Cyclically-adjusted current account balances in Portugal

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January 2019

Abstract
This article uses the methodology suggested by Fabiani *et al.* (2016) to compute cyclically-adjusted current account balances for the Portuguese economy in the period 1995-2017. The methodology makes use of domestic and foreign output gaps, export elasticities and the import content of domestic demand, distinguishing between cyclically-adjusted exports and imports. In addition, we compute the cyclically-adjusted bilateral exports and imports relative to the main Portuguese trade partners. We conclude that the strong current account adjustment observed in the Portuguese economy after 2010 was mainly structural, though a positive effect resulting from cyclical developments was also observed. (JEL: E32, F32, F40)

Introduction

The increase of the current account balance after 2010 is one of the major features of the macroeconomic rebalancing of the Portuguese economy, which took place in the context of the Portuguese Economic and Financial Assistance Program, implemented in the aftermath of the sovereign debt crisis in the euro area. According to the statistics of the Balance of Payments, the Portuguese current account balance evolved from a deficit of approximately 10 per cent of GDP in 2010 to a surplus of 0.5 per cent of GDP in 2017. Sizable current account adjustments have also taken place in other European Union (EU) countries. In this context, an important question is whether such developments resulted from a structural adjustment or simply from cyclical developments. This article tries to answer this question for the Portuguese economy.

Acknowledgements: The authors are thankful to Nuno Alves, António Antunes, Sónia Cabral, Sónia Félix, Miguel Gouveia, José Ramos Maria, Filipa Lima and António Rua for useful comments and suggestions. All errors and omissions are the sole responsability of the authors. The opinions expressed in this article are those of the authors and do not necessarily coincide with those of Banco de Portugal or the Eurosystem.

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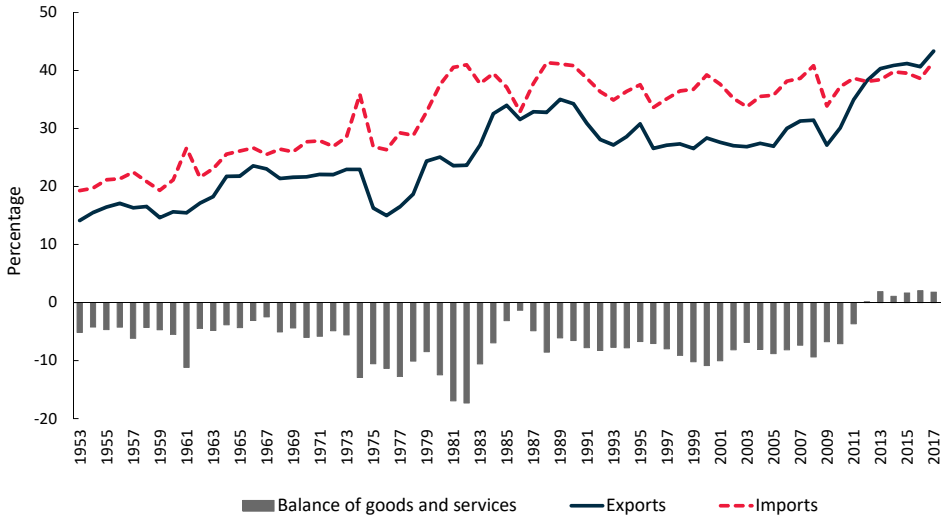
Current account imbalances and subsequent external financing difficulties have been recurrent in Portugal over the last six decades. In 1977-78 and 1983-84 Portugal underwent economic stabilization programs with the International Monetary Fund (IMF). Low private savings, important investment needs and fiscal imbalances repeatedly boiled down to deficits in the external accounts and sizable external financing requirements.

Figure 1 plots the share of exports, imports and the balance of goods and services as a percentage of GDP in a historical perspective. Economic developments in the Portuguese economy in the nineties and in the first decade of this century were characterized by large current account deficits that led to a strong deterioration of the net international investment position, which reached -108 per cent of GDP in 2009. The decreasing interest rates associated to the transition to a low inflation regime, on the way to the accession to the monetary union, greatly expanded domestic demand and this was aggravated by a pro-cyclical fiscal stance. The higher imports associated with the growing domestic demand coincided with a reshuffling of comparative advantages that led to a sizable loss of export market. This was motivated by the EU enlargement to Central and Eastern European countries and strong Asian competition. Moreover, the sluggish adjustment to the macroeconomic imbalances and the slow shift of resources from the non-tradable into the tradable sector implied a prolonged exposure to external risks, which materialized with the 2008 economic and financial crisis. The sudden-stop of external financing in some euro area countries and the self-reinforcing loop between bank and sovereign debt risks threatened the monetary union (see, for example, Salto and Turrini (2010)). In Portugal, the strong difficulties to access external financing led to an external assistance program in 2011 involving the European Commission, European Central Bank and the IMF, which included conditionality in several areas.

The period after 2011 has been characterized by improvements in the Portuguese external balance. As visible in Figure 1, these developments have been quite significant in historical terms. The small surpluses recently recorded in the balance of goods and services are in striking contrast with the large deficits of the last decades. Nevertheless, the adjustment of the Portuguese external balance took place in a context of contraction of economic activity, thus raising concerns about its sustainability in the recovery phase of the cycle. A complementary issue is the impact on the balance of goods and services of economic developments in the main trade partners, for example, to what extent the domestic adjustment in external accounts was made harder by parallel improvements in the current account balance of trade partners.

The literature comparing structural and cyclical current account balances has been growing in the last years. Initial methodological contributions were those of Sachs (1981) and Buiter (1981), while Obstfeld and Rogoff (1995) approached this topic from an intertemporal perspective. Several empirical applications, mostly basing on the relationship between external balances and



Source: Banco de Portugal (Séries Longas and BPStat; Statistics of the Balance of Payments)

FIGURE 1: Balance of goods and services as a percentage of GDP in Portugal 1952-2017

the savings-investment gap, discuss the fundamental determinants of current account balances (e.g. Faruqee and Debelle 1996; Milesi-Ferretti and Blanchard 2011; Chinn and Prasad 2003; Gruber and Kamin 2005; CáZorzi and A. Chudik 2009).

The literature presents two main methods of adjusting the current account balance for the impact of the cycle. The first method bases on the estimation of regressions where the current account balance is correlated with a set of demographic, macroeconomic, financial and institutional variables. The structural current account is obtained by applying the estimated coefficients to the (medium-term) trend values of the explanatory variables. This approach typically considers a panel of countries over a long period of time. Alternatively, it is possible to obtain the cyclical adjustment by estimating a short-run equation with the lagged current account balance and a set of variables that do not affect structural positions but have a short-run influence on the current account.

