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Growth and Competitiveness as Factors of Eurozone External Imbalances

Evidence and Policy Implications

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Abstract

The paper assesses the contribution of key factors associated with external imbalances in the Eurozone through the estimation of a panel-data vector autoregressive model over 1975–2011. Growth fluctuations, initially associated with demand booms triggered by unusually low interest rates and later with demand contractions resulting from the crisis and policy adjustments, have been key drivers of current account fluctuations. Changes in competitiveness, measured by real exchange rates or unit labor costs, have played a less important role. Demand shocks have contributed more to current account balance dynamics in the Eurozone periphery than in the core, whereas competitiveness has been a less prominent factor in the periphery but relatively more important in the core. Changes in competitiveness are positively associated with changes in growth. Preventing imbalances from building up in a context of growing financial integration and easy finance warrants enhanced mutual surveillance of fiscal imbalances, but also better regulation of credit markets to prevent excess leverage and concentration of lending in investments prone to speculative bubbles. Coordination of fiscal policy across the Eurozone would facilitate the management of external imbalances without placing an often unwarranted burden on fiscal tightening in countries with sound fiscal positions affected by credit booms. The policies of internal devaluation implemented in the periphery, aimed at promoting external competitiveness, may have had only limited effectiveness in restoring the external balance to equilibrium.

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Growth and Competitiveness as Factors of Eurozone External Imbalances: Evidence and Policy Implications

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1. Introduction

The Eurozone sovereign debt crisis, triggered by the 2008-09 global financial crisis, exposed macroeconomic imbalances in member countries that had been gradually built since the advent of the common currency in 1999. A main symptom of these imbalances was the broadening of current account deficits in the Eurozone periphery, matched by growing surpluses in the core.[1] The current account deficits in the Eurozone periphery mirrored vigorous domestic spending, persistently surpassing real income growth, with the gap financed, to a large extent, by savings in the core. These patterns of intra-zone current account imbalances led to the accumulation of large external debts in the Eurozone periphery, matched by growing claims held notably by commercial banks in the core.

There were important differences among the periphery countries as to how excess spending materialized prior to the sovereign debt crisis: Both Greece and Portugal experienced a consumption boom, with limited upside in investment, while sizeable fiscal deficits, facilitated by borrowing at very low interest rates, boosted excess spending. In contrast, Ireland and Spain had strong fiscal positions. Excess spending was driven by housing booms, financed to a large extent by foreign savings. Fragilities in both countries morphed into a sovereign debt crisis due to a substantial loss of tax revenues when the real estate booms collapsed and to public support that governments were forced to provide to troubled banks.

The sovereign debt crisis is thus closely linked to the intra-zone external imbalances that emerged in the Eurozone prior to the 2008-09 global financial crisis: These imbalances provided the conduit through which excess domestic spending in the periphery was financed from the core. Recognizing, with hindsight, the severity of these macroeconomic imbalances, EU members introduced in 2012 a new surveillance framework for their early detection and timely correction.[2]

What caused the external imbalances in the Eurozone is still an open, actively debated question. There are two main strands of the diagnosis: The first emphasizes domestic demand growth, spurred by financial integration and the stronger potential for economic convergence that came along with the euro (Blanchard and Giavazzi, 2002). Although simultaneity does not imply

[1] The "Eurozone periphery" in this paper is defined to include the countries of the monetary union most affected by the sovereign debt crisis: Greece, Ireland, Italy, Portugal and Spain. These are the largest net debtor countries in the Eurozone, although in some countries, particularly in Italy, the current account deficits have not always been excessive. The "Eurozone core" countries are defined to include: Austria, Belgium, Denmark, Finland, France, Germany, The Netherlands and Slovenia. The choice of countries is further explained in section 3.

[2] The Macroeconomic Imbalance Procedure (MIP) includes an early warning system based on a scoreboard, which consists of a set of eleven indicators covering what is commonly perceived as major sources of macroeconomic imbalances. The MIP also involves recommendations for corrective action to members experiencing persistent imbalances and, in the event, an enforcement mechanism based on sanctions for members that fail to comply with the recommended corrective actions.

