustness #4	Our model	Bank of Italy	Average (EC, IMF, OECD); export weights	Christodoulopoulou and Tkaèevs (2014)	Symmetric to imports
Robustness #5	Our model	Bank of Italy	Average (EC, IMF, OECD); activation weights	θ_M^{IAD} from Bussière et al. (2013), country-specific	Bussière et al. (2013)
Robustness #6	EC model	EC	EC; export weights	θ_M =1.5 (EC)	1.5 (EC)
Robustness #7	EC model	Bank of Italy	Average (EC, IMF, OECD); export weights	θ_M =1.5 (EC)	1.5 (EC)
Robustness #8	EC model	Bank of Italy	Average (EC, IMF, OECD); export weights	θ_M from Bussière et al. (2013), country-specific	Bussière et al. (2013)
Robustness #9	EC model	Bank of Italy	Average (EC, IMF, OECD); export weights	θ_M from Bussière et al. (2013), panel of countries	Bussière et al. (2013)
Robustness #10	IMF "rule of thumb"	Bank of Italy	Average (EC, IMF, OECD); GDP weights	n.a.	n.a.

Notes: our model and the EC model are described in section 2. The "IMF rule of thumb" is described in this section.

Figure 9: The cyclically-adjusted current account balance: sensitivity analysis

(as a percentage of GDP)



Source: our estimates on Banca d'Italia, Istat, AMECO, OECD and IMF data.

For 2015, our cyclically-adjusted current account (0.5 percentage points of GDP) compares with an upper bound of 1.5 p.p. and a lower bound of -0.9 p.p. The upper bound stems from the EC model (Robustness #6), where trade elasticities are set to 1.5 both on the import and on the export side (lower than most available estimates in the literature, which tend to be closer to 2) and the domestic output gap in 2015 is estimated at -2.9 percent, which is significantly narrower than both the Bank of Italy estimate (-5.1 percent) and the average (-3.7 percent) of the estimates by the European Commission, the IMF and the OECD. The lower bound corresponds to a modified version of our baseline model (Robustness #4; the model is presented in the Appendix)

with trade elasticities borrowed from Christodoulopoulou and Tkaèevs (2014), who distinguish trade in goods from trade in services; the combination of these relatively high elasticities with the Bank of Italy -5.1 percent output gap yields a cyclically-adjusted current account balance equal to -0.9 percent of GDP.

Table 2: The cyclically-adjusted current account balance: sensitivity analysis

(as a percentage of GDP)

Specification	2010	2011	2012	2013	2014	2015
Our model						
Baseline	-3.7	-3.2	-1.3	-0.5	0.2	0.5
Robustness #1	-3.7	-3.3	-1.2	-0.2	0.7	1.2
Robustness #2	-3.5	-3.1	-1.0	-0.1	0.7	1.0
Robustness #3	-4.1	-3.4	-1.9	-1.4	-0.7	-0.3
Robustness #4	-3.7	-3.2	-2.0	-1.6	-1.2	-0.9
Robustness #5	-3.8	-3.2	-1.4	-0.6	0.1	0.6
EC model						
Robustness #6	-3.6	-3.3	-1.1	0.0	1.0	1.5
Robustness #7	-3.6	-3.1	-1.2	-0.4	0.4	0.7
Robustness #8	-4.0	-3.3	-2.2	-1.7	-1.1	-0.6
Robustness #9	-3.6	-3.1	-1.4	-0.7	0.0	0.3
IMF "rule of thumb"						
Robustness #10	-3.5	-3.0	-1.3	-0.6	0.2	0.6
Full set of specifications						
Average	*-3.7*	*-3.2*	*-1.5*	*-0.7*	*0.0*	*0.4*
Min.	*-4.1*	*-3.4*	*-2.2*	*-1.7*	*-1.2*	*-0.9*
Max.	*-3.5*	*-3.0*	*-1.0*	*0.0*	*1.0*	*1.5*
Range (max - min)	*0.6*	*0.4*	*1.1*	*1.7*	*2.2*	*2.4*

Source: our estimates on Banca d'Italia, Istat, AMECO, OECD and IMF data.

Looking at the various estimates in more detail (Table 2), we see further evidence that the choice of the output gap and of the trade elasticities is crucial. A version of our baseline model with a narrower output gap (for 2015, -3.7 instead of -5.1 percent; Robustness #1) brings the cyclically-adjusted surplus in that year to 1.2 percent of GDP. If we use alternative trade elasticities within our baseline framework, the current account reaches 1 percent (Robustness #2)[26] or drops to -0.3 (Robustness #3).[27] Replacing export weights with activation weights in the calculation of the foreign output gap has instead a negligible impact on the results (Robustness #5), as taking the average over a large number of countries smooths out the discrepancies between the two sets of weights.