International organizations have been using and developing this type of methods. The IMF Consultative Group on Exchange Rates (CGER) and its most recent External Balance Assessment (EBA) method are a good example (see Phillips *et al.* (2013)). The European Commission has been using a method broadly similar to that of the IMF EBA, producing specific policy indicators. The OECD has also been using this type of methodology. In particular, Cheung and Rusticelli (2010) assess the link between structural and cyclical determinants of current account balances using panel data on dimensions like differences in demographics, fiscal positions, oil dependency, oil intensity and stage of economic development, amongst others. Tamara (2016) refers the

caveats of this type of methodology, pointing out that current account balances are estimated directly, considering both fundamental and shorter-term factors. Although the EBA framework is considered a strongly integrated and robust current account predictor, it is sensitive to data sources and endogeneity problems between current account balances and output gaps may arise. Moreover, this methodology does not consider the heterogeneity between countries neither, as mentioned by Sastre and Viani (2014), competitiveness factors.

As for Portugal, Afonso and Silva (2017) studied the decomposition of the current account between cyclical and structural components, using Germany as a benchmark to assess its determinants. More recently, Afonso and Jalles (2018) distinguished between cyclical and non-cyclical current account determinants, while providing a refinement and a counter check of the methodologies used when conducting policy decisions.

The second method of computing structural current account balances, focuses on the goods and services account and bases on international trade elasticities. A strong advantage of this approach is the possibility of adjusting separately the export and import components of the current account. Haltmaier (2014) quantifies the cyclical part of the current account balance for several countries by estimating a long-run (or trend) elasticity from a co-integration relationship between trade and income, as well as a short-run (or cyclical) elasticity.[1] The caveats of this approach lie on the uncertainty and revisions associated to output gaps and trade elasticities. In addition, it should be highlighted that the adjustments resulting from the methodology relate exclusively to the output gaps, i.e., all other changes in exports or imports attributable to temporary aspects are included in the structural component. This partly explains the moderate deviations between observed and cyclically-adjusted current account balances. Overall, the two methodological approaches should be taken as complementary and not as substitutes.

An important contribution to the latter strand of literature is that of Fabiani *et al.* (2016), which suggests a model that relies on trade elasticities for exports and imports. The authors focus on the Italian case but also apply the methodology to France, Germany and Spain. According to the results, the overall balancing of the Italian external accounts has largely been of a non-cyclical nature, with a positive contribution coming from the decline in the prices of energy commodities. For the other countries considered, they find that current account imbalances over the recent period are amplified when assessed in cyclically-adjusted terms. One important feature of Fabiani *et al.* (2016) is the explicit consideration of the composition effects associated with

1. The effects of foreign and domestic output gaps on real exchange rate deviations are used in other models, such as Wu (2008) and Kara and Sarikaya (2013).

the different components of domestic demand, as suggested by Bussière *et al.* (2013).

In this article we apply the methodology suggested by Fabiani *et al.* (2016) to the Portuguese economy in the period 1996-2017. We consider the cyclical adjustment of the current account, both for exports and imports. However, we do not discuss elements associated with energy prices nor with the income account. Nevertheless, we go beyond Fabiani *et al.* (2016) by calculating the adjusted exports and imports relatively to the main Portuguese trade partners, making use of estimated bilateral trade elasticities.

The rest of the article is organized as follows. In the next section, we briefly describe the methodology used for the cyclical adjustment of exports and imports, as suggested by Fabiani *et al.* (2016). Section *Data* identifies the data sources. The following section presents the results obtained in aggregate terms, details relatively to the main trade partners and discusses their robustness by using different output gaps and trade elasticities. The last section offers some concluding remarks.

Methodology

Aggregate adjustment

This section closely draws on Fabiani *et al.* (2016) to explain the main features of the model that generates the expressions used for the elasticity of exports and imports to foreign and domestic output gaps, respectively. We start from the basic definition of the current account balance (CAB):

$$CAB = Exports - Imports + BPI + BSI \tag{1}$$

where BPI and BSI stand for "Balance of Primary Income" and "Balance of Secondary Income", respectively. Nevertheless, our adjustment focuses exclusively on the goods and services account. In terms of notation, the home and foreign economies are presented as H and F, respectively. Moreover, current and potential GDP in the home country, in real terms, are identified as Y and Y^*, respectively. In the same way X^* and M^* stand for potential exports and imports in the home economy, in real terms. In addition, nominal variables are denoted as the product of the real counterpart and the corresponding price index.

As in Fabiani *et al.* (2016), home imports and exports are taken to be *isoelastic*, which means that an exogenously given constant long-run elasticity is assumed. Therefore, if the foreign (home) GDP increases by one percent, exports (imports) increase by $\Delta X(\Delta M)$ percent. Starting with the export side, potential exports in real terms are obtained as:

$$X^* = X + \Delta X = \\ = X\left(1 + \frac{\Delta X}{X}\right) = X\left(1 + \theta_x \times \frac{\Delta Y^F}{Y^F}\right) = X\left(1 + \theta_x \times \frac{-y^F}{1+y^F}\right) \quad (2)$$

where ΔX and ΔY^F are the differences between observed and prevailing levels of real exports and real foreign output at the potential (i.e., distances to the potential and not changes between consecutive periods), respectively, and θ_x represents the long-run elasticity of exports to foreign real GDP. In addition, the definition of the foreign output gap $y^F = (Y^F - Y^{*F})/Y^{*F}$ establishes the last term in equation (2):

$$\frac{\Delta Y^F}{Y^F} = \frac{-y^F}{1+y^F} \quad (3)$$

Next, assuming that prices (P_X and P_Y) are unchanged, the cyclically adjusted nominal exports (x^{adj}) is obtained by multiplying the unadjusted export share on GDP (x, computed in nominal terms) by the ratio of potential to actual real exports:

$$x^{adj} = \frac{P_X X^*}{P_Y Y} = \frac{P_X X}{P_Y Y} \times \frac{X^*}{X} = x\frac{X^*}{X} \quad (4)$$

Finally, combining equations (2) and (4), we write cyclically adjusted exports as:

$$x^{adj} = x\left(1 - \theta_x \frac{y^F}{1+y^F}\right) \quad (5)$$

The key exogenous variable is the foreign output gap y^F and the intuition is straightforward: the cyclical adjustment of exports depends negatively on the foreign output gap. If Portuguese trade partners' output is higher than their potential, they will import more and consequently domestic exports benefit from the cycle. The crucial export elasticity is based on the cross-country panel regression in Bussière *et al.* (2013).[2] In the Appendix A we present the methodology and results for the elasticities of home exports to foreign GDP ($\theta_x = 2.6$).

