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Current account imbalances in the Euro area: competitiveness or financial cycle? *

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Abstract

The current account imbalances that are at the heart of the European sovereign debt crisis are often attributed to differences in price competitiveness. However, recent research suggests that domestic demand booms related to the financial cycle may have been more important. As this would have very different policy implications, this paper aims to investigate the relative role of price competitiveness and domestic demand as drivers of the current account imbalances in the euro area. We estimate panel error-correction models for exports, imports and the trade balance. We specifically look at fluctuations in domestic demand at the frequency of the financial cycle. We conclude that although differences in price competitiveness have an influence, differences in domestic demand are more important than is often realized. Fluctuations at the frequency of the financial cycle are more suitable to explain the trade balance than fluctuations at the frequency of the normal business cycle. Our results call for more emphasis on credit growth and macro prudential policy, in addition to the current attention for competitiveness and structural reforms.

Keywords: current account deficits, Economic and Monetary Union, competitiveness, domestic boom, financial cycle.
JEL Classification: E32, F32, F41, F44.

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1. INTRODUCTION

It is by now well-established that current account imbalances are at the heart of the European sovereign debt crisis (Pisani-Ferry, 2012a). The increasing imbalances between the core and the periphery of the euro area are often attributed to the divergence in price competitiveness since the start of the monetary union. Differentials in inflation and the growth of unit labour costs were indeed very persistent. The responsiveness of relative prices seems low within the monetary union, possibly due to structural rigidities on labour- and product markets (Biroli, Mourre and Turrini, 2010; Jaumotte and Morsy, 2012).

In the policy debate and literature, a lot of emphasis is therefore placed on the role of price competitiveness in the process of current account rebalancing within the monetary union. It is concluded that the countries in the periphery need to restore competitiveness by bringing inflation and unit labour cost growth below the euro area average. This is often seen as a long and painful process, which could even drive individual member states towards deflation. The focus on competitiveness therefore usually leads to a plea for structural reforms on product and labour markets, that would speed up the adjustment of relative prices. However, several much more controversial "solutions" have also been proposed. One is that rebalancing requires higher inflation in the core countries of the euro area (De Grauwe, 2011), or even a higher inflation target for the ECB (Darvas, 2012). Some go as far as to claim that countries would benefit from a "euro holiday" (Sinn and Sell, 2012). Such a temporary exit from the common currency would allow these countries to restore price competitiveness via an exchange rate devaluation.

Yet the actual rebalancing that has occurred so far since the financial crisis does not seem to be fully in line with this competitiveness story (Figure 1). In fact, most of the euro area countries with current account deficits have already achieved balanced current accounts or – in the case of Ireland – even a current account surplus. This is despite the fact that the adjustment of relative prices has only been slow and partial, at least until recently (Figure 2). Real effective exchange rates have not returned to the levels at the start of EMU, and losses in price competitiveness have therefore not been fully restored yet.

[FIGURES 1 AND 2 AROUND HERE]

This type of adjustment is in itself in line with the global pattern after the financial crisis. Lane and Milesi-Ferretti (2012) show that the correction of global current account imbalances has mainly occurred via expenditure reduction, while expenditure switching via real exchange rates played little role. However, the pattern does question whether divergences in price competitiveness have been the *only* cause of the current account imbalances in the euro area. The recent literature is raising qualifications from various angles.[1] One is that countries are also affected by factors outside the euro area, like the destination and composition of exports (Chen, Milesi-Ferretti and Tressel, 2012). While German exports of capital and durable consumer goods benefited from high demand in emerging markets and oil producers, Southern European exports face increasing competition from low wage countries like China.

A second but often overlooked line of recent research focuses instead on the role of imports and domestic demand. Several authors suggest that domestic demand booms are a more important cause of the current account deficits in southern Europe than the loss in price competitiveness (Wyplosz, 2013; Di Comite et al., 2013; Diaz Sanchez and Varoudakis, 2013). In this literature, the increase in unit labour costs is primarily seen as a byproduct of domestic demand growth, and not as the main cause of the current account deficits (Gaulier and Vicard, 2012; Gabrisch and Staehr, 2012). These divergences in domestic demand have long remained underexposed in the current debate, but seem quite plausible drivers of the current account imbalances in the euro area. Indeed, the euro area did experience surprisingly large and long-lasting divergences in the strength of domestic demand growth since 1999 (Figure 3). Domestic demand growth was very strong in several peripheral member states before the crisis, particularly in Spain, Ireland and – to a lesser extent – Greece. Meanwhile domestic demand growth was much more subdued in Germany and Austria. EMU member states experienced surprisingly similar divergences in the growth of real credit (Figure 4) and real house prices (Figure 5), which suggests that financial factors may have been important drivers. Indeed, the strength of credit and house prices before the financial crisis was partly a global phenomenon (Hessel and Peeters, 2011; Borio, 2012), with Germany as one of the few exceptions. But in the euro area, it has also been fuelled by the decline of real interest rates in especially the periphery due to EMU-membership (Holinsky, Kool and Muysken, 2012). This pattern reversed after the financial crisis, as especially the boom countries experienced a strong correction in the growth of credit, house prices and domestic demand.

[1]Another interpretation is that additional improvements in price competitiveness remain important for a durable resolution of imbalances (Guillemette and Turner, 2013). In this view, the lack of relative price adjustment has made the recession unnecessarily deep and the adjustment in current accounts a largely temporary phenomenon.

[FIGURES 3, 4 AND 5 AROUND HERE]

While the link between credit driven demand booms and current account imbalances may be relatively new in the recent policy debates for the euro area, it is much more established in the academic literature. Mendoza and Terrones (2012), for example, show that credit booms tend to boost domestic demand and widen external deficits. Vice versa, Lane and McQuade (2014) show that net capital inflows (as measured by, for instance, current account deficits) tend to increase domestic credit growth. Jordà, Schularick and Taylor (2011) show that the link between credit booms and current account deficits has become much closer in recent decades The link between credit and current accounts also suggests a role for the so-called financial cycle. Recent research reveals several characteristics of the financial cycle (Drehmann, Borio and Tsatsaronis, 2012; Borio, 2012a,b). First, the financial cycle is mainly driven by credit and house price growth. Second, the financial cycle has a much wider amplitude and longer duration than normal business cycles. While normal business cycles have a frequency of up to 8 years, the frequency of the financial cycle is thought to be between 16 and 20 years. Finally, a downturn of the financial cycle is often accompanied by a financial crisis.

It therefore seems important to determine the relative role of competitiveness and demand booms more precisely. If the current account imbalances were indeed largely driven by demand booms related to the financial cycle, this would have important policy implications. First, current account imbalances caused by unsustainable demand booms would be able to partly correct themselves without an immediate adjustment in relative prices. A turn in the financial cycle will likely trigger a correction in domestic demand, as banks, households and companies increase savings and engage in a process of deleveraging to reduce debt. This correction happens irrespective of the movements of the real effective exchange rate in this period. Second, this rebalancing of current accounts due to the financial cycle may also be larger and more lasting than many realize, given the longer duration of financial cycles. Finally, it is not sufficient to only monitor price competitiveness, more emphasis on the financial cycle and on credit and asset price growth would be just as important. Therefore, in addition to the existing European mechanisms to foster structural reforms, like Europe 2020 and the macroeconomic imbalance procedure (MIP), a European macro-prudential policy framework would also be very important (Schoenmaker, 2013).

This paper therefore aims to investigate the relative role of price competitiveness and domestic demand as drivers of the current account imbalances within the monetary union. We estimate panel error-correction models for exports, imports and the trade balance in a panel of 17 euro area countries. We use various measures of the real effective exchange rate for price competitiveness, and try to distinguish between tradable and non-tradable prices (Ruscher and Wolf, 2009; Kang and Shambaugh, 2013). In the export equation we incorporate a country-specific measure of foreign demand, which should capture differences in the composition and destination of exports. New compared to the recent literature on euro area current account imbalances is that we estimate a separate equation for imports, where we take into account differences in the strength of domestic demand. In the estimation of the trade-balance, we use a gap-measure for domestic demand. As conventional output-gap measures do not adequately take into account the financial cycle (Borio, Disyatat and Juselius, 2013; 2014), we introduce and investigate several new measures that should adjust for this, inspired by the recent literature.

We find that price competitiveness has a clear influence on current account imbalances, but that domestic demand booms driven by the financial cycle have been more important than is realized in the policy debate and much of the literature. The influence of price competitiveness is clearest on export performance, but at the same time the influence of external demand on differences in exports performance is larger. This confirms the findings by Chen et al. (2012) and Wierts et al. (2014) that the destination and composition of exports matters substantially. The influence of price competitiveness on imports is more difficult to find, in line with the results of Christodoulopoulou and Tkačevs (2014). Domestic demand is by far the most important driver of imports. Regarding changes in the trade balance, we find that differences in domestic demand are a more important driver than differences in price competitiveness, which confirms findings by Wyplosz (2013) and in particular by Diaz Sanchez and Varoudakis (2013). This holds both for the buildup of trade imbalances in the period 1999-2007 and for their correction between 2008 and 2012. Finally, we find that changes in domestic demand at the frequency of the *financial* cycle explain these movements in the trade balance much better than changes at the frequency of the normal *business* cycle. While this is more or less implicated by, for instance, Borio (2012), it was to our knowledge not confirmed yet in empirical research.

The rest of the paper is structured along the following lines. Section 2 provides an overview of various aspect of the literature. Section 3 lays out our methodology, while section 4 provides information on the data. Section 5 presents the results and section 6 concludes.

2. OVERVIEW OF THE LITERATURE

Several strands of literature are related to our research question. The first strand addresses the role of price competitiveness in the recent current account imbalances within the euro area. Many recent papers focus on the effects of price competitiveness on *export* performance. The general conclusion is that competitiveness matters, but with important qualifications. One qualification in this literature is that rebalancing is not a purely internal process, as an important share of exports is directed towards countries outside the euro area (Darvas, 2012). This implies that the division of the adjustment between core and periphery countries matters in the rebalancing process. An adjustment via higher inflation in core countries would, for instance, hurt the competitiveness of the euro area as a whole. Another important finding is that exports are also affected by factors outside the euro area, which are hard to influence in the short run. One is the euro exchange rate (Darvas, 2012; Chen, Milesi-Ferretti and Tressel, 2012), that may affect individual member states in different ways. Another factor that is difficult to influence is the destination and composition of exports. While German exports of capital and durable consumer goods benefited from high demand in emerging markets and oil producers, Southern European exports face increasing competition from low wage countries like China (Chen et al., 2012). More generally, a higher share of high tech exports increases export growth and the elasticity of exports to foreign demand, while it reduces the price elasticity of exports (Wierts, Van Kerkhoff and De Haan, 2014).

Several recent papers focus instead on the role of price competitiveness and of domestic demand on *import* performance. Recent contributions to this literature suggest that demand booms may be a more important cause of the current account deficits than the loss in price competitiveness (Wyplosz, 2013; Di Comite et al., 2013; Diaz Sanchez and Varoudakis, 2013). Several peripheral member states, like Spain and Ireland experienced a boom in domestic demand on the back of high credit and house price growth. This upturn in the financial cycle was partly a global phenomenon (Hessel and Peeters, 2011; Borio, 2012) but has also been fuelled by the decline of real interest rates due to EMU-membership (Holinsky, Kool and Muysken, 2012). The booms eventually turned out to be unsustainable and were corrected during the global financial crisis. This line of literature tends to see the increase in unit labour costs primarily as a byproduct of domestic demand growth, and not as the main cause of the deficit. Gabrisch and Staehr (2012) confirm that the current account deficit Granger causes relative unit labour cost growth, but not vice versa. Gaulier and Vicard (2012) find that growth in unit labour costs in euro area countries was highly correlated with the growth of imports, while the correlation with export growth was low. Ruscher and Wolff (2009) underline that the differentials in unit labour costs growth are strongly related to wages in the non-tradable sector, that have little effect on export performance.

While the link between credit driven demand booms and current account imbalances may be relatively new in the recent debates for the euro area, it is actually much more established in the academic literature. Mendoza and Terrones (2012), for example, identify credit booms in a sample of 61 advanced and emerging economies between 1960 and 2010, and show that these booms tend to boost domestic demand and widen external deficits. Vice versa, Lane and McQuade (2014) show for a sample of 30 European countries between 1993 and 2008 that net capital inflows (as measured by, for instance, current account deficits) tend to increase domestic credit growth. They obtain similar results for a wider sample of 54 advanced and emerging economies. Jordà, Schularick and Taylor (2011) show for 14 advanced countries between 1870 and 2008 that the link between credit booms and current account deficits has become much closer in recent decades.