Our baseline results are broadly consistent with those obtained by various models based on the EC simplified approach (Robustness #7 and #9), if we exclude the models with a significantly narrower output gap (Robustness #6) or with very large trade elasticities (Robustness #8). Finally, our baseline estimate is largely in line with the IMF rule of thumb over the entire period (Robustness #10), despite the different modelling approach.

[26] The Robustness #2 exercise differs from the baseline specification only in that the elasticity of imports to the IAD-variable is calibrated form the cross-country panel regerssion of Bussière and co-authors (rather than the country-specific one), thus delivering θ_M^{IAD}=1.374.

[27] The Robustness #3 exercise considers an alternative (simpler) version of the IAD variable by Bussière et al. (2013). Specifically, we exploit their online appendix in order to re-define their IAD variable as a weighted average of exports and domestic demand, without further distinguishing among domestic demand components. We then re-run their regressions using the modified IAD variable in the place of the original one, and compute the corresponding long-run elasticity.

Is the discrepancy between our estimates and those produced by the EC mainly driven by the different methodology or by the choice of output gaps and trade elasticities? From Table 2 we can first assess the role played by ouput gaps within the EC model by comparing Robustness #6 with Robustness #7 and then gauge the joint contribution of varying the modelling approach and the elasticities by comparing Robustness #7 with our baseline, as the relative weight of these two elements cannot be easily disentangled. It turns out that the different output gaps are the most relevant factor, accounting on average for about two thirds of the discrepancy in the period after 2011.

As a final validation of our baseline results, they tend to be close to the average of all the estimates presented in Table 2.

5. The other major euro-area countries

For the sake of comparison we have applied our baseline model to the other main euro-area countries. While the algebra is unchanged, the domestic output gap is now derived as a simple average of the output gap estimates made by three different institutions (European Commission, IMF and OECD).[28] The foreign output gap is still a weighted average of the trading partners' output gaps, but weights are now calculated from the Cepii BACI dataset.[29] Finally, long-run import elasticities (to the IAD variable) are again taken from the country-specific estimates of Bussière et al. (2013), delivering, θ_M^{IAD}=1.636 for France, θ_M^{IAD}=1.167 for Germany and θ_M^{IAD}=1.898 for Spain; the export elasticity is the same for all countries (θ_X=1.896), since it is borrowed from the cross-country panel regression of Bussière and co-authors.

Figure 10 reports the main results. In 2015 the current account surplus of Germany, which already exceeded the upper threshold set by the EC Macroeconomic Imbalance Procedure (MIP), was even larger in cyclically-adjusted terms (9.7 percent of GDP, compared to the unadjusted 8.5 percent). The rather narrow German output gap implied in fact a small adjustment on the import side, whereas the large negative foreign output gap – owing mainly to the sovereign debt crisis in the euro area - resulted in a significant upward adjustment on the export side (1.3 percentage points of GDP in 2015). In contrast to the unadjusted surplus, which increased sharply before the crisis and then fluctuated between 6 and 7 percent until rising again in the last biennium, the cyclically-adjusted measure has been growing almost linearly without interruption since 2003: a simple time regression projects it in 2019 beyond 12 percent of GDP, twice the threshold set by the MIP.