causality, external imbalances were built in parallel with the massive capital flows unleashed by the introduction of the common currency and the elimination of exchange rate risk among Eurozone countries. This factor, together with the common institutional framework provided by the Eurozone, has drastically reduced the obstacles that often discourage capital flows from developed to emerging market economies in other regions (Lane, 2008; Lane and Peels, 2012). The second line of diagnosis emphasizes the loss of competitiveness mainly resulting from wage and other business cost growth inconsistent with underlying productivity growth (Trichet, 2011; Draghi, 2012). Misalignment of wages with productivity growth could result from distortions in labor markets or excessive public sector wage growth. Excessive demand and lack of competition in non-tradable goods sectors could also affect the cost of other key inputs to tradable goods. Factors affecting non-price competitiveness may have also contributed to the imbalances (European Central Bank, 2012). The diagnosis emphasizing divergence of competitiveness within the Eurozone has been a central, and increasingly popular, theme in post-crisis policy debates (Gros, 2012; Wyplosz, 2013). The popularity of the competitiveness diagnosis is reflected in the EU Commission's eclectic scoreboard for the surveillance of macroeconomic imbalances, which includes changes in two indicators directly measuring price competitiveness: (i) the real effective exchange rate and (ii) nominal unit labor costs (EU Commission, 2012).

However, systematic evidence on the drivers of external imbalances in the Eurozone remains relatively sparse. Often, the diverging competitiveness among the periphery and the core has been interpreted as direct evidence that competitiveness gaps have been at the root of the external imbalances in the periphery, with the analysis then focusing on the structural reform agenda to rebalance competitiveness in the Eurozone (Zemanek et al., 2009). Empirical studies of external imbalances typically rely on panel regressions that control for a set of medium-term determinants of current account balances over four- or five-year periods (Jaumotte and Sodsriwiboon, 2010; Barnes et al, 2010).[3] The work by Jaumotte and Sodsriwiboon finds that external imbalances in the Eurozone periphery exceeded predicted levels based on current account fundamental determinants, with the gap possibly attributable to financial integration and to the periphery's relative loss of competitiveness. Results by Lane and Pels (2012) suggest that the initial level of per capita income and expected growth have been significant factors of current account imbalances in the Eurozone. Few studies, however, investigate the relative contribution to external imbalances of initial income disparities, growth, and competitiveness. Using panel cointegration techniques, Belke and Dreger (2011) compared the relative effect of per capita income differences and competitiveness and concluded that diverging competitiveness has been a main factor of external imbalances in the Eurozone. By estimating a vector error correction model, Arghyrou and Chortaras (2008) found that real exchange rates have been significant determinants of current account balances in Eurozone countries, although relative income

[3] Earlier studies of current account determinants in the same vein include Calderon et al (2002), and Chinn and Prasad (2003).

differences appear to be predominant in the long run but also in the adjustment to equilibrium. Yet, as pointed out by Wyplosz (2013), both external imbalances and changes in competitiveness (approximated by the real exchange rate) may be occurring simultaneously but may be caused by other factors, and may thus not reflect a causal relationship. Using a stylized model of current account and goods market equilibrium, Wyplosz finds some evidence that demand shocks largely explain the current account imbalances in the Eurozone, while competitiveness shocks only have a small explanatory value. [4]

A sound understanding of the causes of the Eurozone's external imbalances is critical as different diagnostics point to very different policy implications for addressing the risks associated with such imbalances. The underlying analytical framework in this paper acknowledges the endogeneity of both the current account balance and the real exchange rate—a key determinant of price competitiveness. We identify key variables potentially associated with external imbalances through their impact on savings and investment and assess their contribution to these imbalances through the estimation of a panel-data Vector Autoregressive (panel VAR) model on these variables. The panel VAR makes it possible to identify the relative contribution of the variables of interest to external imbalances through their interaction as part of a multi-dimensional time series model, where all the macro variables are considered as endogenous. The panel VAR is estimated for the Eurozone countries as a whole, over different time periods, but also for the Eurozone periphery and core country groups separately, with the aim of analyzing the diversity of the determinants of external imbalances in these two groups.

The findings of the paper suggest that growth fluctuations have played an important role in current account balance fluctuations in the Eurozone as a whole. Growth shocks have played a more important role in current account balance dynamics in the Eurozone periphery than in the core. Changes in competitiveness, measured by real exchange rates or unit labor costs, have not been a prominent factor of external imbalances in the Eurozone periphery. However, competitiveness changes, measured by unit labor costs, have contributed to the current account surpluses in the Eurozone core. The contribution of real interest rate shocks to external imbalances has significantly increased since 1996, especially in the Eurozone periphery. The empirical findings of the panel VAR, together with the stylized facts of intra-Eurozone imbalances, corroborate the view that, up until the 2008-09 crisis, growing external imbalances in the periphery were mainly driven by a domestic demand boom made possible by greater financial integration and the resulting surge in credit and intra-regional capital flows.