The role of booms and busts in domestic demand is closely linked to the recent literature on the financial cycle. An increasing number of studies investigates the characteristics of the financial cycle (Drehmann, Borio and Tsatsaronis, 2012; Borio, 2012).[2] The first outcome is that the financial cycle is driven by growth in credit and house prices, while stock prices play a much smaller role. Second, the financial cycle has a much longer duration and wider amplitude than normal business cycles. While normal business cycles have a frequency of up to 8 years, the frequency of the financial cycle is thought to be between 16and 20 years. Finally, the correction of the financial cycle is often accompanied by a financial crisis. Research also tries to quantify the financial cycle. This is not straightforward, as conventional calculations of the output gap do not take into account the more medium term fluctuations that are related to the financial cycle (Borio, Disyatat and Juselius, 2013; Gilbert and Hessel, 2013). Some papers therefore use the gap in the credit to GDP-ratio calculated with a statistical filter over lower frequencies (Alessi and Detken, 2009; Drehmann et al., 2010). Others filter GDP-data that are corrected for fluctuations in the current account to come up with something resembling a domestic absorption gap (Dobrescu and Salman, 2011; Lendvai, Moulin and Turrini, 2011). More recently Borio, Disyatat and Juselius (2013, 2014) adjust output gap measures by estimating a relationship between GDP, credit and house prices.

[2] We are not aware of any papers that directly link the financial cycle to the current account imbalances in the euro area.

Our empirical strategy is also related to literature on the estimation of aggregate trade equations. For instance, Hooper, Johnson and Marquez (2000) estimate trade elasticities for G7 countries in the short-run and long-run using cointegration techniques. Their results suggest that foreign demand and domestic demand are the most relevant drivers for exports and imports, respectively. They also find price effects, and report that price elatisticities for imports are lower than generally found in the literature. Meanwhile, Clarida (1996) estimates structural demand equations for imported consumer durables based on a theoretical model, where the real spending on import durables is influenced by the relative prices (as durable/non-durable) and consumption of non-durable goods. More recently, Bayoumi, Harmsen and Turunen (2011) estimate the export performance for euro area countries using county-specific foreign demand together with price competitiveness indicators, proxied by various measures of the real effective exchange rate (REER). The results suggest that the elasticity of exports with respect to aggregate foreign demand is positive and highly significant, but the coefficient on price competitiveness varies widely, depending on the specific measure. Trade volumes are also studied for G7 countries by Funke and Nickel (2006). The exports equation uses as explanatory variables a foreign real income measure, which represents foreign demand, and the relative price of exported goods, a sort of real exchange rate.[3] In the import equation, import demand is a function of the relative price of imported goods and domestic real income (see also Goldstein and Khan, 1985). Quite importantly, imports are determined by the composition of domestic demand (the equation distinguishes indeed between consumption (private and public) and investment expenditure) but also by exports. Exports are relevant as increasing vertical integration and supply has increased the import content of exports. In line with expectations, Funke and Nickel (2006) show that in the export equation, the relative price variable is negative and the foreign income coefficient is positive. For imports, all demand variables show the expected positive effect, while the price elasticity is negative as expected.[4] Very recently, Christodoulopoulou and Tkačevs (2014) estimate export and import equations for individual euro area countries. They find that price competitiveness clearly matters for exports, but that the effect for imports is less obvious.

Finally, our empirical approach is also related to the literature on the trade balance and the so-called "J-curve". The estimated equation for the trade balance is usually derived from the

[3] The relative price of exported goods is given by this formula: (WPXG*r)/PXG, where WPXG is world export prices in US$, r is the nominal US$ exchange rate and PXG is domestic export prices.
[4] The negative sign is because it has been calculated for the imports equation as the relative price of imported goods.

theoretical model introduced among others by Goldstein and Khan (1985)[5] and Rose (1991), where the trade balance is driven by demand in the home country and the foreign country and the real exchange rate.[6] Much of the empirical literature is concerned with the effect of the real exchange rate on the trade balance. In the long run, a devaluation – or an increase in price competitiveness – is thought to improve the trade balance, if there is a stable long-run relationship between the trade balance and the real exchange rate and if the so-called Marshall-Lerner condition holds.[7] However, in the short run there may be a "J-curve" effect, as the balance may deteriorate before it starts to improve. This is because quantities may only adjust slowly and therefore the price effect may dominate in the short run.

Empirical estimations for the trade balance show that the presence of a "J-curve" effect is at best ambiguous (Gomez and Alvarez Ude, 2006; Ng et al., 2006; Bahmani-Oskooee and Ratha, 2007). The general consensus is that the short-run response of the trade balance to currency depreciation does not follow any specific pattern. The results are basically country specific (Bahmani-Oskooee and Ratha, 2004). To the best of our knowledge, there are still no contributions in a panel context on the effect of demand, or related gaps, and real (effective) exchange rate on the aggregate trade balance.

3. METHODOLOGY

Description of the model

We investigate the relative importance of price competitiveness and domestic demand in explaining current account imbalances in a panel setup for euro area countries. We focus on the trade balance and its components because it is the largest part of the current account and because it is most directly connected to price competiveness. Although the other components of the current account have also played some role in the euro area (Holinski, Kool and Muysken, 2012; Kang and Shambaugh, 2013), the trade balance explains most of the fluctuations and cross-country differences in the current account (European Commission, 2009). We therefore

5 The trade balance in Goldstein and Khan (1985) is measured as the difference between exports and imports and as a percentage of GDP. Another definition of the trade balance is imports/exports (Rose and Yellen, 1988).
6 The RER measures the cost of foreign goods relative to domestic goods. It gives a measure of competitiveness, and it is a useful variable for explaining trade behavior and national income.
7 The Marshall Lerner condition states that if domestic and foreign supply elasticities are infinitely elastic, a devaluation (an increase in competitiveness) causes an improvement of the trade balance when domestic plus foreign demand elasticities, in absolute value, exceeds one. A generalized version is the Bickerdike-Robinison-Metzler (BRM) condition, which states that the effect of a depreciation of the real exchange rate on the trade balance depends on the relative size of demand and supply elasticities for both imports and exports .

believe that the trade balance is a reasonable approximation for the current account balance for these countries in this period.

We estimate separate equations for exports, imports and the trade balance. The attention for imports is relatively new in the literature on euro area current account imbalances. The framework for our model follows the structure of a typical dynamic panel data model with lagged dependent variables. We use the Autoregressive Distributed Lag (ARDL) model as described, for instance, by Pesaran and Shin (1997). Although the coefficients on lagged dependent variables might not be our primary interest, the introduction of these lags becomes crucial to control for the dynamics of the process. We decided to keep one lag for the dependent variable and the regressors are added contemporaneously and lagged by one period.[8]

Following Hooper et al. (2000), we start with the model for aggregate exports, where we use two regressors both expressed in logs. The first one captures the effects of price competitiveness, proxied by various measures of the real effective exchange rate (*reer*). We also consider also the role of country-specific foreign demand (fd), calculated as weighted average of the real GDP of each trading partner (see section 3). In line with the recent literature on euro area export performance (Di Mauro, Forster and Lima, 2010; Bayoumi, Hansen and Turunen, 2011) our ARDL framework becomes:

$$exp_{i,t} = \lambda_i exp_{i,t-1} + \delta_{10i} reer_{i,t} + \delta_{11i} reer_{i,t-1} + \delta_{20i} fd_{i,t} + \delta_{21i} fd_{i,t-1} + \mu_i + \varepsilon_{i,t} \qquad (1)$$

The equation used for aggregate imports considers 3 regressors, also expressed in logs. First, we again use price competitiveness proxied by the various measures for the *reer*. Second, we use several proxies of domestic demand (*dd*) (Hooper et al., 2000), as described below in the data section. Finally, we also incorporate exports (*exp)* as a driver of import growth, in line with Funke and Nickel (2006) and Christodoulopoulou and Tkačevs (2014). This should capture imports that are directly linked to the manufacturing of export goods.[9] Due to vertical integration and supply chain trade, an increasing share of exports requires imports of components and other intermediate goods. It could also help to deal with other trends in imports that are difficult to explain. Our ARDL-equation becomes:

[8] After applying the Akaike information criterion (AIC) and the Bayesian information criterion (BIC) for the lag selection, we decided to use 1 lag for both dependent and independent variables. We applied different combination of lags for the variables in our 3 equations and the differences are minor. We decided therefore to keep the simplest framework.
[9] While export growth may therefore be an important driver of import growth, the causality is unlikely to go the other way. We therefore do not incorporate import growth in the export growth equation.

$$imp_{i,t} = \lambda_i imp_{i,t-1} + \delta_{10i} reer_{i,t} + \delta_{11i} reer_{i,t-1} + \delta_{20i} dd_{i,t} + \delta_{21i} dd_{i,t-1} + \delta_{30} exp_{i,t} + \delta_{31} exp_{i,t-1} + \mu_i + \varepsilon_{i,t} \quad (2)$$

Finally, in addition to the equations for imports and exports separately, we estimate a third equation to analyze the trade balance, where the dependent variable is taken as trade balance-to-GDP ratio (tb).[10] First of all, this equation for the trade balance estimates a measure that is more directly comparable to the current account balance. Second, as the trade balance is stationary (see below) this allows us to estimate an equation that is less sensitive to the strong trend increase in exports and imports. This alternative specification should therefore increase the robustness of our results. Finally, the stationarity of the trade balance also allows us to add various *gap* measures of domestic demand as explanatory variable, in addition to the various measures of price competitiveness. The advantage of a gap measure is that it indicates more directly what part of domestic demand was driven by cyclical and hence unsustainable developments. But as gap measures are stationary, they are more difficult to incorporate directly in the import and export equations. The mostly used indicator for the demand shock is the (relative) output gap. However, standard output gaps do not properly take into account the financial cycle (Borio, 2012) and we use several gap measures that should correct for this (*fcycle*, see below). This specification can be viewed as an improvement of the J-curve literature on the relation between trade balance and real exchange rate and an interesting adoption of the recent literature on financial cycle measures (Drehman et al., 2010; Borio et al., 2012). To our knowledge, it has not been studied yet together with the competitiveness variables. The equation becomes:

$$tb_{i,t} = \lambda_i tb_{i,t-1} + \delta_{10i} reer_{i,t} + \delta_{11i} reer_{i,t-1} + \delta_{20i} fcycle_{i,t} + \delta_{21i} fcycle_{i,t-1} + \mu_i + \varepsilon_{i,t} \quad (3)$$

Data sources and description

The data we use to estimate the model cover the period from 1994:Q1 to 2012:Q3 with quarterly frequency for 17 euro area countries.[11] The complete description of the variables and

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[10] The trade balance-over-GDP ratio is taken in log form as following: [log(exports)-log(imports)] / log(GDP) where all the variables are in real terms. This is because this calculation is most directly comparable to the current account balance, which is usually measured as a percentage of GDP. We have also tried other calculations of the trade balance, most importantly log(exports)/log(imports). The results with this other measure are very similar.

[11] The countries are Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia and Spain. Concerning Belgium and Luxembourg, separated data are not available until 1997 for most of the variables. Following the suggestion by C. Davis (Princeton University), we decided to assign them to Belgium. We have chosen 1994 as a starting point for our data because this is the first year in which all the former Soviet countries that are now in the euro area were independent (Estonia (1991), Slovenia (1992) and Slovakia (1993)).

their sources is available in the Annex. The dependent variables are imports, exports or the trade balance over GDP. Those are obtained *vis-à-vis* the rest of the world and they are in real terms. The nominal data are taken from IMF IFS in current USD, we therefore use the exchange rate EURUSD from Eurostat in order to calculate nominal data in euro. We deflate the data using deflators from the AMECO database, interpolating the annual data to obtain them in quarterly terms.

To measure price competitiveness, we use various measures for the real effective exchange rate (REER) from Eurostat and the EU Commission DG ECFIN database. The REER is measured against a broad group of 36 trading partners[12] and deflated in different ways, using the GDP-deflator, the consumer price index (CPI), unit labour costs (ULC) for the total economy and export prices. We also decompose the real effective exchange rate further into tradable and non-tradable prices. This allows us to better understand the exact effects of price competitiveness in the light of the qualifications raised by Wyplosz (2013) and Gaulier and Vicard (2012). We use the decomposition from Ruscher and Wolff (2009), where the non-tradable or internal part of the REER is calculated as the "broad component" $REER_{gdp}$ (REER with GDP as the deflator) divided by the "narrow component" or tradable component $REER_{exp}$ (REER with export prices as the deflator).

Our measure of foreign demand (fd) is country-specific and calculated on the basis of real GDP data from the IMF International Financial Statistics (IFS) and trade data from the IMF Direction of Trade Statistics (DOTS). More specifically, to obtain demand of the rest of the world for euro area countries, we use real GDP of each trading partner weighted by the percentage of the trade of the reporter country *vis-à-vis* each partner.[13] For some countries (Malta, Cyprus, Luxembourg, Ireland and Greece) we use annual data for real GDP (the only one available for the 90s) interpolated using cubic splines to have them in quarterly frequency.