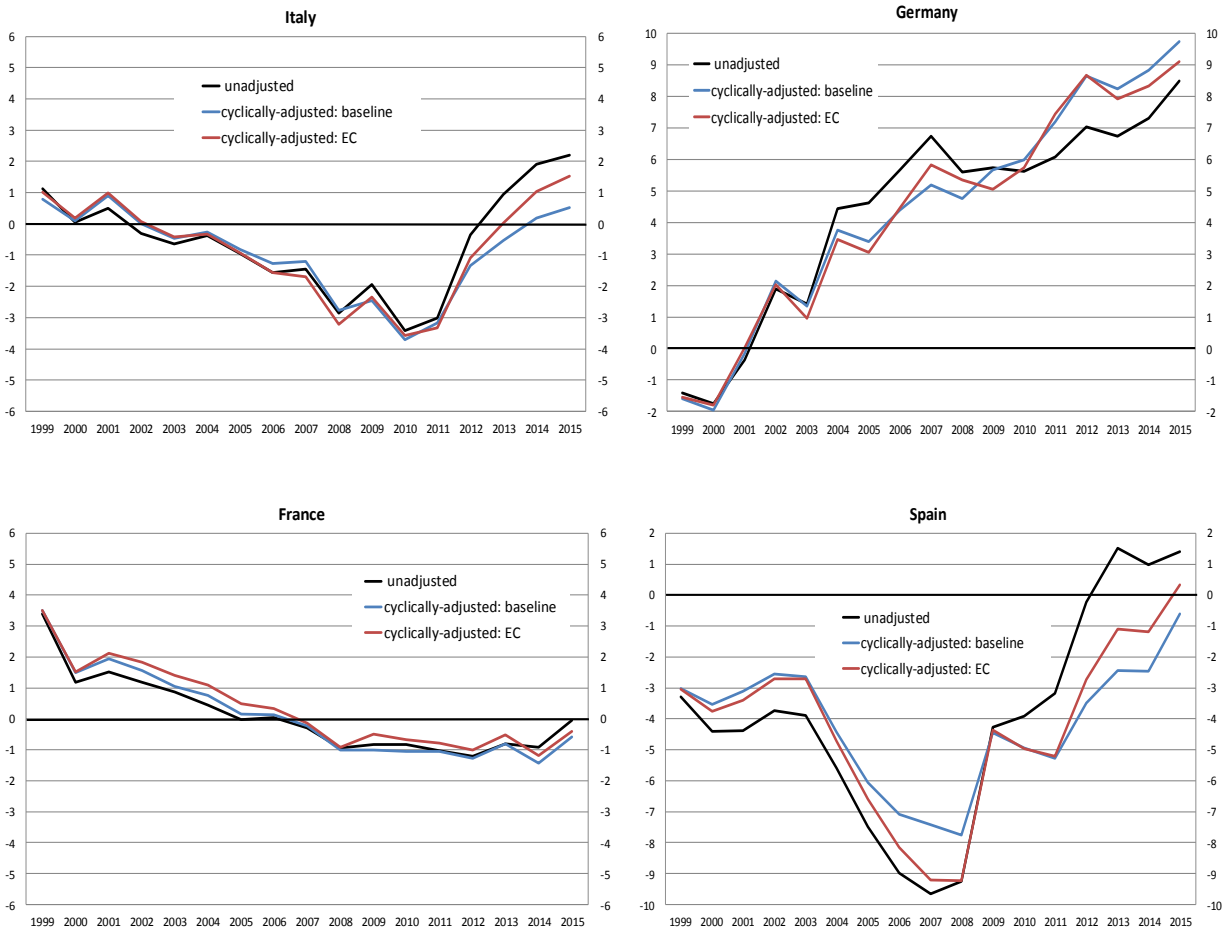
An even larger difference between the observed and the cyclically-adjusted current account balance arises in the case of Spain: the surplus observed in 2015 (1.4 percent of GDP) becomes a 0.6 percent deficit in cyclically-adjusted terms. The main factor behind such a large correction is the significant discrepancy between the domestic and the foreign output gap (-4.1 versus -1.6 percent, respectively); in addition, the calibrated import elasticity is the highest among the four main euro-area countries. The cyclical adjustment improves Spain's current account by more than 1 p.p. of GDP on average in the pre-crisis years, while it has a negative impact exceeding 3 p.p. on

[28] In the spirit of the output gap estimated for Italy by Banca d'Italia, which is an average of different models.

[29] BACI provides bilateral export values at the HS 6-digit product disaggregation, for more than 200 countries since 1995 (www.cepii.fr/cepii/en/bdd_modele/presentation.asp?id=1).

average after 2011. In contrast to the unadjusted series, which turns into surplus in 2013, the cyclically-adjusted current account balance still records a deficit well above 2 percentage points of GDP in 2013-14, falling to 0.6 p.p. in 2015 (also thanks to lower oil prices).

Figure 10: Cyclically-adjusted current account balance in the major euro-area countries
(as a percentage of GDP)



Source: our estimates on Banca d'Italia, Istat, ECB, AMECO, OECD, IMF and CEPII data.

Compared to the other main euro area countries, the impact of the cyclical adjustment is relatively small in the case of France, mainly reflecting the broadly symmetric developments of domestic and foreign output gaps.

As in the case of Italy, our estimates for the other three major euro-area countries are significantly different from those of the European Commission (the red lines in Fig. 10). Taking 2015 as an example, the latter point to a smaller cyclical adjustment for Germany (0.6 percentage points, compared to 1.3 obtained with our methodology), for Spain (-1.1 versus -2.0 points) and for France (-0.4 versus -0.6 points). Overall, these divergent results are driven by two main factors. First, the output gaps estimated by the EC tend to be narrower than those reported by the other institutions; in this perspective the decrease of imports in the countries hit by the sovereign debt crisis is interpreted as a structural phenomenon, which corresponds to a flat or even declining trend in the potential output of those countries. Second, the trade elasticities used by the EC (1.5

for all countries) tend to ignore country-specific differences and in particular appear to underestimate the import elasticity of Spain and overestimate that of Germany.