If home imports are assumed to be isoelastic to home GDP, an expression similar to that used for exports could be applied to determine cyclically-adjusted imports. However, as stated by Fabiani *et al.* (2016), this would be a very strong simplification for the import side. Imports are activated

2. In the panel regression we considered the following OECD countries: Australia; Belgium; Canada; Finland; France; Germany; Italy; Japan; Korea; Netherlands; New Zealand; Norway; Spain; Sweden; United Kingdom; United States. These were also the countries considered by Bussière *et al.* (2013), except for Denmark, for which the information was not available. The foreign output gap is the weighted average of individual output gaps with weights proportional to the share of these countries in Portuguese exports.

by demand, rather than GDP, thus it may be misleading not to distinguish between components of demand in order to allow for their different import intensities.

Bussière *et al.* (2013) suggests a new measure that reflects the import intensity of the different components of domestic expenditure and the import content of exports. This import intensity-adjusted measure of demand is labeled as IAD, and it is constructed for each country as:

$$IAD_t = C_t^{\omega_{C,t}} G_t^{\omega_{G,t}} I_t^{\omega_{I,t}} X_t^{\omega_{X,t}} \tag{6}$$

where C stands for private consumption, G for government consumption, I for investment, and X for exports. The weights, $\omega_{k,t}$, with $k = C, G, I, X$ are the total import contents of these final demand components. These weights are time-varying and normalized in each period such that their sum equals one.

Bussière *et al.* (2013) model imports as being activated by a geometric weighted average of the various demand components, with weights reflecting their relative import contents. The authors present rolling-window estimates confirming that the assumption of a stationary, time-invariant long-run elasticity of imports is reasonable only in the case of the IAD variable, whereas the long-run elasticity of imports to GDP shows an increasing trend. In this article, the IAD approach is implemented in a reduced-form approach, as in Fabiani *et al.* (2016). While the original version separately considers four components of demand (private consumption, public consumption, investment, exports), we just isolate the component that typically shows the highest import intensity: exports. This approach has also been used by Christodoulopoulou and Tkacevs (2016).

As in the case of exports, real imports are assumed to be isoelastic relatively to the reduced form IAD variable, which is a convex combination of exports and domestic demand (in log terms). Therefore, the growth rate of imports is given by:

$$\frac{\Delta M}{M} = \theta_M^{IAD} \frac{\Delta IAD}{IAD} = \theta_M^{IAD} \left[\omega_x \frac{\Delta X}{X} + (1 - \omega_x) \frac{\Delta DD}{DD} \right] \tag{7}$$

where θ_M^{IAD} is the constant long-run elasticity relatively to imports, which is calibrated using the regressions suggested in Bussière *et al.* (2013), ω_x is the weight of exports in building the IAD variable, and DD stands for domestic demand. As in Bussière *et al.* (2013) we compute the import intensity of each IAD component with global input-output tables, using a linear interpolation to construct quarterly series and normalizing so that they sum to unity.

Taking Δ as the difference between potential and current levels of the variables, potential imports are defined as:

$$M^* = M + \Delta M = M + \theta_M^{IAD} \omega_x \left(\frac{M}{X} \right) \Delta X + \theta_M^{IAD} (1 - \omega_x) \left(\frac{M}{DD} \right) \Delta DD \tag{8}$$

where $\theta_M^{IAD} = (\Delta IAD/IAD)/(\Delta Y/Y)$.

Similarly to what was done for export elasticities, the methodology and panel regression results for the elasticity of IAD are presented in Appendix A ($\theta_M^{IAD} = 1.48$). Next, equation 8 can be simplified to:

$$M^* = M + \eta_X(X^* - X) + \eta_D(DD^* - DD) \tag{9}$$

where $\eta_X = \theta_M^{IAD}\omega_x\frac{M}{X}$ and $\eta_D = \theta_M^{IAD}(1-\omega_x)\frac{M}{DD}$.

Considering the national accounts identity $Y^* = DD^* + X^* - M^*$ and including equation (9) we obtain:

$$Y^* = DD^* + X^* - [M + \eta_X(X^* - X) + \eta_D(DD^* - DD)] \tag{10}$$

then, solving with respect to DD it is possible to write equation (9) as:

$$M^* = M + \frac{\eta_D(Y^* - Y)}{1-\eta_D} + \frac{(X^* - X)(\eta_X - \eta_D)}{1-\eta_D} \tag{11}$$

Equation (11) expresses the level of imports that would prevail if domestic and foreign output were jointly taken at their potential level, thus simultaneously determining (home) exports and domestic demand. These are the two components of aggregate demand that activate imports, each with a specific intensity. Moreover, the relative share of potential domestic demand and potential exports determine potential imports and are coherent with potential output.

As in 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):

$$m^{adj} = \frac{p_M M^*}{p_Y Y} = \frac{p_M M}{p_Y Y}\frac{M^*}{M} = m\frac{M^*}{M} \tag{12}$$

where m denotes the unadjusted import share on GDP (computed in nominal terms). Finally, the adjusted current account, which is the ultimate object of interest, is given by:

$$ca^{adj} = x^{adj} - m^{adj} + bpi + bsi, \tag{13}$$

where bpi and bsi denote the unadjusted balance of primary income and secondary income, as percentage of GDP.

Bilateral adjustment

In this article, we go beyond the methodology previously presented and take a bilateral perspective. Conceptually, this is not different from what was described above, though it involves explicitly considering the output gap of

the different trading partners and the structure of imports originating from them. Therefore, there is a larger number of (bilateral) import elasticities to be estimated.

On the export side, the cyclically adjusted exports of country i (home) to country j are obtained as:

$$x_{ij}^{adj} = x_{ij}\left(1 - \theta_x \frac{y_j}{1+y_j}\right) \tag{14}$$

where x_{ij} represents the unadjusted bilateral exports of country i to country j on home GDP. As before, we assume that the long-run elasticity of exports is the same for all countries: $\theta_x = 2.6$. The main difference is that the adjustment of bilateral exports relies on the foreign output gap which, in this case, is considered to be the individual output gap of country j and not a weighted average of those of the main trade partners.