Data for domestic demand (dd) are also taken from the IMF IFS.[14] For some countries (Malta, Cyprus, Luxembourg, Ireland and Greece) we use annual data interpolated to obtain them in a quarterly frequency. For some countries (Belgium, Luxembourg, Ireland, Spain, Portugal,

[12] The partners are: the EU countries (EU27) and other industrial countries (Australia, Canada, United States, Japan, Norway, New Zealand, Mexico, Switzerland, and Turkey).

[13] The partners are the EA17, other European countries (Sweden, Switzerland, the UK) and the main geographical areas defined by the IMF (Africa, Central and Eastern Europe, Developing Asia, Middle East, Western Hemisphere).

[14] Defined according to ESA 95 standards as the sum of final consumption expenditure of household (and NPISHs) and the government, as well as gross fixed capital formation. For some countries we calculate domestic demand as GDP minus net exports instead (see data description in the annex).

Slovakia and Greece) and some periods (in the 90s), the data come from OECD (estimated values) and are built as GDP minus net exports.

Finally, we calculate various gap measures for the financial cycle (*fcycle*) component in our trade balance equation, inspired by the recent literature. Research on the financial cycle characteristics is still in its infancy, and there is no consensus yet on the best way to measure it. We do not intend to go deeply into this ongoing debate, and our relatively simple measures are therefore by no means meant as the best or the only possible proxies for the financial cycle. However, we do believe our measures provide a reasonable illustration of the evolution of financial variables in combination with domestic demand surrounding the global financial crisis. Moreover, the measures differ sufficiently to ensure that our results do not depend on just one single method, which should increase the robustness of our results.

Our first measure is a traditional filter of real GDP using the Hodrick-Prescott filter. But in addition to the traditional value for the smoothing parameter lambda of 1,600 for quarterly data, we make calculations with much higher values of 100,000 (as in Alessi and Detken, 2009) and 400,000 (Drehmann et al., 2010). These higher values have been applied to the credit-to-GDP ratio as a measure of the financial cycle, but as far as we know, they have not been applied to GDP. Whereas a value of lambda of 1.600 filters out fluctuations at the frequency of the business cycle (with a mean duration around 5 years), these higher values filter out fluctuations that last between three and four times longer: with a mean duration of 16-20 years (Drehmann et al., 2010). That should allow us to capture the fluctuations in GDP that are driven by low-frequency movements of the financial cycle. Second, we also apply the HP-filter with higher values for lambda to calculate gaps in domestic demand instead of GDP. The idea is that domestic demand provides a better measure of the domestic absorption that is driven by financial factors, such as credit and house prices, than GDP, because it indirectly takes into account the changes in the current account balance (see for comparable methodologies Dobrescu and Salman (2011) and Lendvai, Moulin and Turrini (2011)). Finally, in the spirit of Borio, Disyatat and Juselius (2013; 2014) we obtain another financial cycle measure by estimating the principle component of three variables: i) the output gap calculated with a lambda of 1,600, ii) the growth in real house prices and iii) the growth in real credit to the private sector.[15] Whereas Borio, Disyatat and Juselius (2013; 2014) use a Kalman-filter framework, our measure is simpler than that. It captures the co-movement in these three

[15] As data on credit and house prices are not available for the full sample for all 17 euro area countries, this measure for the financial cycle is only available for the original members of the euro zone, called EMU12 hereafter, which however do not include Luxembourg after 1997 (before that year the data for Luxembourg are included in Belgium).

variables, and unlike the other methods above does not impose any frequency, at least not on the movement of credit and house prices. The measure is based on a multivariate method and also uses data on the underlying drivers of the financial cycle: credit and house prices. This variable may therefore capture the financial cycle more directly than the two univariate measures that look at fluctuations at the frequency of the financial cycle, but do not strictly guarantee that these fluctuations are actually driven by financial factors.

[FIGURE 6 AROUND HERE]

To illustrate the nature of these financial cycle measures we show their evolution for three countries (Figure 6): one country where the financial cycle was pronounced (Spain), one where the financial cycle was more or less absent (Germany) and one intermediate case (Portugal). Whereas fluctuations in the Spanish *business* cycle where relatively small, Spain has indeed experienced a very pronounced *long term* fluctuation in GDP: the long-term GDP gap was very positive in the years before the crisis, and has been very negative afterwards. The long-term fluctuation in domestic demand was considerably stronger even than the long-term fluctuation in GDP. Moreover, the measure based on credit and house price growth displays a remarkably similar movement, although this measure peaks somewhat earlier than the two univariate gap measures. In stark contrast, the long-term fluctuations in Germany have been very small. The fluctuations in GDP at the frequency of the financial cycle are almost similar to those at the frequency of the business cycle, while the long-term fluctuations in domestic demand are even more stable than that. This is also in line with the very subdued development of German credit and house price growth. The Portuguese case is indeed an intermediate one: the long-term fluctuations in GDP and domestic demand have been more pronounced than the normal business cycle, in line with the development of credit and house prices. But the fluctuations have been less severe than in Spain. Portugal had already experienced a financial boom in the late 1990s, and has been growing very slowly since then, partly as a result of structural impediments (Reis, 2013). All in all, we are fairly confident that our measures provide a reasonable approximation of the financial cycle in European countries.

Diagnostics and estimation strategy

The literature (Bayoumi et al., 2011) suggests that aggregate trade panels are non-stationary (I (1)) and cointegrated. In order to investigate the possibility of cointegration in our panel, it is first necessary to determine if our series are stationary or not. Because the panel is unbalanced, we have chosen the Im, Pesaran and Shin test (IPS, hereafter), which is based on the Dickey-

Fuller procedure. The test is based on an Augmented Dickey-fuller (ADF) statistics averaged across groups.[16] The null hypothesis assumes that all series are non-stationary and it is accepted for exports and imports. It is instead rejected for the of trade balance-over-GDP ratio.

[TABLE 1a AROUND HERE]

Regarding cointegration, it is well-known that many studies have failed to reject the null hypothesis of no cointegration, even in cases where cointegration is strongly suggested by theory. To address this problem, Westerlund (2007) developed new panel cointegration tests based on structural rather than residual dynamics. Two tests are designed to test the alternative null hypothesis that the panel as a whole is cointegrated, while two others test the alternative that at least one unit is cointegrated. Therefore, we analyzed the presence of cointegration in the panel by using this panel cointegration test developed by Westerlund (2007).[17] The null hypothesis of no cointegration is rejected for both exports and imports and also for the trade balance, therefore our panels are cointegrated.

[TABLE 1b AROUND HERE]

In addition, we test for the presence of cross sectional dependence by using the test by Pesaran (2004), because this is quite common when the number of observations in time (T) is larger than the number of cross-sections (N). Indeed, there is significant evidence of cross-sectional dependence in our data because, for instance, world income can be viewed as common factor driving imports. Following Funke and Nickel (2006) and Solberger (2011) we therefore demean the imports, as this takes out a large part of the common factor and therefore substantially reduces cross-sectional dependence.

Normally, in case of a dynamic panel data with T greater then N, the strategy is to use a fixed effects estimator. However, in case of non-stationarity and cointegration in a dynamic setup, it is common to apply a re-parameterization into an Error Correction Model (ECM). When we

[16] We also run a second generation t-test proposed by Pesaran (2007) for unit roots in heterogeneous panels with cross-section dependence (called CIPS). The results confirm the presence of unit roots in all variables except for the trade balance (in this case the Z[t-bar] is -0.345 and the p-value is equal to 0.365). This t-test is also based on Augmented Dickey-Fuller statistics as IPS (2003) but it is augmented with the cross section averages of lagged levels and first-differences of the individual series (CADF statistics). The null hypothesis assumes that all series are non-stationary.

[17] The Stata module we applied is described in Persyn and Westerlund (2008).

proceed to re-parameterize our ARDL into an ECM framework (Blackburne and Frank, 2007) the baseline ARDL (1,1,1) for the export equation and import equation becomes:

$$\Delta exp_{i,t} = \phi_i\left(exp_{i,t-1} - \theta'_{0i} - \theta'_{1i}reer_{i,t} - \theta'_{2i}fd_{i,t}\right) + \delta'^{*}_{11i}\Delta reer_{i,t} + \delta'^{*}_{21i}\Delta fd_{i,t} + \mu_i + \varepsilon_{i,t} \quad (4)$$

$$\Delta imp_{i,t} = \phi_i\left(imp_{i,t-1} - \theta'_{0i} - \theta'_{1i}reer_{i,t} - \theta'_{2i}dd_{i,t} - \theta'_{3i}exp_{i,t}\right) + \delta'^{*}_{11i}\Delta reer_{i,t} + \delta'^{*}_{21i}\Delta dd_{i,t} + \delta'^{*}_{31i}\Delta exp_{i,t} + \mu_i + \varepsilon_{i,t} \quad (5)$$

For the estimation of the trade balance, we applied the same ECM structure even if stationarity is confirmed at the 1% level, because cointegration in the variables is then taken into account. It is good to recall that the ECM in the trade balance equation is also widely used in the time series literature on trade balance and "J-curve" effect, see, for instance, in Gomez and Alvarez Ude (2006) and Yuen-Ling, Wai-Mun and Geoi-Mei (2006).

$$\Delta tb_{i,t} = \phi_i\left(tb_{i,t-1} - \theta'_{0i} - \theta'_{1i}reer_{i,t} - \theta'_{2i}fcycle_{i,t}\right) + \delta'^{*}_{11i}\Delta reer_{i,t} + \delta'^{*}_{21i}\Delta fcycle_{i,t} + \mu_i + \varepsilon_{i,t} \quad (6)$$

In order to estimate this non-stationary panel in which the number of groups (N) is less than the number of time-series observations (T), we follow the recent advances in the non-stationary panel literature by considering three alternative possible estimators: a traditional fixed-effects estimator called Dynamic Fixed Effect (DFE), the mean-group estimator (MG)[18], and the pooled mean-group estimator (PMG).[19] These methods mainly differ in their treatment of possible heterogeneity between the countries in the sample. The DFE estimator (also used by Bayoumi et al., 2011) constrains the coefficients to be equal across groups both in the short and in the long-run and also imposes that the speed of adjustment coefficient is homogeneous. It therefore (implicitly) assumes a relatively high degree of homogeneity. By contrast, the MG estimator relies on estimating N separate time-series regressions for individual countries, and averaging of the coefficients over the individuals. In the MG estimation, better use is therefore made of possible heterogeneity, as all the coefficients are heterogeneous both in the short and in the long-run analysis. As a more or less intermediate case, the PMG estimator (used by Funke and Nickel, 2006, for instance) relies on a combination of pooling and averaging of coefficients, which gives heterogeneous short-run coefficients, intercepts and the error variances but assumes homogeneous coefficients in the long-run.

As reported by Blackburne and Frank (2007), if the true model is heterogeneous, the PMG estimates are inconsistent. Therefore we test for the differences of the models estimated by PMG

[18] See Pesaran and Smith (1995).

[19] See Pesaran, Shin and Smith (1997,1999).

and MG by using the Hausman test. We conclude that the MG estimator is preferred over the PMG estimator, because the null hypothesis that the difference in the coefficients is not systematic can be rejected. As discussed in Baltagi, Griffin, and Xiong (2000), DFE models may be subject to a simultaneous equation bias due to the endogeneity of the error term and the lagged dependent variable. The Hausman test indicates that the simultaneous equation bias is minimal for our panel, allowing us to use the DFE estimator. However, as said, the presence of very different countries in the panel leads us to primarily apply the MG estimator which deals better with heterogeneity in the coefficients.[20]

4. RESULTS

Estimation results

We first present the estimations for exports, which are based on (country-specific) foreign demand and the various measures of competitiveness, as measured by the real effective exchange rate (REER). As we estimate an error-correction model, we present coefficients for the short-run and for the long-run, as well as for the coefficient of adjustment (Table 2). The results are in line with expectations and comparable to those of Bayoumi et al. (2011) and Christodoulopoulou and Tkačevs (2014). As expected, foreign demand has a positive and significant impact on export performance. In the short run the impact of foreign demand growth is positive but lower than one, and significant in most of the specifications. The long-run impact of foreign demand is positive and higher than one, a strongly significant result in each specification. A long-run elasticity above one is probably related to the fact that exports tend to increase as a share of GDP due to trade integration and globalization.

[TABLE 2 AROUND HERE]

Price competitiveness also clearly matters, as a loss in competitiveness (an increase in the REER) consistently has a downward effect on export performance. This is in line with expectations and with most of the literature, and it clearly contradicts the recent suggestion that competitiveness would not matter at all for export performance within the euro area (Gaulier and Vicard, 2012). The negative short-run coefficients are significant in most specifications and are quite similar for different measures of the REER, comparable to the results of Bayoumi et al.(2011). The only exception is the real effective exchange rate based on CPI-inflation, which is

[20] We have also estimated all equations with dynamic fixed effects (DFE). The results tend to be quite similar – with a few exceptions that will be mentioned – and are therefore not reported separately.

the index where prices related to a country's exports play the smallest role. The negative long-run coefficients are somewhat larger than the short-run coefficients, but they are all insignificant. A possible explanation is that the long-run coefficients are quite sensitive to the specification, because of differences in the long-run trends of exports and the REER. While the REER is thought to be mean-reverting in the long run– and thus close to stationary, exports are clearly non-stationary, as they increase faster than GDP in the long run. This could make the long-run coefficients of the REER sensitive to how much of the trend increase in exports is captured by other variables in the model.[21] The long-run coefficient is the highest for the REER measured in export prices, the measure that most directly related to what foreigners actually pay.