Both these elements concur to the European Commission's assessment of a noticeable reduction of macroeconomic imbalances in the euro area over the last few years. Conversely our analysis suggests a more nuanced view. After adjusting for cyclical conditions, macroeconomic imbalances appear in our estimates as being still fairly large, with a German surplus almost touching 10 percentage points of GDP and Spain still recording a mild deficit despite the fall of energy prices.

6. Concluding remarks

Over the last five years Italy managed an impressive adjustment of the current account balance, moving from a deficit of 3.4 percent of GDP in 2010 to a surplus of 2.2 percent in 2015. The rebalancing took place during a protracted phase of economic downturn characterised by a markedly weak domestic demand.

In this paper we evaluate the role played by cyclical factors in the sharp reversal of the external deficit. To this end, we develop an innovative methodology which derives the cyclically-adjusted current account balance from a combination of domestic and foreign output gaps and trade elasticities. We improve upon the existing literature by taking into account composition effects in an internally consistent framework, in the sense that, given exogenously estimated domestic and foreign output gaps, the potential levels of domestic demand, exports and imports are simultaneously derived. Moreover, we run an extensive sensitivity analysis; this is especially important given the significant margins of uncertainty surrounding, in particular, the estimates of potential output.

We estimate that Italy's cyclically-adjusted current account was in surplus for about 0.5 percentage points of GDP in 2015; taking into account the full set of alternative specifications, it ranged between -0.9 and +1.5 percent.

According to our estimates, the overall external rebalancing of the Italian economy since 2010 (5.6 percentage points of GDP) was for around three quarters of a non-cyclical nature: the cyclically-adjusted balance improved in fact by 4.2 points, with the fall of energy prices contributing for 1.2 points.

The application of our baseline model to the other main euro-area countries suggests that, after correcting for cyclical effects, external imbalances are larger and still sizeable. In cyclically-adjusted terms, in 2015 Germany recorded a surplus (which has grown almost linearly without interruption since the early 2000s) of almost 10 percent of GDP. On the other hand, the impressive rebalancing of the Spanish economy over the recent years is more muted, as the cyclically-adjusted current account still records a mild deficit.

Finally, our baseline results and the several alternative specifications and modelling strategies we have implemented indicate that the calibration of trade elasticities and of output gaps matters crucially for the assessment of cyclically-adjusted current account balances. In particular, we argue that the approach adopted by the European Commission tends to overestimate the cyclically-

adjusted balance for Spain, Italy and France over the recent period, and to underestimate that of Germany. This bias is not negligible and might lead to unwarranted policy implications.

Appendix: separating trade in goods from trade in services

Christodoulopoulou and Tkačevs (2014) present time-series estimates of trade elasticities for a large set of euro-area countries. They separate trade in goods from trade in services and, focusing on the import side, estimate the long-run elasticities of each of these two components relative to domestic demand on the one side and to overall exports on the other side. This appendix briefly shows how our baseline model can be amended in order to take advantage of their approach. In short, the model proposed in this appendix is isomorphic to our baseline model presented in the main text provided parameters η_D and η_X are appropriately defined.

We follow the logic of Christodoulopoulou and Tkačevs (2014) and posit that closing the domestic output gap affects imports of goods (MG) and imports of services (MS) in a isoelastic fashion as follows:

$$\frac{\Delta MG}{MG} = \theta_{MG,DD}\frac{\Delta DD}{DD} + \theta_{MG,X}\frac{\Delta X}{X},$$
$$\frac{\Delta MS}{MS} = \theta_{MS,DD}\frac{\Delta DD}{DD} + \theta_{MS,X}\frac{\Delta X}{X},$$

Potential overall imports are then defined as:

$$M^* := M + \Delta MG + \Delta MS$$
$$= M + \theta_{MG,DD}\frac{MG}{DD}\Delta DD + \theta_{MG,X}\frac{MG}{X}\Delta X + \theta_{MS,DD}\frac{MS}{DD}\Delta DD + \theta_{MS,X}\frac{MS}{X}\Delta X$$

By defining the time-varying parameters

$$\eta_D := \theta_{MG,DD}\frac{MG}{DD} + \theta_{MS,DD}\frac{MS}{DD}$$
$$\eta_X := \theta_{MG,X}\frac{MG}{X} + \theta_{MS,X}\frac{MS}{X},$$

the preceding expression can be restated in the same terms as equation [5] in the main text:

$$M^* = M + \eta_D(DD^* - DD) + \eta_X(X^* - X),$$

so that the rest of our previous exposition carries over.