The cyclical adjustment of imports of country i from country j is given by:

$$m_{ij}^{adj} = m_{ij}\frac{M_{ij}^*}{M_{ij}} \tag{15}$$

where m_{ij} represents the unadjusted bilateral imports of country i from country j on GDP of country i and M_{ij}^* measures the bilateral potential imports, which are defined as:

$$M_{ij}^* = M_{ij} + \frac{\eta_{ij}^D(Y^* - Y)}{1-\eta_{ij}^D} + \frac{(X_{ij}^* - X_{ij})(\eta_{ij}^X - \eta_{ij}^D)}{1-\eta_{ij}^D} \tag{16}$$

In addition, bilateral elasticities are given by:

$$\eta_{ij}^X = \theta_{Mij}^{IAD}\omega_x\frac{M_i}{X_i} \tag{17}$$

and

$$\eta_{ij}^D = \theta_{Mij}^{IAD}(1-\omega_x)\frac{M_i}{DD_i} \tag{18}$$

where θ_{Mij}^{IAD} represents the bilateral elasticity of the IAD variable.

Data

The implementation of the methodologies described in the previous section required a large amount of statistical information and some hypotheses. Firstly, the source of comparable cross-country data was the OECD Economic Outlook (November 2018). In particular, we used quarterly data from Q4 1995 until Q4 2017 for the volumes of GDP and its components: government consumption, private consumption, gross total fixed capital formation,

imports and exports of goods and services. Moreover, we collected the corresponding deflators of GDP and total imports of goods and services.

Secondly, the information on the domestic and foreign output gaps, which are key elements in the methodology, was collected from the IMF World Economic Outlook (April 2018). It is widely acknowledged that estimates of output gaps depend on the method used for computation (statistical or structural methods) and are sensitive to revisions of data.[3] For this reason in subsection *Robustness* we evaluate the results obtained with different output gaps for the Portuguese economy. Nevertheless, in order to ensure the consistency of results we take the a common statistical source for domestic and foreign output gaps: the IMF World Economic Outlook.

Thirdly, the estimation of the long-run elasticity of the IAD requires information contained in global about input-output matrices. For this purpose we used the 2016^{th} edition of the OECD Inter-Country Input-Output database (ICIO), which includes information for a total of 71 countries and 34 industries (according to a classification based on ISIC Rev3) on an annual basis from 1995 until 2011.

Finally, bilateral trade flows are not available in existing databases. Therefore, in order to break down the aggregate of total real imports in the OECD database, we assume that the share of each country on nominal and real Portuguese total imports is equal. The shares of the different partners in nominal trade flows are taken from Portuguese National Statistics.

Results

In this section, we present the results for the cyclically-adjusted current account balance of the Portuguese economy between 1995 and 2017. Firstly, we present the results for trade elasticities estimations. Secondly, we separately examine the adjustment for exports and imports. Thirdly, we compute the cyclical adjustment of exports relatively to the main Portuguese trade partners. Moreover, we present the cyclically adjusted current account balance for different series of the Portuguese output gap. Finally, we test the impact on the cyclical adjustment that results from using different elasticities. These two exercises make it possible to evaluate the robustness of the main results, while highlighting the uncertainty underlying this methodological approach.

We estimated trade elasticities both for exports and imports according to the methodology previously described. The Appendix A presents the results of the elasticity of home exports to foreign GDP (Table A.2). As in Bussière

3. For a discussion on output gap methodologies with an emphasis on Portugal see Banco de Portugal (2017).

et al. (2013), the exports elasticity is obtained through a panel regression and is assumed to be the same for all countries. We considered only the coefficients statistically significant at a 10 percent level and obtain $\theta_x = 2.6$.[4] The elasticity of imports to the *IAD* is also described in Appendix A and, using the statistically significant parameters, it is equal to $\theta_M^{IAD} = 1.48$.

Cyclically-adjusted exports and imports

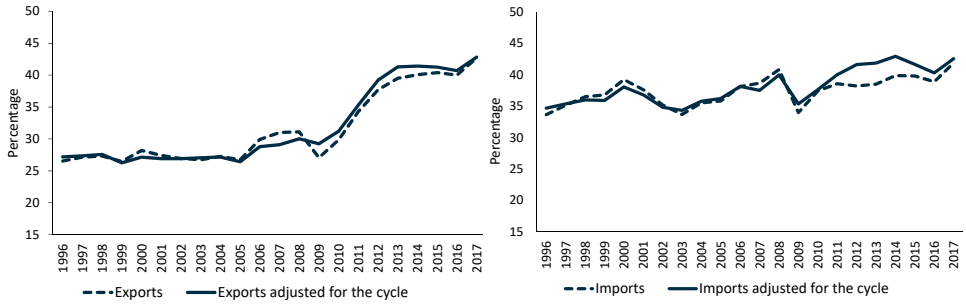
Panel A of Figure 2 presents the series for the observed and cyclically-adjusted Portuguese exports as a percentage of GDP, basing on equation (5). The element that stands out is the sharp increase in the share of exports as a percentage of GDP since the turn of the century. This corresponds to the adjustment of the Portuguese productive structure to the new pattern of comparative advantages that followed the enlargement of the EU to Central and Eastern European countries and the rise of Asian competition in the mid-nineties. Those were negative shocks to Portuguese exports and the recovery that followed started well before the economic and financial crisis of 2008 and the subsequent sovereign debt crisis in the euro area.

The cyclical developments in foreign clients did not strongly affect the path of domestic exports. In the years before the 2008 crisis, the positive foreign output gaps drove Portuguese exports above their structural level. Conversely, the problems that emerged in the aftermath of the sovereign debt crisis led the ratio of exports on GDP to increase less than potential. More recently, the dynamics of exports moderated and they have remained close to the structural level as a percentage of GDP. Overall, the gap between observed and structural export to GDP ratios has been relatively small, never exceeding 2.2 percentage points (p.p.) in absolute terms (Appendix B).

In panel B of Figure 2 we show the results for the adjustment of Portuguese imports to the domestic cycle, taking into account the structure of domestic demand, as presented in equation (12). The results show that from 1996 to 2008 the changes in imports of goods and services as a percentage of GDP were largely of a structural nature. Nevertheless, after this period the observed import ratio stood systematically below the structural level, meaning that the contraction of domestic demand that was associated to a negative output gap brought down imports significantly. In this period, the strongest cyclical adjustment of imports represented 3.4 p.p. of GDP in 2012 and 2013, while the smallest adjustment stood close to zero in 2006 (Appendix B).