We proceed by presenting the estimation results for imports, using various proxies for domestic demand and price competitiveness. We add our measure for non-tradable prices as a fifth measure of competitiveness. In line with Funke and Nickel (2006) and Christodoulopoulou and Tkačevs (2014), we also include exports in order to capture the share of imports that is directly related to exports. We expect domestic demand and exports to have a positive impact on imports, while the coefficient of the REER should be positive as well.[22] A loss in competitiveness should increase imports. We first use domestic demand directly (Table 3).

[TABLE 3 AROUND HERE]

As expected, domestic demand has a significant positive impact on imports. The short-run elasticity is somewhat below one, while the long-run coefficient is around one. This is somewhat lower than the results in Christodoulopoulou and Tkačevs (2014), although they don't use an ECM. Both coefficients are highly significant in all specifications. This underlines that domestic demand is indeed a clear driver of import growth. Exports also have a significantly positive impact on imports, in line with expectations. The short-run elasticities are close to 0.4, while the long-run elasticities are around 0.6. This underlines that an important share of imports of euro area countries can indeed be directly related to exports. The impact of price competitiveness on import growth is however more difficult to grasp. In this specification, the coefficients for the

[21] Indeed, the long-run coefficients vary among the specifications we tried. For example, when we estimate the export equation also with the DFE methodology, the long-run elasticities of the REER are positive instead of negative.

[22] REER = p/e x p* Therefore for the exports, having a negative REER means an increase in competitiveness. But a negative REER may be caused by: i) decreasing in home prices ii) increasing in foreign prices iii) depreciation of the home currency. All these factors lead to lower imports. Therefore the sign of REER in case of imports should be positive.

REER are generally insignificant, both in the short and in the long run. In addition, the coefficient is negative in two cases in the short run and in all cases in the long run. Although this is not in line with expectations, Christodoulopoulou and Tkačevs (2014) find very similar results. This implies that imports are more driven by domestic demand than by price competitiveness, although the results may also be influenced by the robustness issues mentioned above –the sensitivity of price elasticities to the exact specification due to trends in import growth.[23]

We continue with the estimation results for the trade balance (as a percentage of GDP). We incorporate price competitiveness as the real effective exchange rate based on the GDP-deflator, as well as various proxies for domestic demand. This specification allows us to express domestic demand as a gap measure, which makes clearer what part of domestic demand may have been driven by the financial cycle. We start with the various HP-filtered gaps for domestic demand, as these are most directly related to the domestic demand data used in the import equation. We therefore initially only report the results with the three domestic demand gaps (Table 4a).

[TABLE 4a AROUND HERE]

The results are more or less in line with expectations and quantitatively comparable to some other results in the literature. The effect of price competitiveness is positive and insignificant in the short run, but has the expected negative sign in the long run, while it is weakly significant in some of the specifications. The sign of the coefficients is in line with the "J-curve" result and follows the Bickerdike-Robinison-Metzler (BRM) condition: in the sense that a depreciation of the real exchange rate eventually improves the trade balance.[24] Our long-term coefficient of -0.07 for the real effective exchange rate is a bit smaller but comparable to the results of Guillemette and Turner (2013), who find in a somewhat different specification a coefficient of -0.05 for extra-EMU exports and of -0.16 for intra-EMU exports.

[23] We have also estimated an alternative specification, where we use domestic credit as a proxy for domestic demand (these results are available upon request). Credit growth is sometimes used as a proxy for the financial cycle (Alessi and Detken, 2009; Drehmann et al., 2010). This might be a good proxy for the part of domestic demand that is driven by financial factors. The effect of competitiveness is clearer in this specification, although the results are not fully robust. The short-run coefficients for REER generally have the wrong sign, which is in two cases also statistically significant. However, the long-run coefficients for the REER are overwhelmingly positive, and in three cases highly significant. Interesting is that the coefficient of the REER based on export prices is the smallest (and insignificant), while the coefficient of the REER based on non-tradable prices is the highest (and significant). This suggests that import performance is more related to non-tradable prices than to tradable prices, as suggested by Ruscher and Wolff (2009). Indeed, it could be that a boom in domestic demand driven by the financial cycle will push up both imports and non-tradable prices at the same time. As a final robustness check, we also estimated the import equation with both credit and domestic demand. The coefficients are very similar those reported in Table 3.

[24] See footnote for an explanation on the BRM model and the Marshall-Lerner condition.

As expected, the domestic demand gap is significantly negative in most specifications, both in the short run and in the long run. An increase in domestic demand therefore has a negative effect on the trade balance due to a rise in imports. The long-term coefficients around -0.18 are somewhat smaller but quantitatively comparable to the results of Guillemette and Turner (2013), who find a coefficient of -0.27 for the output gap. It is interesting that the long-term coefficients differ substantially between the domestic demand gap calculated with the normal lambda of 1,600 and the gap calculated with the higher lambdas of 100,000 and 400,000. While the gaps with the higher lambdas have the expected negative long-run coefficient (a positive gap is associated with a lower current account balance), the long run coefficient for the gap with the normal lambda has a positive sign. Our interpretation is that the business cycle (the gap with normal lambda) can explain short-term fluctuations in the trade balance, but not the long-term fluctuations. These long-term fluctuations in the trade balance seem more related to the financial cycle (the gaps with higher lambdas, as used by Alessi and Detken (2009) and Drehmann et al. (2010) for the frequency of the financial cycle). This confirms that the financial cycle is a more relevant driver of the current accounts in the euro area than the business cycle.
As a robustness check, we also estimated the trade balance equation adding the REER deflated by the ULC for the total economy (instead of GDP-REER) and the year-on-year growth in foreign demand. The results (reported in Table 4b) are very similar in sign and magnitude to the previous specification. In contrast to expectations and the results Guillemette and Turner (2013), we do not find a significant effect of foreign demand on the trade balance.

[TABLE 4b AROUND HERE]

Finally, we estimate the trade balance using all the different measures of the financial cycle. This allows us to ensure that our results do not depend on a single method of calculation. As the financial cycle measure calculated as principal component of the output gap, real credit growth and real house price growth is only available for the original 12 EMU member states (see footnote 15 above), we restrict our sample to these countries. We also recalculated the various gaps for GDP and domestic demand in order to obtain more precise measures.[25]

[TABLE 5 AROUND HERE]

[25] For these countries the data for GDP and domestic demand are available from 1970 instead of GDP. The smaller sample therefore allows us to calculate the gap measures for the full period 1970-2013. As the gaps calculated with higher lambda's specifically look at low-frequency movements, the measures may be sensitive to the starting point of the sample. We still estimate the model for the period 1994-2013 only, also due to data availability for the REER.

The results clearly confirm that our findings are not dependent on a single measure for the financial cycle. The coefficients for the financial cycle are indeed very robust across specifications and the long-run coefficients are always significantly negative. The exception is the standard business cycle measure, i.e. the gap in real GDP with lambda 1,600, which is not significant. This again confirms that fluctuations at the business cycle frequency may not be the best explanation of the movements in the trade balance. The size of the coefficients differs somewhat among the various gap measures, but this is also because the fluctuations in the various measures themselves may differ substantially (Figure 6 above). Price competitiveness is not significant in most of these specifications, with the exception of the domestic demand gap with lambda 400,000 and the principal component (see columns 11-14 in Table 5).

Relative importance of competitiveness, foreign demand and domestic demand

We then use the estimation results to get a feel for the relative importance of these different factors in explaining exports, imports and the trade balance for euro area countries. We start by calculating average export growth rates for the period 1999-2007 (calculated on a compounded basis) and the part of this export growth that can be explained by price competitiveness and foreign demand. To do this, we multiply the average change in the GDP-based REER and the average foreign demand growth by their long-term coefficients (Figure 7, based on the coefficients from Table 2).[26]

[FIGURE 7 AROUND HERE]

The differences in export growth before the crisis are quite substantial. Slovakia, Estonia and Slovenia show the highest exports growth, probably as a result of convergence, their transition process towards EMU-membership and the outsourcing of stages of production by the old member states. Export growth is also relatively high in the core countries of the euro area (Germany, Finland, Austria, Luxembourg and the Netherlands), while France and the countries in the periphery display lower export growth. These differences can indeed be partly traced back to price competitiveness. While the decrease in the REER has contributed positively to export growth in Germany, it has decreased exports in many other euro area countries,

[26] The average growth rate on a compounded basis is the percentage variation of the variable in a set of time and it has been calculated by using a quarterly variation on the so-called Compound Annual Growth Rate (CAGR) formula, which is as follows: $= \left[\left(\frac{V_T}{V_0}\right)^{1/T}\right] - 1$. Where T represents the number of periods, that is the number of quarters in our case, V_T is the value of the variable in time T, which is the end of the time range taken into account, and V_0 is instead the value in t=0.

including Spain, Ireland, Malta, Cyprus and to a lesser extent Portugal and Italy.[27] However, price competitiveness is only one explanation for the differences in export performance. In fact, the variation of the contribution of foreign demand is higher. Foreign demand has contributed substantially to export growth in core countries like Germany, Belgium and France, but also in Ireland. By contrast, the contribution of foreign demand was relatively low in peripheral countries like Greece, Spain and Italy. This confirms the finding of Chen et al. (2012) and Wierts et al. (2014) that the destination and composition of foreign demand matters substantially. The differences in foreign demand can, for instance, be driven by a higher level of high-tech and innovative products. A technology weighted RCA (Balassa) index of revealed comparative advantage is indeed highest in core countries like Germany, the Netherlands and France, while it is lowest in Greece and Portugal.[28]

We then turn to import growth in the period 1999-2007, and the part of it explained by competitiveness and domestic demand (Figure 8, based on the coefficients from Table 3), calculated in the same way as the exports. Import growth also differs substantially, with the highest values again for the converging countries Estonia, Slovenia and Slovakia, as well as for Cyprus and Spain. As expected on the basis of our estimations, competitiveness has almost no influence on import growth. Domestic demand seems the key driver of import growth, and domestic demand also displays large differences between countries. Apart from the converging countries, the highest contribution of domestic demand is in an important part of the periphery: Ireland, Spain, Cyprus and Greece. These countries indeed experienced a boom in credit and house prices (Kang and Shambaugh, 2013). By contrast, domestic demand growth had a much smaller contribution in most of the core countries, and especially Germany. The contribution of domestic demand was also low in the peripheral countries Portugal and Italy. Rather than a credit driven domestic demand boom, these countries experienced a gradual decline in potential growth due to structural weaknesses, that was masked by favourable financing conditions worldwide (Kang and Shambaugh, 2013; Bassanetti et al., 2013; Reis, 2013).

[FIGURE 8 AROUND HERE]

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[27] Estonia and Slovakia also have a large negative contribution, but their real exchange rate may have appreciated due to convergence (Balassa-Samuelson effect).

[28] We computed a technology RCA index by using OECD data (average of data concerning year 2000 and 2009), which is calculated in the following way. When the country is specialized in an industry (the sector taken into account is always manufacturing), i.e. when RCA>1, the RCA index has been multiplied by the technology level of that industry. The technology level is taken from Wierts et al. (2014), which is based on the OECD classification. A similar technology RCA index has been built by Zemanek et al. (2010). We computed the level-weights in this way: in case of high technology the level is 1, for a level medium/high is 0.5, medium/low is 0.25 and for low technology sectors is 0. The results are available upon request.

We now show how these factors have contributed to the change in the trade balance before and after the crisis. We first show the change in the trade balance between 1999 and 2007, as well as the contributions from the change in the domestic demand gap (with a high lambda as a proxy for the financial cycle) and the change in price competitiveness (Figure 9, based on the coefficient of REER and the domestic demand gap with lambda 400,000 from Table 4a).[29] The widening of trade imbalances between the core and periphery since 1999 is evident, although not in all countries. Italy and Portugal, for instance, did not see much additional widening of the trade balance in this period. The widening of the trade balances is partly driven by price competitiveness. The REER improved the trade balance in Germany, while it worsened the trade balance in most of the periphery, especially in Ireland, Spain and Cyprus. However, differences in the financial cycle are much more important drivers of the imbalances in the euro area. The contribution of the financial cycle was especially large in Ireland, Spain, Cyprus, Greece, Slovenia and Estonia. The financial cycle contributed much less to the worsening of the trade balance in Portugal and Italy, probably because these countries had very low domestic demand before the crisis. The financial cycle also hardly affected the trade balance in many core countries, especially Germany, Austria and Belgium.