Christodoulopoulou and Tkačevs (2014) focus on a country at a time and experiment with several econometric specifications, differing in the proxy for measuring the price competitiveness of imports relative to domestic supply. In order to calibrate the four elasticities $\theta_{MG,DD}$, $\theta_{MG,X}$, $\theta_{MS,DD}$ and $\theta_{MS,X}$ we take the average over the different specifications. We obtain the following set of calibrated parameters:

Country	$\theta_{MG,DD}$	$\theta_{MG,X}$	$\theta_{MS,DD}$	$\theta_{MS,X}$
France	1.940	0.490	0.263	0.248
Germany	1.538	0.598	1.295	0.123
Italy	1.648	0.318	1.348	0.498
Spain	1.196	0.738	1.700	0.313

References

Banca d'Italia (1986), "Modello trimestrale dell'economia italiana", Banca d'Italia Working Paper no. 80/1.

Bassanetti, A., M. Caivano and A. Locarno (2010), "Modelling Italian potential output and the output gap", Banca d'Italia Working Paper no. 771.

Blanchard, O. and F. Giavazzi (2002), "Current account deficits in the euro area: the end of the Feldstein-Horioka puzzle?", *Brookings Papers on Economic Activity*, 2: 147-186.

Blanchard, O. and G. M. Milesi-Ferretti (2012), "(Why) Should Current Account Balances Be Reduced?", *IMF Economic Review*, 60(1): 139-50.

Buiter, W.H. (1981), "Time preference and international lending and borrowing in an overlapping-generations model", *Journal of Political Economy*, 89: 769-797.

Bussière, M., G. Callegari, F. Ghironi, G. Sestieri, and N. Yamano (2013), "Estimating Trade Elasticities: Demand Composition and the Trade Collapse of 2008-2009", *American Economic Journal: Macroeconomics*, 5(3): 118–151.

Ca' Zorzi, M., A. Chudik, A. Dieppe (2009), "Current account benchmarks for Central and Eastern Europe: a desperate search?", ECB Working Paper no. 995.

Chinn, M.D. and E.S. Prasad (2003), "Medium-term determinants of current accounts in industrial and developing countries: an empirical exploration", *Journal of International Economics*, 59: 47-76

Christodoulopoulou S. and O. Tkačevs (2014), "Measuring the effectiveness of cost and price competitiveness in external rebalancing of euro area countries what do alternative HCIs tell us?", ECB Working Paper no. 1736.

Cottarelli, C. (2015), "Potential growth rates and the working of SGP fiscal rules", VoxEU, http://voxeu.org/article/assessing-compliance-stability-and-growth-pact-s-rules.

Darvas, Z. and A. Simon (2015), "Filling the gap: open economy considerations for more reliable potential output estimates", Bruegel Working Paper no. 2015/11.

ECB (2014), "To what extent has the current account adjustment in the stressed euro area countries been cyclical or structural?", Monthly Bulletin, January 2014.

Faruqee, H. and G. Debelle (1996), "What Determines the Current Account? a Cross-Sectional and Panel Approach", IMF Working Paper no. 96/58.

Freund, C. (2009), "The Trade Response to Global Downturns. Historical Evidence", World Bank's Policy Research Working Paper no. 5015.

Gruber, J.W. and S. B. Kamin (2007), "Explaining the global pattern of current account imbalances", *Journal of International Money and Finance*, 26: 500-522.

Havik, K., K. Mc Morrow, F. Orlandi, C. Planas, R. Raciborski, W. Roeger, A. Rossi, A. Thum-Thysen, V. Vandermeulen (2014), "The Production Function Methodology for Calculating Potential Growth Rates and Output Gaps", *European Economy, Economic Papers* no. 535.

Obstfeld (2012), "Does the Current Account Still matter?", NBER Working Paper no. 17877.

Obstfeld, M. and K. Rogoff (1995), "The intertemporal approach to the current account", *Handbook of International Economics*, 3: 1731-99.

Phillips, S., L. Catão, L. Ricci, R. Bems, M. Das, J. Di Giovanni, D.F. Unsal, M. Castillo, J. Lee, J. Rodriguez and M. Vargas (2013), "The External Balance Assessment (EBA) Methodology", IMF Working Paper no. 272.

Sachs, T.D. (1981), "The current account and macroeconomic adjustment in the 1970s", *Brookings Papers on Economic Activity*, 1: 201-268.

Salto, M. and A. Turrini (2010), "Comparing alternative methodologies for real exchange rate assessment", *European Economy, Economic Papers* no. 427.