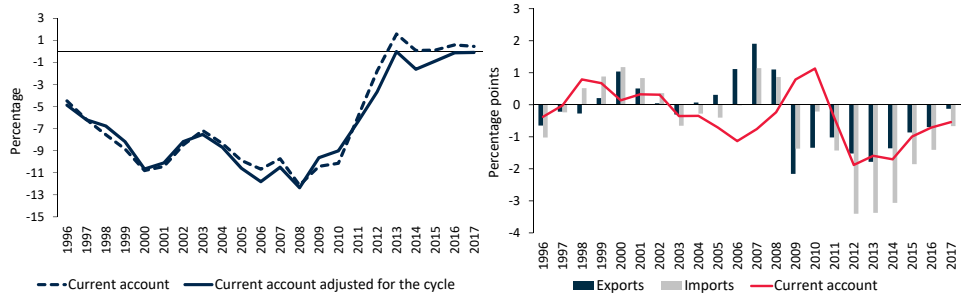
When the cyclical adjustment of exports and imports is combined, we obtain the proxy of the structural current account balance as a percentage of GDP for the Portuguese economy (Figure 3). In panel A we present the balance

4. In the robustness section we assess the impact of considering exactly the same export elasticity as in Bussière *et al.* (2013).



(A) Exports (B) Imports

FIGURE 2: Cyclically-adjusted exports and imports (percentage of GDP), national accounts statistics



(A) Observed and cyclically-adjusted current account balances (B) Contributions to cyclical adjustments

FIGURE 3: Cyclically-adjusted current account balance (percentage of GDP), national accounts statistics

and in panel B the contributions of exports and imports to the difference between the adjusted and observed values. According to our results, the observed external balance stood about 0.5 p.p. of GDP lower than structural in the period 1998-2001, mostly due to the impact of the cycle on imports. From 2003 onwards the adjustment reversed (except in 2009 and 2010), amounting to 1.5 p.p. of GDP in the average of the period 2012-2015 period, due to the effect of imports, which was not compensated by the fact that exports also stood below their structural level. Finally, in the most recent years the gap between adjusted and non-adjusted current account balances progressively diminished to 0.5 p.p. in 2017.

Overall, the adjustment of the Portuguese current account balance to the economic cycle is not very large. Nevertheless, a clear message is that most of the correction observed in the Portuguese current account balance in the latest years has a structural nature. Although the structural balance remains

negative in the period studied, 2017 stands as the year with the second lowest deficit in the sample (-0.1 per cent of GDP).

Detail for the main trade partners

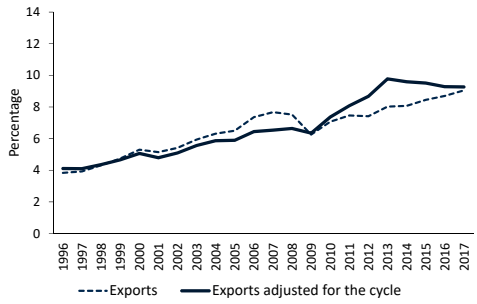
The developments in the Portuguese current account balance are affected by cyclical developments in the main trade partners, notably in terms of demand for Portuguese exports. Moreover, Portuguese imports adjusted for demand differ for each trade partner. Therefore, by using the estimated bilateral elasticities, changes in the domestic output gap have a different impact on imports from each trade partner. In this subsection we take Spain, Germany and France and assess the cyclical adjustment on bilateral exports and imports.[5]

These three countries represent a large share of Portuguese international trade in the period considered. Spain, Germany and France are the three top export destinations and import origins, representing together 60 and 70 per cent of these aggregates in 2017, respectively.

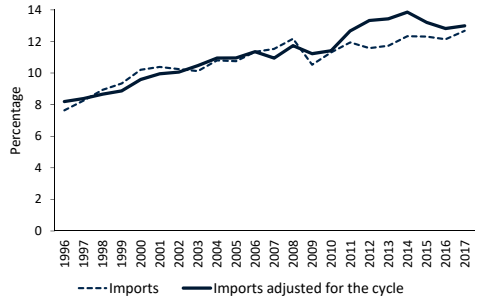
Figure 4 presents the results for the three countries and shows some differences. Spain (panels A and B), which has been reinforcing its role as the main trade partner, is the country where the the distance between the observed and structural exports a percentage of GDP is higher. The structural exports stood above the observed ratio in the years before the sovereign debt crisis but turned significantly below trend afterwards due to the downturn in the Spanish economy, while correcting its own macroeconomic imbalances. Nevertheless, this gap has diminished in 2017. As for Portuguese structural imports from Spain, they stood slightly above the observed ratio up to the sovereign debt crisis but the severe downturn of the Portuguese economy reversed this situation. Overall, the adjustment in exports and imports partly offset each other, which should be seen as a normal situation among strongly integrated economies, whose business cycles are synchronized.

Relatively to Germany, which has broadly stabilized its importance as a Portuguese trade partner, the adjustments in exports are very small (panel C). This is partly explained by the fact that this country was not significantly affected by the sovereign debt crisis in the euro area. As for imports, the adjustment is important and results from the high bilateral elasticity estimated for the import content of domestic demand components (panel D). As for France (panels E and F), whose share in Portuguese exports has increased very significantly in the latest years, structural exports and, mostly, imports stood above what was observed.

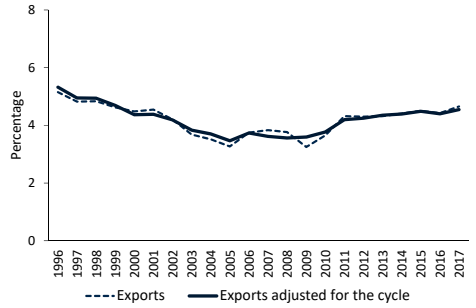
5. Bilateral IAD coefficients for Spain, Germany and France vis-à-vis Portugal are: $\theta^{IAD}_{M_{ESP}} = 0.94$; $\theta^{IAD}_{M_{DEU}} = 1.57$; $\theta^{IAD}_{M_{FRA}} = 0.84$.