[FIGURE 9 AROUND HERE]

The importance of the financial cycle is also clearly visible in the rebalancing of current accounts since the financial crisis (Figure 10). The improvement in the trade balance in the periphery of the euro area between 2008 and 2012 is almost fully driven by the reversal in domestic demand since the crisis. Price competitiveness only contributed to rebalancing in Ireland. This is in line with the findings of Lane and Milesi-Ferretti (2012). The reversal in domestic demand was especially strong in Estonia, Ireland, Spain and Cyprus, the countries with the strongest booms before the crisis. It was also relatively strong in Portugal and Italy, despite their already weak domestic demand before the crisis. In retrospect, the situation in Portugal and Italy before the crisis may still have been unsustainable as these countries relied on exceptionally favorable external financial conditions to finance their increasing current account deficits (Bassanetti el al., 2013; Reis, 2013). By contrast, many of the core countries did not suffer from financial

[29] The cumulative growth rate cannot be used in this case. When the sign of the initial amount V_0 times the sign of the final amount V_T is -1 (a sign change occurs), you can only get a real result when the number of periods is odd. For an even number of periods, the solved rate is a complex number. Using an odd numbers of periods however, all these growth rates are above 100% and then they are not informative when a zero is crossed. In almost all the gap types and in the trade balance we have a change in the sign from 1999 to 2007.

imbalances and therefore had a much less extreme reversal in domestic demand. This holds especially for Germany and Austria.

[FIGURE 10 AROUND HERE]

Finally, to underline the robustness of our results, we also show the contribution of the principal component measure of the financial cycle to the changes trade balance for the original EMU12 (Figure 11, based on the coefficients in columns in Table 5). As this measure is peaking somewhat earlier than the domestic demand gap for several countries (see Figure 6 above), we choose somewhat different time periods. We analyze the changes in the trade balance during the period 1994-2003, then in the pre-crisis years 2004-2007 and finally in the rebalancing period 2008-2012. Although the specific dynamics are somewhat different than for the domestic demand gap as financial cycle measure, the results confirm that changes in the financial cycle have been more important drivers of the changes in the trade balance than price competitiveness. This is most clear in the period 1994-2003, where the financial cycle contributed to worsening trade balances in especially Spain and Ireland, but also in France and Italy. By contrast, it contributed to an improvement in the trade balance in Germany and somewhat surprisingly in Portugal and the Netherlands. These last two countries experienced a strong upswing in the financial cycle in the late 1990s, somewhat earlier than most other euro area countries. This implies that house price and credit growth in these countries already decelerated after the turn of the millennium.[30] In the immediate pre-crisis years (2004-2007) the role of the financial cycle is somewhat less clear with this measure. This is because this measure peaks already somewhere around 2003, and house price and credit growth started to decelerate slowly (from very high levels) in these years. However, the role of the financial cycle is more clear and important again in the rebalancing phase 2008-2012. It contributed to the improvement in the trade balance in most of the so-called periphery, especially Greece, Spain, Ireland and Portugal. By contrast, the financial cycle had a slight worsening effect on the trade balance in Germany and especially Austria as credit and house price growth started to accelerate in these countries. This analysis confirms the role of the financial cycle as a strong

[30] This is related to the fact that our principal component is partly based on series in *growth* rates (real house prices and real credit), rather than on direct gap measures. This is in line with Borio, Disyatat and Juselius (2013, 2014) and has the advantage that this measure is much more robust in *real time* than traditional output gap measures. The implication in our estimation is that *changes* in the trade balances are indirectly driven by *changes* in the growth rate of house prices and credit. While this makes sense for most countries and most periods, it may lead to somewhat counterintuitive results in specific countries and specific periods. This is for instance the case when the growth rate of credit and house prices decelerates, but still remains very high, as described for some countries in the main text.

factor for the trade balance in the euro zone.

[FIGURE 11 AROUND HERE]

5. CONCLUSION

We have investigated the relative importance of price competitiveness and domestic demand as drivers of the current account imbalances in the euro area. We conclude that competitiveness has a clear influence, but that domestic demand booms driven by the financial cycle have been more important than is realized in the policy debate and much of the literature. The influence of price competitiveness is clearest on export performance. At the same time, the influence of external demand on differences in exports performance is larger. This confirms findings in the recent literature that the destination and composition of exports matters substantially. The influence of competitiveness on import performance is more difficult to find, and is clearest for non-tradable prices. But domestic demand is by far the most important driver of imports.

We also find that differences in domestic demand are a more important driver of changes in trade balances in the euro area than differences in price competitiveness. This holds both for the buildup of imbalances in the period 1999-2007 and for the correction between 2008 and 2012. Changes in domestic demand at the frequency of the financial cycle explain these movements in the trade balance much better than changes at the frequency of the normal business cycle. The financial cycle led to booms and busts in domestic demand in Estonia, Spain, Ireland and Greece. By contrast, it allowed Portugal and Italy to mask low potential growth and to finance growing trade deficits that might be unsustainable under less benign financial conditions.

Our findings have several policy implications. First, current account imbalances caused by unsustainable demand booms due to the financial cycle will partly correct themselves without an immediate adjustment in relative prices. This correction will happen irrespective of the movements of the real effective exchange rate in this period, and may also be larger and more lasting than many realize. Second, it may not be sufficient to only monitor price competitiveness, more emphasis on the financial cycle and on credit and house price growth would be just as important. More attention should also be paid to the development of non-tradable prices. Finally, in addition to the existing European mechanisms to foster structural reforms, like Europe 2020 and the macroeconomic imbalance procedure (MIP), a European macro-prudential policy framework would deserve priority.