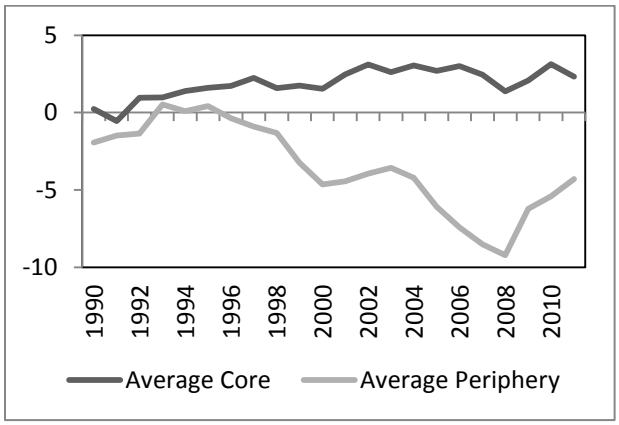
[4] The literature has also examined other factors affecting the external balance, such as dependency ratios and trade. For example, using a methodology of bilateral trade regressions, Chen et al (2012) found that the Eurozone periphery suffered from asymmetric trade shocks compared to the core. It benefited less from increased demand from China and oil producing countries, while it was affected more from competition by Eastern and Central European countries.

The paper is organized as follows: The next section reviews stylized facts associated with external imbalances in the Eurozone and discusses the analytical interpretations of the imbalances. The third section presents the empirical model and the results of the panel VAR estimation for the full sample of Eurozone countries and for the Eurozone core and periphery groups. The fourth section discusses some policy implications of the findings and concludes.

2. Stylized facts and interpretations of external imbalances in the Eurozone

The divergence between the external balances in Eurozone periphery and core countries surfaced in the mid-1990s, prior to the advent of the euro, with deficits in the periphery building up gradually and reaching, on average, 10 percent of GDP prior to the global financial crisis (Figure 1). In contrast, core Eurozone countries maintained a current account surplus throughout the 1990s, which grew somewhat larger in proportion to GDP after the introduction of the euro. External imbalances in the periphery have started unwinding since 2009, as a result of the recession triggered by the 2008-09 crisis.

Figure 1: External current account imbalances in the Eurozone core and periphery: stylized facts (in % of GDP 1990-2011)



Source: BPS database.

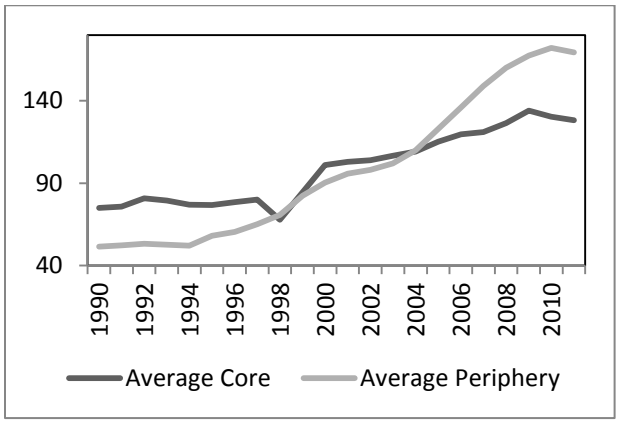
Explanations of Eurozone external imbalances emphasizing the role of financial integration and domestic demand growth were initially proposed by Blanchard and Giavazzi (2002) who demonstrated that foreign borrowing is optimal for a less advanced country in a monetary union which expects to catch up with richer countries. External borrowing—and hence the current account deficit that mirrors the excess of investment over domestic savings—would be higher the greater the expected income growth as a result of convergence and the lower the interest rate. Such “good imbalances” would be an opportunity for less advanced Eurozone countries to capitalize on financial integration through the common currency, by boosting investment and productivity growth while smoothing consumption during the convergence process. Empirical studies have confirmed the tendency for capital to flow from high-income to less advanced

countries within the Eurozone (Schmitz and von Hagen, 2010), although this pattern does not characterize cross-country capital flows at the global level (Lane, 2008).