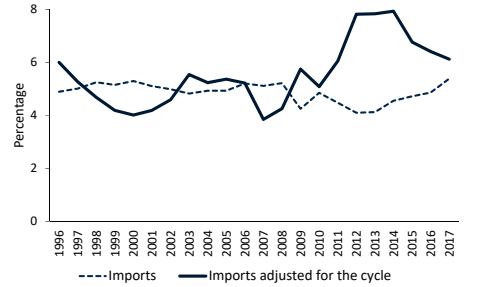
(A) Spain - exports



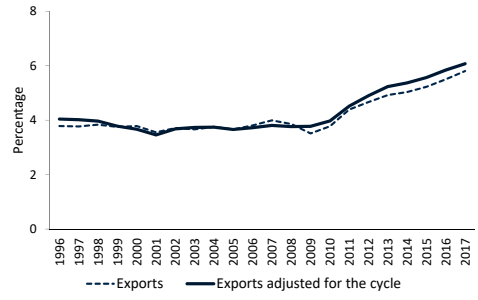
(B) Spain - imports



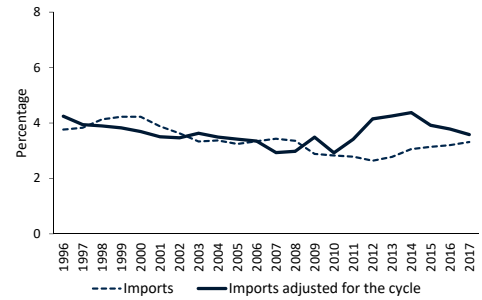
(C) Germany - exports



(D) Germany - imports



(E) France - exports

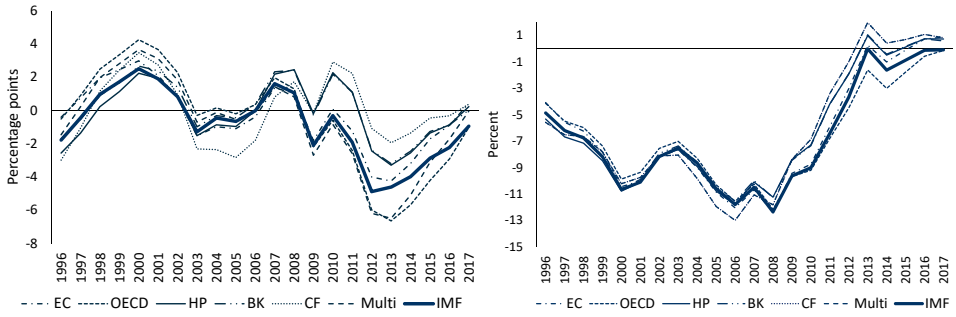


(F) France - imports

FIGURE 4: Cyclically-adjusted exports/imports vis-à-vis Spain, Germany and France (percentage of GDP)

Robustness

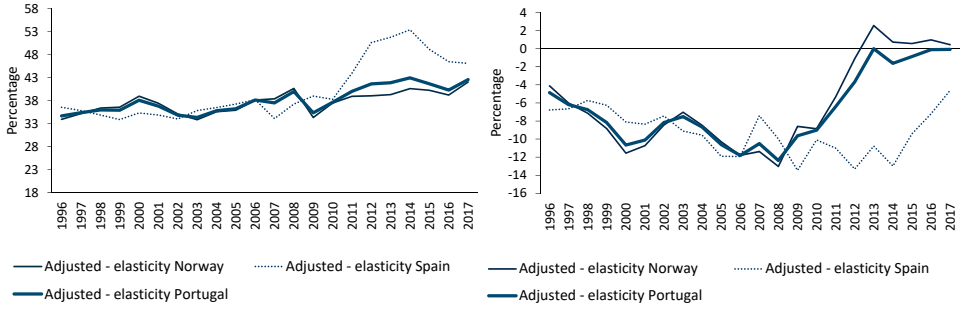
There is uncertainty regarding some parameters in the methodology, which may affect the results obtained for the Portuguese cyclically-adjusted current account balance as a percentage of GDP. In order to assess the robustness of results, we recomputed the adjusted current account balances with different series for the Portuguese output gap and for a range of import elasticity estimates.



(A) Output gaps (B) Adjusted current account

FIGURE 5: Robustness of results - Output gap

Notes: HP- Hodrick–Prescott filter; BK- Baxter-King filter; CF- Christiano-Fitzgerald filter, Multi- Multivariate filter.



(A) Adjusted imports (B) Adjusted current account

FIGURE 6: Robustness of results - Elasticity of imported adjusted demand

Panel A of Figure 5 plots several series for the Portuguese output gap from 1996 to 2017. Beyond our baseline output gap (of the IMF) we show estimates by the OECD, European Commission and calculations by Banco de Portugal with different statistical filters. The range of output gap estimations is considerable, reaching more than 4 p.p. of GDP in some periods. The panel B of Figure 5 plots the cyclically adjusted balances with the different output gap series. This exercise only affects the adjusted imports and it is visible that the main features of the results are not altered. Foreign output gaps are part of the calculations for cyclically-adjusted exports but the consideration of different estimates for all these variables is beyond the scope of this article.

In addition, we computed the cyclically adjusted imports and the subsequent current account balance using the highest and lowest import elasticities that would emerge from adopting the methodology for the set of countries considered to compute the Portuguese external demand,

particularly the ones for Spain ($\theta_{IAD}^{ESP} = 2.68$) and Norway ($\theta_{IAD}^{NOR} = 0.51$), respectively (Figure 6). The difference relatively to the benchmark situation is strong if we use the Spanish elasticity as the structural adjustment only takes place in the recent years. In any case the structural correction of the Portuguese current account balance is visible. It should be noted that these alternative elasticities affect the parameters η_X and η_D in equation (11) and have a non-linear impact on adjusted imports.

Another robustness exercise consists of computing the cyclically-adjusted current account balance with the export elasticity used by Fabiani *et al.* (2016), that is $\theta_x = 1.9$ instead of our $\theta_x = 2.6$. We observe that this change does not affect the structural current account balance in any significant way, thus we do not plot it. Finally, we replicated the overall exercise excluding exports and imports of energy products and the results remain qualitatively unchanged.

Final remarks

The current account balance is a key macroeconomic indicator. Although in the nineties and early years of the new century its importance was somewhat downplayed for the case of countries taking part in a monetary union, the global economic and financial crisis of 2008 and the euro area sovereign debt crisis that followed have shown that countries cannot run prolonged current account deficits and strongly deteriorate the net external position.

As in the case of other macroeconomic variables, exports and imports are affected by cyclical developments. Therefore, it is important to disentangle structural and cyclical developments. In this article, we adopt the methodology presented by Fabiani *et al.* (2016) and apply it to the Portuguese economy in the period 1995-2017. In addition, we extend the analysis to the bilateral dimension and identify specific adjustments for the Portuguese exports and imports with its main trade partners.

We conclude that the strong current account adjustment observed in the Portuguese economy after 2010 was mainly structural, though a positive effect from cyclical developments is also observed. Taking the average of the period 2012-2017, the cyclically adjusted current account balance lies 1.2 p.p. below the observed balance. In 2017, the structural current account balance stood at -0.1 percent of GDP. The results are robust for different series of the Portuguese output gap and import elasticities. As for the bilateral analysis, we conclude that the recession in the main Portuguese trade partner (Spain) deteriorated Portuguese exports. However, for Germany and France the adjustments to exports are small but relevant for imports.