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FIGURES AND TABLES

Figure 1: Current account adjustment since the crisis

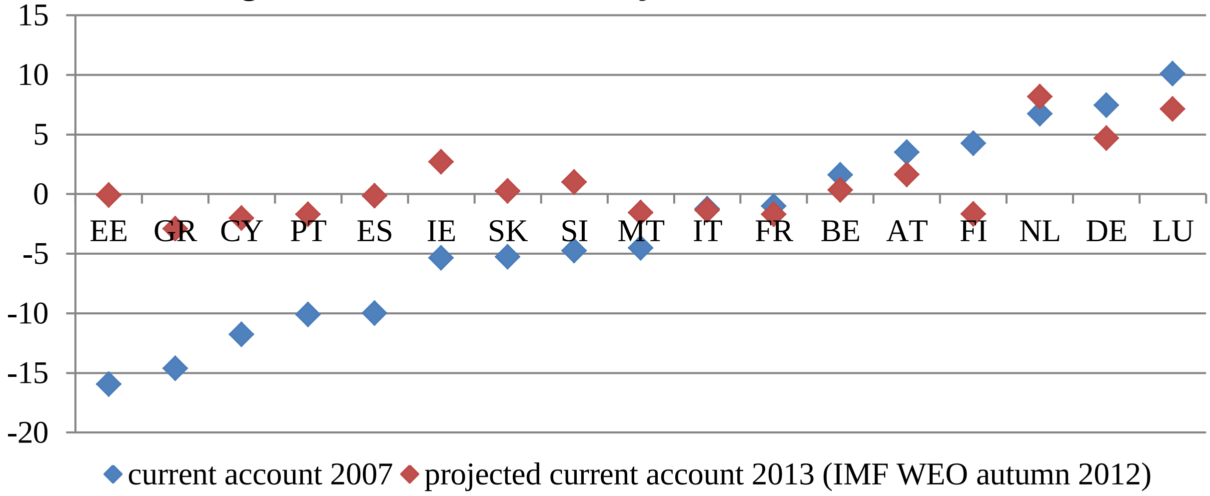


Figure 2: relative price adjustment since the crisis

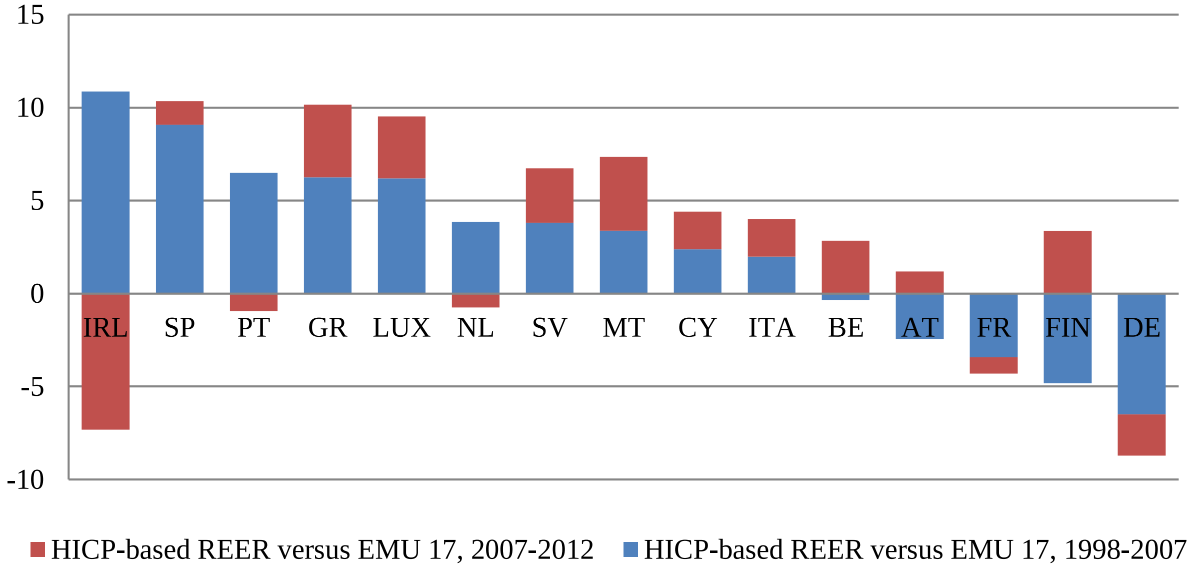


Figure 3: divergences in domestic demand growth in the euro area

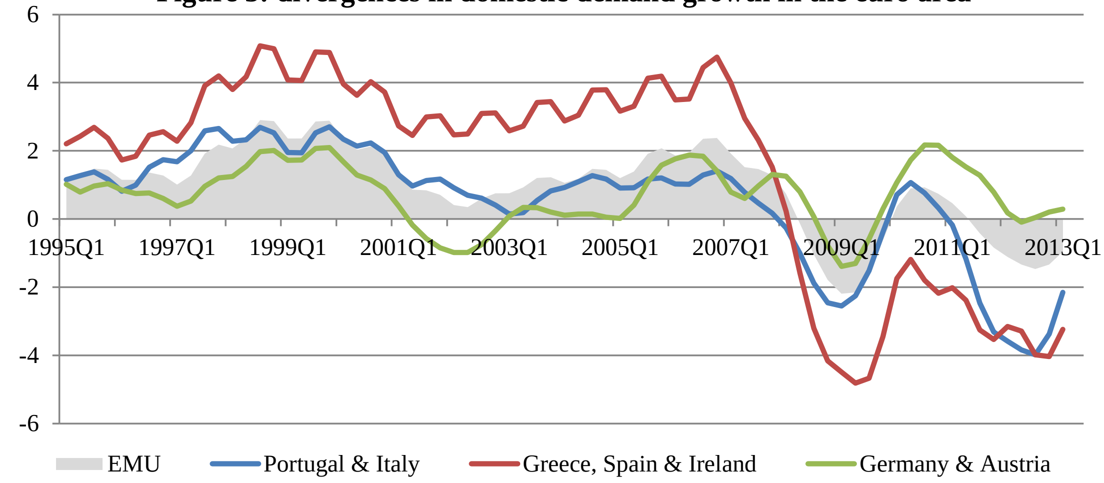


Figure 4: divergences in real credit growth in the euro area

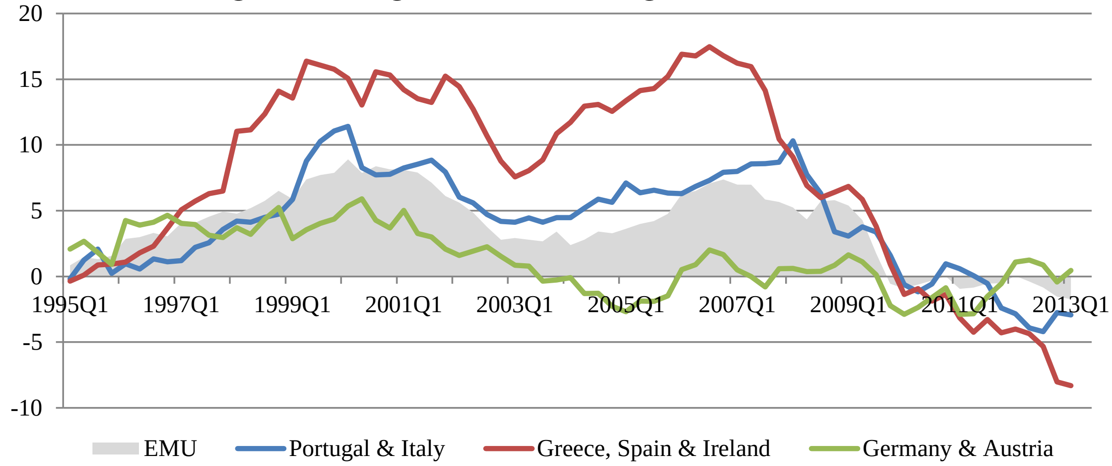


Figure 5: divergences in real house price growth in the euro area

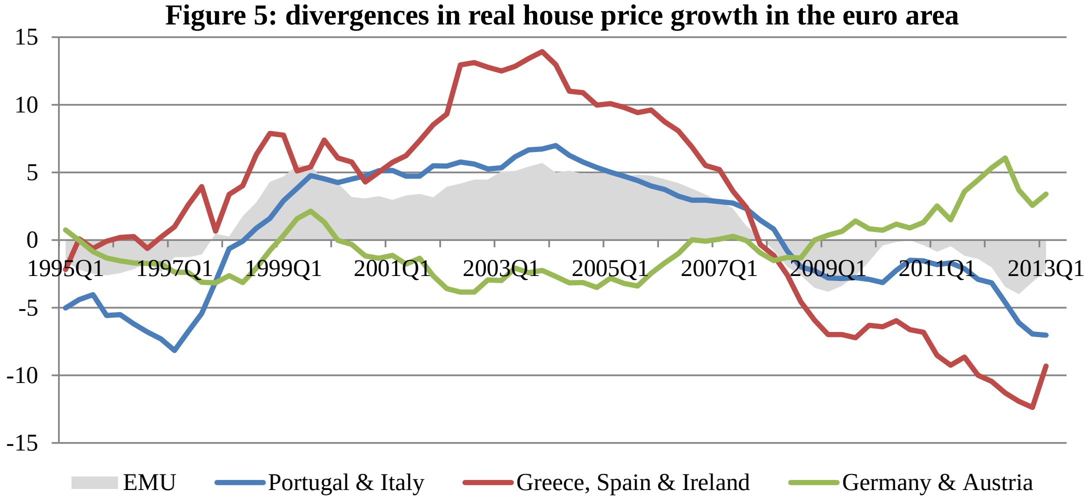


Figure 6: measures for the financial cycle in various EMU-countries

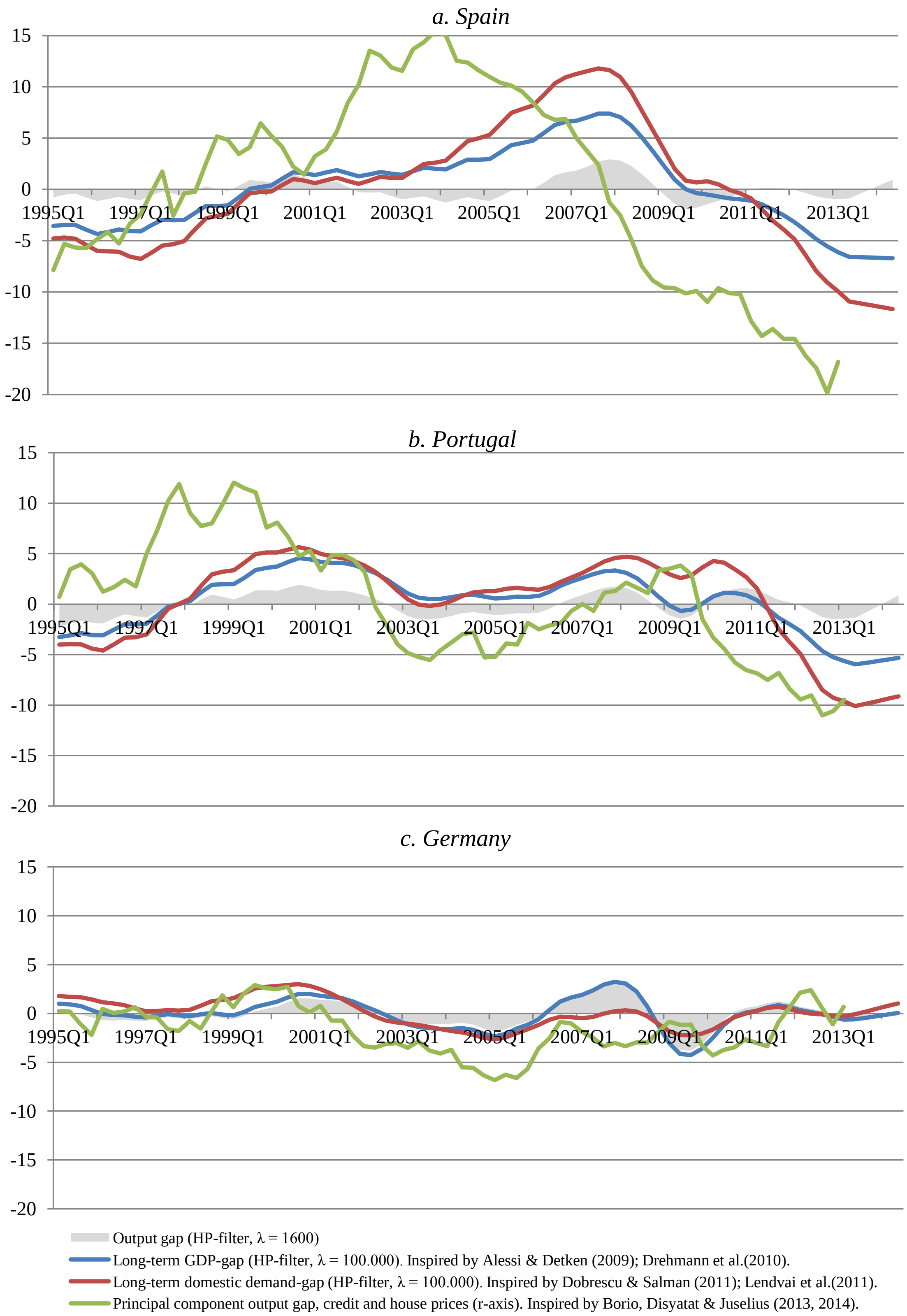


Table 1a:Stationarity test: Im-Pesaran-Shin (IPS) panel unit root test

	IPS t-bar -test			
Variable	No trend		Trend	
	t-stat	p-value	t-stat	p-value
Exports	**-1.5740**	**0.0577**	**-0.1967**	**0.4220**
Imports	**-1.5582**	**0.0596**	**2.7499**	**0.9970**
Trade balance/GDP	**-2.5179**	**0.0059***	**-2.3083**	**0.0105***
REER_GDP	-1.4786	0.0696	-0.1902	0.4246
REER_CPI	-0.4121	0.3401	-0.7186	0.2362
REER_ULC	-0.6393	0.2613	0.6743	0.7499
REER_XP	-2.4576	0.0070*	-0.0719	0.4713
REER_NNTR	-8.6901	0.0000*	-14.464	0.0000*
Domestic demand	-2.5325	0.0057*	7.3861	1.0000
Foreign demand	-2.0475	0.0203*	8.4085	1.0000

Note: In the IPS-test, one lag has been imposed. * means that some panels are stationary. IPS can be used in case of unbalanced panel, but requires that there are no gaps in each individual time series. Other tests require that the panels are strongly balanced. The variables in bold are the dependent variables in our equations: exports, imports and the trade balance.

Table 1b: Cointegration test: Westerlund ECM test

	p-value (trend NOT included)			
Equation	**Gt**	**Ga**	**Pt**	**Pa**
Exports	0.015	0.000	0.024	0.000
Imports	0.000	0.000	0.000	0.000
Trade balance/GDP	0.000	0.000	0.000	0.000

	p-value (trend included)			
Equation	**Gt**	**Ga**	**Pt**	**Pa**
Exports	0.068*	0.002	0.187*	0.034*
Imports	0.000	0.000	0.000	0.000
Trade balance/GDP	0.000	0.000	0.000	0.000

Note: Westerlund test with constant and 1 lag included (for the whole sample). Bootstrapped 100 times. * means that the series are not cointegrated. The results using different lambdas for the domestic demand gap in the trade balance equations are the same. Gt and Ga are the group-mean tests of cross-sectional units (for variance and mean). Pt and Pa are instead the statistics for the panel as a whole.

Table 2: Export equation estimations by using MG

VARIABLES	(1) LR	(2) SR	(3) LR	(4) SR	(5) LR	(6) SR	(7) LR	(8) SR
Adj		-0.295***		-0.289***		-0.289***		-0.300***
		(0.049)		(0.049)		(0.049)		(0.053)
D. Foreign demand		0.277*		0.242		0.257*		0.326**
		(0.144)		(0.152)		(0.147)		(0.141)
D. Reer_GDP		-0.600***						
		(0.219)						
D. Reer_CPI				-0.0299				
				(0.236)				
D. Reer_ULC						-0.625***		
						(0.217)		
D. Reer_XP								-0.573**
								(0.223)
Constant		5.363***		4.993***		5.212***		5.575***
		-1.131		-1.098		(0.992)		(1.229)
LONG RUN								
Foreign demand	1.748***		1.801***		1.748***		1.393***	
	(0.512)		(0.383)		(0.359)		(0.32)	
Reer_GDP	-0.794							
	(0.758)							
Reer_CPI			-0.551					
			(0.678)					
Reer_ULC					-0.287			
					(0.298)			
Reer_XP							-1.058	
							(0.917)	
Observations	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220

Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the value of exports towards to rest of the world and in real terms. *Adj* is the error-correction speed of adjustment parameter. *Foreign demand* is the demand of the rest of the world as real GDP of each trading partner weighted by the percentage of the trade of the reporter country *vis-à-vis* each partner. The *Reer_GDP* is the Real Effective Exchange Rate taken *vis-à-vis* 36 partners deflated by GDP. *Reer_CPI* the Real Effective Exchange Rate taken *vis-à-vis* 36 partners deflated by CPI. *Reer_ULC* the Real Effective Exchange Rate taken *vis-à-vis* 36 partners deflated by ULC for the total economy. *Reer_XP* the Real Effective Exchange Rate taken *vis-à-vis* 36 partners deflated by export prices. The D. measures for the variables are the first difference of them. All variables are in logs.

Table 3: Import equation estimations by using MG and domestic demand as regressor

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	LR	SR	LR	SR	LR	SR	LR	SR	LR	SR
Adj		-0.637***		-0.629***		-0.624***		-0.600***		-0.606***
		(0.058)		(0.051)		(0.054)		(0.058)		(0.055)
D. Domestic demand		0.819***		0.809***		0.812***		0.881***		0.903***
		(0.211)		(0.212)		(0.207)		(0.205)		(0.199)
D. Exports		0.355***		0.365***		0.375***		0.385***		0.383***
		(0.0611)		(0.0582)		(0.0634)		(0.0626)		(0.0651)
D. Reer_GDP		-0.173								
		(0.155)								
D. Reer_CPI				0.0896						
				(0.165)						
D. Reer_ULC						0.022				
						(0.131)				
D. Reer_XP								-0.305***		
								(0.111)		
D. Reer_NNTR										0.345
										(0.36)
Constant		-11.34***		-10.69***		-10.86***		-10.55***		-10.89***
		(1.362)		(1.475)		(1.392)		(1.395)		(1.221)
LONG RUN										
Domestic demand	0.965***		1.048***		1.048***		0.977***		0.913***	
	(0.107)		(0.1)		(0.101)		(0.109)		(0.115)	
Exports	0.607***		0.579***		0.565***		0.581***		0.595***	
	(0.049)		(0.0565)		(0.0559)		(0.0492)		(0.0456)	
Reer_GDP	-0.101									
	(0.142)									
Reer_CPI			-0.261							
			(0.206)							
Reer_ULC					-0.124					
					(0.116)					
Reer_XP							-0.0519			
							(0.137)			
Reer_NNTR									-0.00501	
									(0.182)	
Observations	1,188	1,188	1,188	1,188	1,188	1,188	1,188	1,188	1,188	1,188

Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the value imports towards to rest of the world and in real terms. *Adj* is the error-correction speed of adjustment parameter. *Domestic demand* is the demand for each member state. *Export*s are simply the exports towards to rest of the world and in real terms. The *Reer_GDP* is the REER taken *vis-à-vis* 36 partners deflated by GDP. *Reer_CPI* the REER deflated by CPI. *Reer_ULC* the REER deflated by ULC for the total economy. *Reer_XP* is the REER deflated by export prices. *Reer_NNTR* is the REER deflated by non-tradable prices calculated Reer_GDP/Reer_XP. The D. measures for the variables are the first difference of them. All variables are in logs.

Table 4a: Trade balance over GDP estimation by using the MG method and with domestic demand gap as a regressor

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	LR	SR	LR	SR	LR	SR
Adj		-0.470***		-0.467***		-0.382***
		(0.058)		(0.059)		(0.059)
D. Reer_GDP		-0.026		0.0206		0.0257
		(0.0408)		(0.0387)		(0.0393)
D. Dom_dem_gap1600		-0.213***				
		(0.0464)				
D. Dom_dem_gap100				-0.131***		
				(0.0388)		
D. Dom_dem_gap400						-0.126***
						(0.0405)
Constant		-0.0128		0.0476		0.0592
		(0.0717)		(0.0714)		(0.0716)
LONG RUN						
Reer_GDP	0.0268		-0.0663		-0.0748*	
	(0.0464)		(0.0408)		(0.0429)	
Dom_dem_gap1600	0.274***					
	(0.0796)					
Dom_dem_gap100			-0.188***			
			(0.0554)			
Dom_dem_gap400					-0.184***	
					(0.0561)	
Observations	1,186	1,186	1,186	1,186	1,186	1,186

Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the trade balance-over-GDP ratio. *Adj* is the error-correction speed of adjustment parameter. The *Reer_GDP* is the Real Effective Exchange Rate taken *vis-à-vis* 36 partners deflated by GDP. Dom*_dem_gap1600*, *Dom_dem_gap100* and *Dom_dem_gap400* are the measures of business cycle and financial cycle respectively. They are domestic demand gaps calculated as (real domestic demand - HP filtered domestic demand (with smoothing variable = 1,600 or 100,000 or 400,000))/ HP filtered domestic demand (with smoothing variable = 1,600 or 100,000 or 400,000)). The D. measures for the variables are the first difference of them. All variables are in logs except the gaps.

Table 4b: Trade balance over GDP estimation by using the MG method and with domestic demand gap, ULC REER and y-o-y growth of foreign demand as regressors

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	LR	SR	LR	SR	LR	SR
Adj		-0.421***		-0.485***		-0.488***
		(0.056)		(0.054)		(0.054)
D.Reer_ULC		-0.0793		0.00425		0.0117
		(0.0488)		(0.0533)		(0.0540)
D.Dom_dem_gap1600		-0.230***				
		(0.0465)				
D.Dom_dem_gap100				-0.123***		
				(0.0370)		
D.Dom_dem_gap400						-0.107***
						(0.0394)
D.Growth_fd_yoy		0.0296***		0.0120		0.0121
		(0.0110)		(0.0104)		(0.0102)
Constant		0.000910		0.0706		0.0753
		(0.0626)		(0.0707)		(0.0708)
LONG RUN						
Reer_ULC	0.0102		-0.0556		-0.0586*	
	(0.0294)		(0.0338)		(0.0341)	
Dom_dem_gap1600	0.222***					
	(0.0661)					
Dom_dem_gap100			-0.177***			
			(0.0407)			
Dom_dem_gap400					-0.165***	
					(0.0387)	
Growth_fd_yoy	-0.0884*		-0.0238		-0.0229	
	(0.0458)		(0.0276)		(0.0274)	
Observations	1,133	1,133	1,133	1,133	1,133	1,133

Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the trade balance-over-GDP ratio. *Adj* is the error-correction speed of adjustment parameter. The *Reer_ULC* is the Real Effective Exchange Rate taken *vis-à-vis* 36 partners deflated by ULC of total economy. *Dom_dem_gap1600, Dom_dem_gap100* and *Dom_dem_gap400* are the measures of business cycle and financial cycle respectively. They are domestic demand gaps calculated as (real domestic demand - HP filtered domestic demand (with smoothing variable = 1,600 or 100,000 or 400,000))/ HP filtered domestic demand (with smoothing variable = 1,600 or 100,000 or 400,000)). *Growth_fd_yoy* is the year-on-year growth rate in foreign demand. The D. measures for the variables are the first difference of them. All variables are in logs except the gaps.

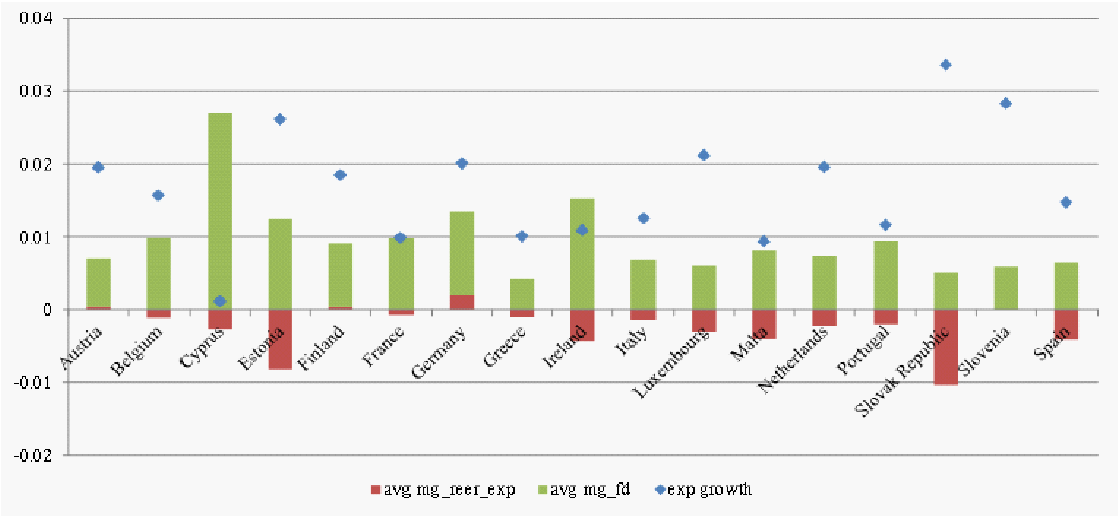
Table 5: Trade balance over GDP estimation by using the MG method ONLY for EZ12 with different financial cycle measures.

VARIABLES	(1) LR	(2) SR	(3) LR	(4) SR	(5) LR	(6) SR	(7) LR	(8) SR	(9) LR	(10) SR	(11) LR	(12) SR	(13) LR	(14) SR
Adj		-0.375***		-0.513***		-0.502***		-0.347***		-0.426***		-0.428***		-0.419***
		(0.087)		(0.081)		(0.078)		(0.079)		(0.074)		(0.073)		(0.071)
D.Reer_GDP		0.0110		0.0371		0.0540		0.0216		0.0393		0.0504		0.0322
		(0.0322)		(0.0304)		(0.0352)		(0.0377)		(0.0337)		(0.0363)		(0.0249)
D.Dom_dem_gap1600		-0.0854												
		(0.105)												
D.Dom_dem_gap100				-0.0989										
				(0.0995)										
D.Dom_dem_gap400						-0.0511								
						(0.0926)								
D.Gdp_gap1600								-0.106						
								(0.137)						
D.Gdp_gap100										-0.148				
										(0.124)				
D.Gdp_gap400												-0.133		
												(0.120)		
D.Pc_gap														0.0146
														(0.0257)
Constant		0.0739		0.0278		0.0916		0.0539		0.0665		0.112*		0.194***
		(0.0623)		(0.0847)		(0.0777)		(0.0632)		(0.0684)		(0.0616)		(0.0614)
LONG RUN														
Reer_GDP	-0.0389		-0.0252		-0.0519		-0.0334		-0.0555		-0.0774**		-0.128***	
	(0.0494)		(0.0452)		(0.0380)		(0.0464)		(0.0411)		(0.0356)		(0.0473)	
Dom_dem_gap1600	-0.448***													
	(0.164)													
Dom_dem_gap100			-0.309***											
			(0.0642)											

Dom_dem_gap400					-0.255***									
					(0.0601)									
Gdp_gap1600							-0.378							
							(0.264)							
Gdp_gap100									-0.249***					
									(0.0935)					
Gdp_gap400											-0.205**			
											(0.0804)			
Pc_gap													-0.149***	
													(0.0471)	
Observations	801	801	801	801	801	801	801	801	801	801	801	801	773	773

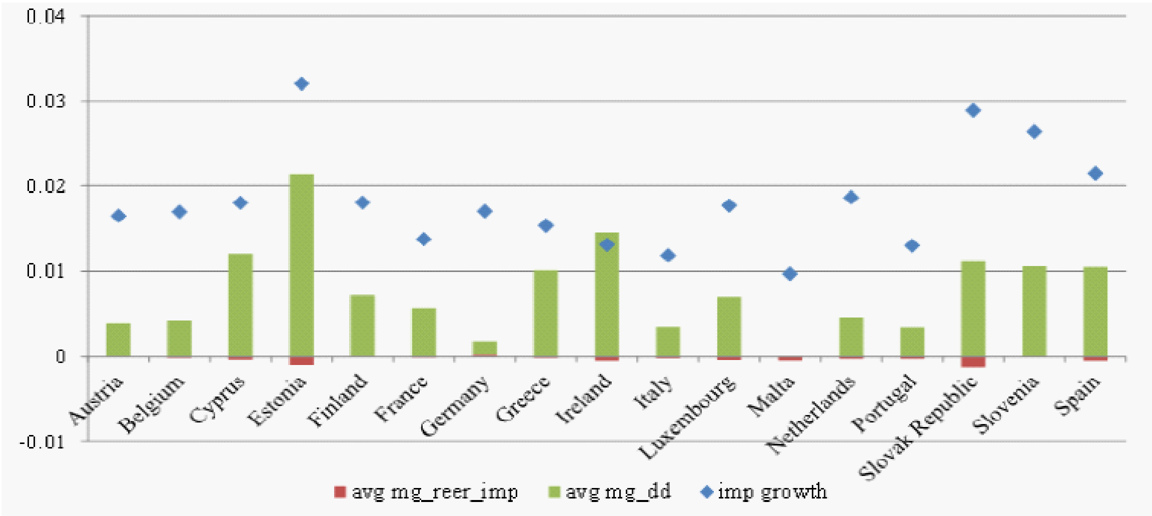
Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the trade balance-over-GDP ratio. *Adj* is the error-correction speed of adjustment parameter. The *Reer_GDP* is the Real Effective Exchange Rate taken *vis-à-vis* 36 partners deflated by GDP. *Dom_dem_gap1600, Dom_dem_gap100* and *Dom_dem_gap400* for the domestic demand gaps and *Gdp_gap1600, Gdp_gap100* and *Gdp_gap400* for the real GDP gaps are the measures of business cycle and financial cycle respectively. They are gaps calculated as (real domestic demand - HP filtered domestic demand (with smoothing variable = 1,600 or 100,000 or 400,000))/ HP filtered domestic demand (with smoothing variable = 1,600 or 100,000 or 400,000)). *Pc_gap* is the gap calculated by the principal component analysis. The D. measures for the variables are the first difference of them. All variables are in logs except the gaps.

Figure 7: contribution of REER and foreign demand to export growth, 1999-2007



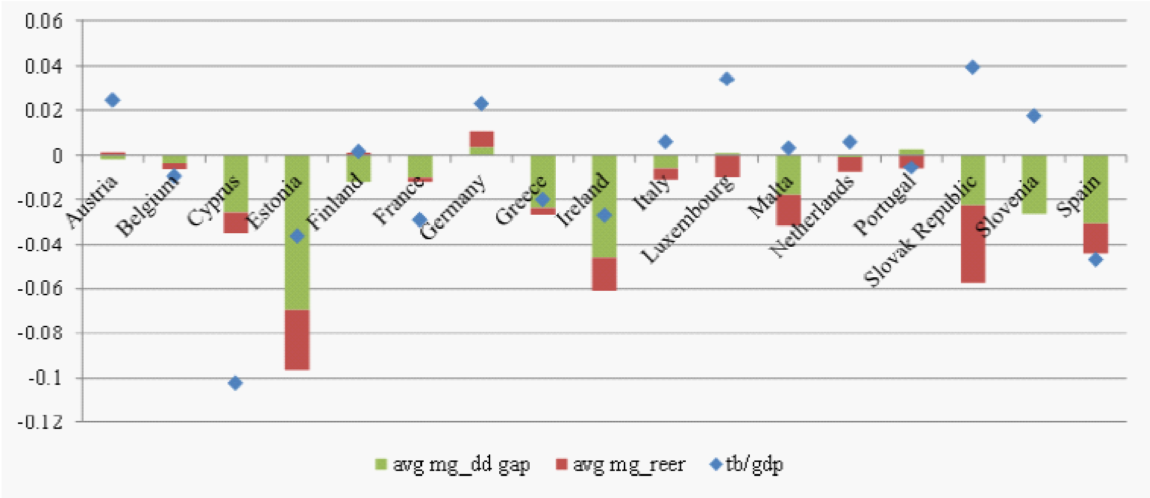
Note: *avg mg_fd* and *avg mg_reer_ exp* are the long term coefficients of foreign demand and GDP- REER multiplied by the cumulative growth in the value of the variables. *Exp growth* is the compound growth of exports in the period (1999-2007).On the y-axis: average quarterly growth rate of exports in the period 1999-2007 (calculated on a compounded basis) expressed as a percentage, 0.02 is equal to 2%.The corresponding annual rate is roughly equal to 8%.