The Portuguese current account balance has strongly improved after the euro area sovereign debt crisis and the subsequent Portuguese economic and financial assistance program. Although the methodology only adjusts the current account balance for domestic and foreign output gaps, thus

leaving other all other fluctuations unaffected, the structural nature of the Portuguese adjustment is visible. Nevertheless, this trend should be reinforced and a continuing screening of current account developments is necessary. Only through near balance or positive current account balances will the Portuguese external indebtedness decrease, reducing exposure to future external economic and financial risks.

References

Afonso, António and João Jalles (2018). "Decomposing and Analysing the Determinants of Current Accounts' Cyclicality: Evidence From the Euro Area." Working Papers 2018-42, ISEG - Lisbon School of Economics and Management.

Afonso, António and Jorge Silva (2017). "Current account balance cyclicality." *Applied Economics Letters*, 24(13), 911–917.

Banco de Portugal (2017). "Potential output: Challenges and uncertainties."

Buiter, Willem (1981). "Time Preference and International Lending and Borrowing in an Overlapping-Generations Model." *Journal of Political Economy*, 89(4), 769–97.

Bussière, Matthieu, Giovanni Callegari, Fabio Ghironi, Giulia Sestieri, and Norihiko Yamano (2013). "Estimating Trade Elasticities: Demand Composition and the Trade Collapse of 2008-2009." *American Economic Journal: Macroeconomics*, 5(3), 118–151.

CáZorzi, M. and A. Dieppe A. Chudik (2009). "Current account benchmarks for Central and Eastern Europe: A desperate search?" ECB Working Papers 995, European Central Bank.

Cheung, D. Furceri, C. and E. Rusticelli (2010). "Structural and Cyclical Factors behind Current-Account Balances." Working paper 775, OECD Economics Department.

Chinn, Menzie D. and Eswar S. Prasad (2003). "Medium-term determinants of current accounts in industrial and developing countries: An empirical exploration." *Journal of International Economics*, 59(1), 47–76.

Christodoulopoulou, Styliani and Olegs Tkacevs (2016). "Measuring the effectiveness of cost and price competitiveness in external rebalancing of euro area countries: What do alternative HCIs tell us?" *Empirica*, 43(3), 487–531.

Fabiani, Silvia, Stefano Federico, and Alberto Felettigh (2016). "Adjusting the external adjustment: Cyclical factors and the Italian current account." Questioni di Economia e Finanza (Occasional Papers) 346, Bank of Italy, Economic Research and International Relations Area.

Faruqee, Hamid and Guy Debelle (1996). "What Determines the Current Account? A Cross-Sectional and Panel Approach." IMF Working Papers 346, International Monetary Fund.

Gruber, Joseph W. and Steven B. Kamin (2005). "Explaining the global pattern of current account imbalances." International Finance Discussion Papers 846, Board of Governors of the Federal Reserve System.

Haltmaier, Jane (2014). "Cyclically Adjusted Current Account Balances." International Finance Discussion Papers 1126, Board of Governors of the Federal Reserve System.

Kara, A. Hakan and Cagri Sarikaya (2013). "Cyclically Adjusted Current Account Balance." Research Notes 18, Research and Monetary Policy Department, Central Bank of the Republic of Turkey.

Milesi-Ferretti, Gian M and Olivier J Blanchard (2011). "(Why) Should Current Account Balances Be Reduced?" IMF Staff Discussion Notes 3, International Monetary Fund.

Obstfeld, Maurice and Kenneth Rogoff (1995). "The intertemporal approach to the current account." In *Handbook of International Economics*, *Handbook of International Economics*, vol. 3, edited by G. M. Grossman and K. Rogoff, chap. 34, pp. 1731–1799. Elsevier.

Phillips, Steven T, Luis Catão, Luca A Ricci, Rudolfs Bems, Mitali Das, Julian Di Giovanni, Filiz D Unsal, Marola Castillo, Jungjin Lee, Jair Rodriguez, and Mauricio Vargas (2013). "The External Balance Assessment (EBA) Methodology." IMF Working Papers 272, International Monetary Fund.

Sachs, Jeffrey D. (1981). "The Current Account and Macroeconomic Adjustment in the 1970s." *Brookings Papers on Economic Activity*, 12(1), 201–282.

Salto, Matteo and Alessandro Turrini (2010). "Comparing alternative methodologies for real exchange rate assessment." European Economy - Economic Papers 427, European Commission.

Sastre, Teresa and Francesca Viani (2014). "Countries' safety and competitiveness, and the estimation of current account misalignments." Working Papers 1401, Banco de España.

Tamara, Tinti (2016). *External sustainability analysis*. Master's thesis, Nova School of Business and Economics, Portugal.

Wu, Yi (2008). "Growth, Expansion of Markets, and Income Elasticities in World Trade." *Review of International Economics*, 16(4), 654–671.

Appendix A

A.1. Elasticity of imports to the Imported Adjusted Demand (IAD)

Bussière *et al.* (2013) show that the total import content of an expenditure component, assuming S sectors and v final demand components in the economy and that the output of each sector is used both as an intermediate and to satisfy final demand, can be defined as:

$$\omega_v = \frac{uM_v^{ind} + uM_v^{dir}}{uF_v^d + uF_v^m} = \frac{uA^m(1-A^d)^{-1}F_v^d + uF_v^m}{uF_v^d + uF_v^m} \tag{A.1}$$

where u is a $1 \times S$ vector with all elements equal to one and the subscript v selects the v^th column of each matrix corresponding to the expenditure components of interest. $(1-A^d)^{-1}$ stands for the usual Leontief inverse, A^d is an $S \times S$ matrix of domestic input coefficients, A^m is the $S \times S$ matrix of imported input coefficients, F^d is the matrix of final demands of domestic goods and services and the direct imports are given by the $S \times V$ matrix, $F^m = M^{dir}$. Therefore, ω_v allows us to capture the IAD aggregate to be used in the regressions.

The estimation of the IAD elasticity follows the theoretical underpinnings of some empirical trade literature, notably the CES demand system. Under CES preferences, the logarithm of import demand is determined by:

$$lnM_t = lnD_t + \beta_p lnP_{M,t} \tag{A.2}$$

where D_t is aggregate demand (a CES aggregation of domestic and imported goods) and $P_{M,t}$ is the relative import price. This equation is estimated in first differences either for a panel of countries or for each country separately to obtain the elasticities of imports. However, standard measures of aggregate demand are replaced with IAD. Therefore:

$$\Delta lnM_{k,t} = \sum_{l=0}^{L} \beta_{IAD,l} \Delta lnIAD_{k,t-l} + \sum_{l=0}^{L} \beta_{P,l} \Delta lnP_{M,k,t-l} + \sum_{l=1}^{L} \beta_{M,l} \Delta lnM_{k,t-l} + \varepsilon_{k,t} \tag{A.3}$$

where k is a country, Δ denotes first differences and $\varepsilon_{k,t}$ is the error term. Applying the steady-state condition for a maximum of one lag we obtain:

$$\Delta lnM_{k,T} = \frac{\widehat{\beta}_{IAD,0} + \widehat{\beta}_{IAD,1}}{(1-\widehat{\beta}_{M,1})} \Delta lnIAD_{k,T} + \frac{\widehat{\beta}_{P,0} + \widehat{\beta}_{P,1}}{(1-\widehat{\beta}_{M,1})} \Delta lnP_{M,k,T} \tag{A.4}$$

Table A.1 presents the results of the regression estimated for Portugal, which leads to $\theta_M^{IAD} = 1.48$. It should be noted that coefficients for prices are not statistically significant at a level of 10 percent.

$M_{k,t}$	Coef.	Std. Error	t	P-value
$M_{k,t-1}$	-0.343	0.123	-2.79	0.007
$IAD_{k,t}$	1.381	0.122	11.32	0.00
$IAD_{k,t-1}$	0.61	0.209	2.92	0.00
$P_{M,k,t}$	0.003	0.108	0.26	0.798
$P_{M,k,t-1}$	0.123	0.107	1.15	0.254
R^2=71.1	Number of periods=63		F(5,57)=31.52	

TABLE A.1. Import elasticity estimates for Portugal

A.2. Elasticity of home exports to foreign GDP

The long-run elasticity of home exports to foreign GDP is assumed to be equal to the long-run elasticity of imports to GDP in the cross-country panel regression. It requires running the following panel regression:

$$\Delta lnM_{k,t} = \delta_k + \sum_{l=0}^{L} \beta_{GDP,l} \Delta lnGDP_{k,t-l} + \sum_{l=0}^{L} \beta_{P,l} \Delta lnP_{M,k,t-l} + \sum_{l=l}^{L} \beta_{M,l} \Delta lnM_{k,t-l} + \varepsilon_{k,t} \quad \text{(A.5)}$$

where k is a country, Δ denotes first differences, δ_k is the country fixed effects and $\varepsilon_{k,t}$ is the error term. Applying the steady-state condition for a maximum of one lag we obtain:

$$\Delta lnM_{k,T} = \frac{(\widehat{\beta}_{GDP,0} + \widehat{\beta}_{GDP,1})}{(1 - \widehat{\beta}_{M,1})} \Delta lnGDP_{k,T} + \frac{(\widehat{\beta}_{P,0} + \widehat{\beta}_{P,1})}{(1 - \widehat{\beta}_{M,1})} \Delta lnP_{M,k,T} \quad \text{(A.6)}$$

Table A.2 presents the results of the regression estimated for Portugal, which leads to $\theta_x = 2.6$. It should be noted that coefficients for lagged imports, prices and the constant are not statistically significant, at a 10 percent level.

A final note regards the extension of the methodology to the bilateral dimension. In all stages of the IAD computation and in the regression that estimates elasticity of imports, the conceptual approach is similar. This implies taking sub-blocks of the global input-output matrix and bilateral export and import flows.

$M_{k,t}$	Coef.	Std. Error	t	P-value
$M_{k,t-1}$	-0.061	0.046	-1.34	0.201
$GDP_{k,t}$	1.606	0.294	5.46	0.00
$GDP_{k,t-1}$	0.994	0.102	9.74	0.00
$P_{M,k,t}$	-0.190	0.078	-2.44	0.027
$P_{M,k,t-1}$	0.005	0.059	0.09	0.928
R^2=0.36	Number of obs. (17 countries)=1,071			F(5,16)=102.32

TABLE A.2. Exports elasticity estimates for Portugal

Appendix B: Observed and cyclically adjusted exports and imports

	Exports			Imports			Current account		
	Observed	Adjusted	Difference	Observed	Adjusted	Difference	Observed	Adjusted	Difference
1996	26.5	27.2	-0.6	33.7	34.7	-1.0	-4.5	-4.9	0.4
1997	27.1	27.4	-0.2	35.1	35.4	-0.2	-6.2	-6.2	0.0
1998	27.3	27.6	-0.3	36.5	36.0	0.5	-7.5	-6.8	-0.8
1999	26.5	26.3	0.2	36.8	35.9	0.9	-8.9	-8.2	-0.7
2000	28.2	27.2	1.0	39.3	38.1	1.2	-10.8	-10.7	-0.1
2001	27.4	26.9	0.5	37.6	36.8	0.8	-10.4	-10.1	-0.3
2002	26.9	26.9	0.0	35.2	34.8	0.4	-8.5	-8.2	-0.3
2003	26.8	27.1	-0.3	33.7	34.3	-0.7	-7.2	-7.5	0.4
2004	27.3	27.2	0.1	35.5	35.8	-0.3	-8.3	-8.7	0.3
2005	26.7	26.4	0.3	35.8	36.2	-0.4	-9.9	-10.6	0.7
2006	29.9	28.8	1.1	38.1	38.2	0.0	-10.7	-11.8	1.1
2007	31.0	29.1	1.9	38.7	37.5	1.1	-9.7	-10.5	0.8
2008	31.1	30.0	1.1	40.8	40.0	0.9	-12.1	-12.4	0.2
2009	27.1	29.2	-2.2	34.0	35.4	-1.4	-10.4	-9.6	-0.8
2010	29.9	31.2	-1.3	37.4	37.6	-0.2	-10.1	-9.0	-1.1
2011	34.3	35.3	-1.0	38.6	40.0	-1.4	-6.0	-6.4	0.4
2012	37.7	39.2	-1.5	38.2	41.6	-3.4	-1.8	-3.7	1.9
2013	39.5	41.3	-1.8	38.5	41.9	-3.4	1.6	0.0	1.6
2014	40.1	41.4	-1.4	39.9	43.0	-3.1	0.1	-1.6	1.7
2015	40.4	41.3	-0.9	39.8	41.7	-1.9	0.1	-0.9	1.0
2016	40.0	40.7	-0.7	38.9	40.3	-1.4	0.6	-0.1	0.7
2017	42.7	42.8	-0.1	41.9	42.6	-0.7	0.5	-0.1	0.5

TABLE B.1. Yearly observed and cyclically adjusted exports and imports as a percentage of GDP