Figure 8: contribution of REER and domestic demand to import growth, 1999-2007



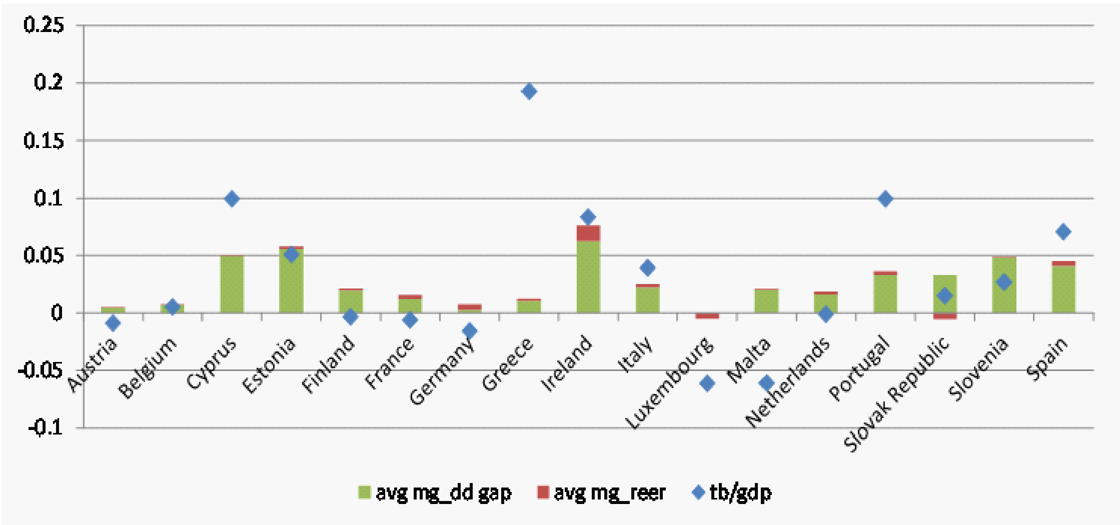
Note: *avg mg_dd* and *avg mg_reer_ imp* are the long term coefficients of domestic demand and GDP-REER multiplied by the cumulative growth in the value of the variables. *Imp growth* is the cumulative growth of imports in the period (1999-2007). The imports in the equations and figures are taken demeaned to deal with the presence of cross-sectional dependence. On the y-axis: average quarterly growth rate of imports in the period 1999-2007 (calculated on a compounded basis)expressed as a percentage, 0.02 is equal to 2%.The corresponding annual rate is roughly equal to 8%.

Figure 9: contribution of REER and domestic demand gap in change in trade balance, 1999-2007



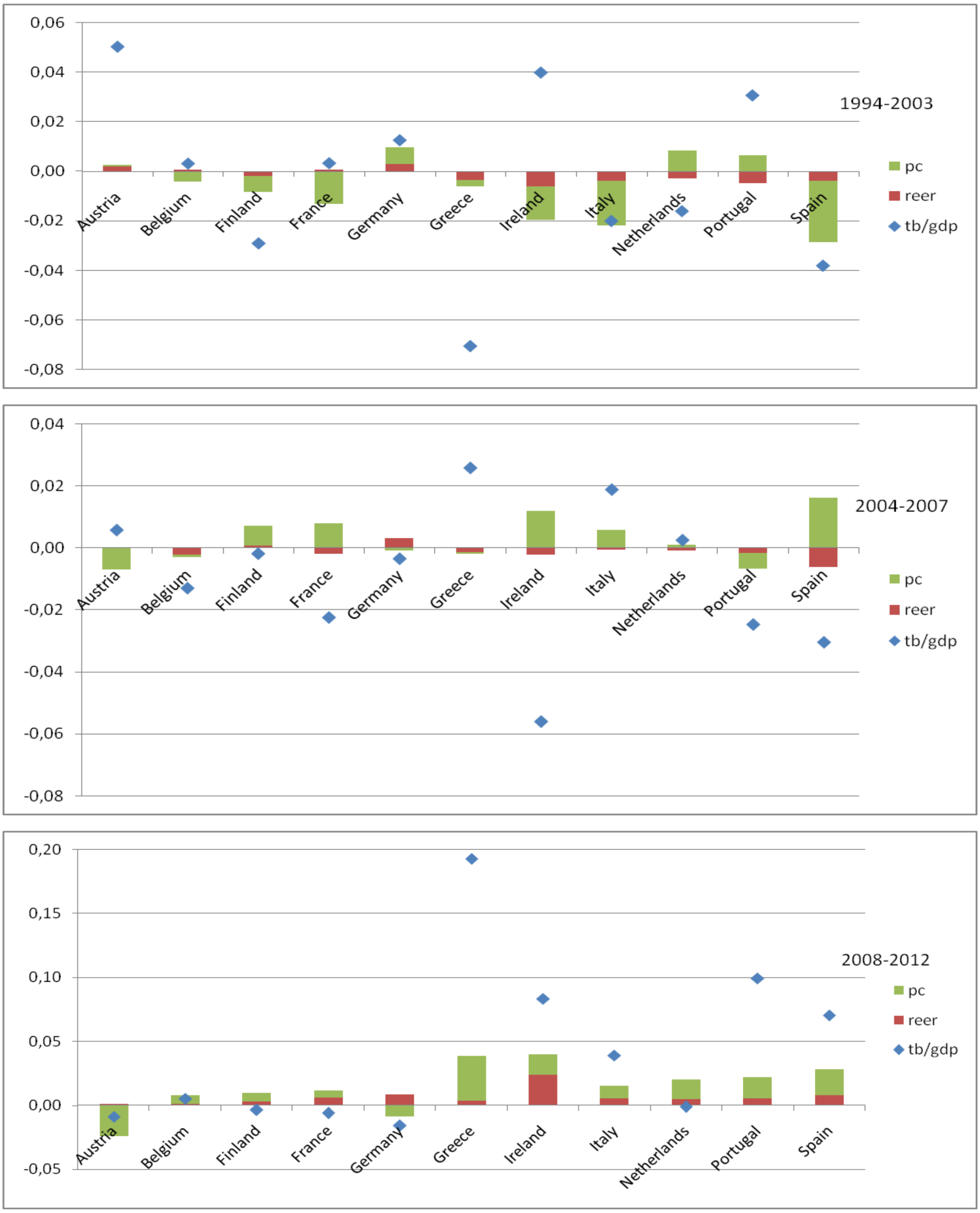
Note: *avg mg_dd gap* and *avg mg_reer* are the long term coefficients of domestic demand gap and GDP-REER multiplied by the difference in the value of the variables. Tb/gdp is the difference of trade balance over GDP in the period (1999-2007).On the y-axis: the difference in the trade balance over GDP in the period (1999-2007) expressed as a percentage, 0.02 is equal to 2%.

Figure 10: contribution of REER and domestic demand gap in change in trade balance, 2008-2012



Note: *avg mg_dd gap* and *avg mg_reer* are the long term coefficients of domestic demand gap and GDP-REER multiplied by the difference in the value of the variables. Tb/gdp is the difference of trade balance over GDP in the period (2008-2012). On the y-axis: the difference in the trade balance over GDP in the period (2008-2012) expressed as a percentage, 0.05 is equal to 5%.

Figure 11: contribution of REER and the pc gap in trade balance for old EZ members



Note: *pc* and *reer* are the long term coefficients of pc gap and GDP-REER multiplied by the difference in the value of the variables. *Tb/gdp* is the difference of trade balance over GDP in the different periods. On the y-axis: the difference in the trade balance over GDP in a period expressed as a percentage, 0.05 is equal to 5%.

ANNEX: Description of the variables

Variable name	Sources	Description
Exports	IMF IFS (nominal data in current USD); Eurostat (EURUSD exchange rate); AMECO (deflators)	Exports *vis-à-vis* the rest of the world and in real terms. The nominal data are taken from IMF IFS in current USD, we use therefore the exchange rate EURUSD from Eurostat in order to have nominal data in euro. We deflate the data using deflators from AMECO database, interpolating the annual data to have them in quarterly terms.
Imports	IMF IFS (nominal data in current USD); Eurostat (EURUSD exchange rate); AMECO (deflators)	Imports *vis-à-vis* the rest of the world and in real terms. The nominal data are taken from IMF IFS in current USD, we use therefore the exchange rate EURUSD from Eurostat in order to have nominal data in euro. We deflate the data using deflators from AMECO database, interpolating the annual data to have them in quarterly terms.
Trade balance	IMF IFS (nominal data in current USD); Eurostat (EURUSD exchange rate); AMECO (deflators)	The trade balance-over-GDP ratio is taken in log form as following: [log(exports)-log(imports)] / log(GDP) where all the variables are in real terms.
Trade balance 2	IMF IFS (nominal data in current USD); Eurostat (EURUSD exchange rate); AMECO (deflators)	The trade balance is taken as exports/imports where all the variables are in real term.
REER_GDP	DG Ecfin	Real Effective Exchange Rate- Deflator: GDP ; 36 partner countries
REER_CPI	Eurostat	Real Effective Exchange Rate- Deflator: CPI ; 36 partner countries
REER_ULC	Eurostat, DG Ecfin	Real Effective Exchange Rate- Deflator: Nominal ULC total economy
REER_XP	DG Ecfin	Real Effective Exchange Rate- Export prices
REER_NNTR	Elaborations of the author on Ruscher and Wolff (2009)	Real Effective Exchange Rate- Non-tradable REER = REER_GDP/REER_XP

Foreign Demand	IMF IFS (nominal data in current USD); IMF DOTS (trade data)	More specifically, to obtain demand of the rest of the world for euro area country, we use real GDP of each trading partner weighted by the percentage of the trade of the reporter country *vis-à-vis* each partner. For some countries (Malta, Cyprus, Luxembourg, Ireland and Greece) we use for real GDP the annual data (the only one available for the 90s) interpolated using cubic splines to have them in quarterly frequency.
Domestic Demand	IMF IFS (nominal data in current USD); OECD	Data for domestic demand (dd) are also taken from the IMF IFS. For some countries (Malta, Cyprus, Luxembourg, Ireland and Greece) we use annual data interpolated to have them in quarterly frequency. For some countries (Belgium, Luxembourg, Ireland, Spain, Portugal, Slovakia and Greece) and some periods (in the 90s), the data come from OECD (estimated values) and are built as GDP minus net exports.
Dom_dem_gap 1600	IMF IFS (nominal data in current USD); OECD	Domestic demand gap calculated as (real domestic demand - HP filtered domestic demand (with smoothing variable = 1,600))/ HP filtered domestic demand (with smoothing variable = 1,600))
Dom_dem_gap 100	IMF IFS (nominal data in current USD); OECD	Domestic demand gap calculated as (real domestic demand - HP filtered domestic demand (with smoothing variable = 400,000))/ HP filtered domestic demand (with smoothing variable = 100,000))
Dom_dem_gap 400	IMF IFS (nominal data in current USD); OECD	Domestic demand gap calculated as (real domestic demand - HP filtered domestic demand (with smoothing variable = 400,000))/ HP filtered domestic demand (with smoothing variable = 400,000))
Gdp_gap1600	IMF IFS (nominal data in current USD); OECD	Real GDP gap calculated as (real domestic demand - HP filtered domestic demand (with smoothing variable = 1,600))/ HP filtered domestic demand (with smoothing variable = 1,600)). For some countries (Malta, Cyprus, Luxembourg, Ireland and Greece) we use for real GDP the annual data (the only one available for the 90s) interpolated using cubic splines to have them in quarterly frequency.

Gdp_gap100	IMF IFS (nominal data in current USD); OECD	Real GDP gap calculated as (real domestic demand - HP filtered domestic demand (with smoothing variable = 400,000))/ HP filtered domestic demand (with smoothing variable = 100,000)). For some countries (Malta, Cyprus, Luxembourg, Ireland and Greece) we use for real GDP the annual data (the only one available for the 90s) interpolated using cubic splines to have them in quarterly frequency.
Gdp_gap400	IMF IFS (nominal data in current USD); OECD	Real GDP gap calculated as (real domestic demand - HP filtered domestic demand (with smoothing variable = 400,000))/ HP filtered domestic demand (with smoothing variable = 400,000)). For some countries (Malta, Cyprus, Luxembourg, Ireland and Greece) we use for real GDP the annual data (the only one available for the 90s) interpolated using cubic splines to have them in quarterly frequency.
Pc_gap	IMF (nominal data in current USD); OECD (house prices), BIS (credit).	The principle component of three variables: i) the GDP gap calculated with a lambda of 1,600, ii) the growth in real house prices and iii) the growth in real credit to the private sector.

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