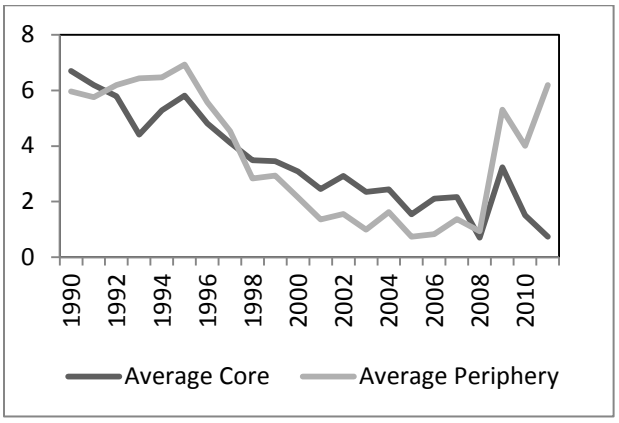
The diverging trends in credit growth and interest rates in the Eurozone periphery and core constitute key stylized facts of this line of diagnosis. Since the early 1990s, growth of credit to the private sector in the periphery surpassed by far credit growth in the core (Figure 2a): Credit to the private sector in the periphery more than tripled in proportion to GDP from 1990 to 2011, exceeding since the mid-2000s levels seen in the core. The credit boom was accompanied by a decline in real long-term interest rates, which was significantly steeper in the periphery than in the core (Figure 2b). As a matter of fact, because inflation remained higher in the periphery, the average real long-term interest rate was *lower* in the periphery compared to the core for about a decade, from the late 1990s to the onset of the global financial crisis. This was sharply reversed with the outbreak of the sovereign debt crisis in 2009 when real long-term interest rates in the periphery jumped to levels unseen since the early 1990s, well before the introduction of the euro. In contrast, after a spike during the crisis, real long term interest rates in the core reverted to their earlier lows, reflecting to a large extent capital flight to safety from periphery crisis-hit countries to the core.

Figure 2: Credit and interest rates in the Eurozone core and periphery (1990-2011)

(a) Credit to private sector (in % of GDP)



(b) Real interest rate on long-term government bonds



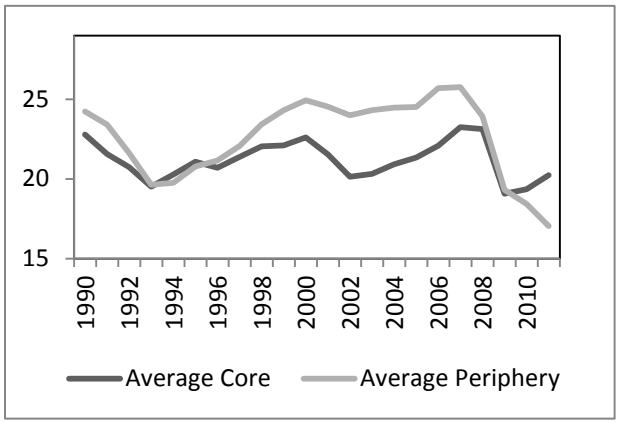
Source: IFS and WDI databases.

Easier credit and lower real interest rates are expected to stimulate investment while tempering the incentives to save, thus boosting the current account deficit. Consistent with credit market developments and the expectation of real convergence, the investment ratio in the Eurozone periphery grew more than in the core from the early 1990s to the introduction of the euro (Figure 3a). In parallel, the periphery's savings rate started to continuously decline, in the aftermath of the introduction of the common currency in 1998-99 (Figure 3b). This contrasts with the increase in the savings rate in the core, up until the global economic crisis. Although rising investment may have been, on average, the initial trigger of external imbalances, this factor seems to have receded in the 2000s as the investment ratio in the periphery stabilized before the crisis. The fall

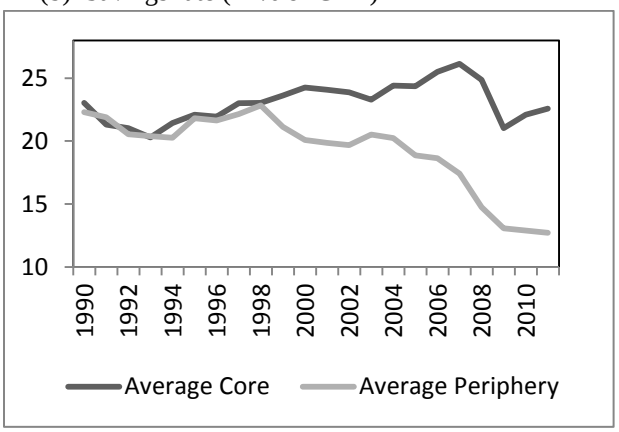
in savings rates appears more closely related to the broadening of external imbalances in the periphery since the advent of the euro.

Figure 3: Savings-Investment imbalances in the Eurozone core and periphery (1990-2011)

(a) Gross investment rate (in % of GDP)



(b) Savings rate (in % of GDP)



Source: WDI database.

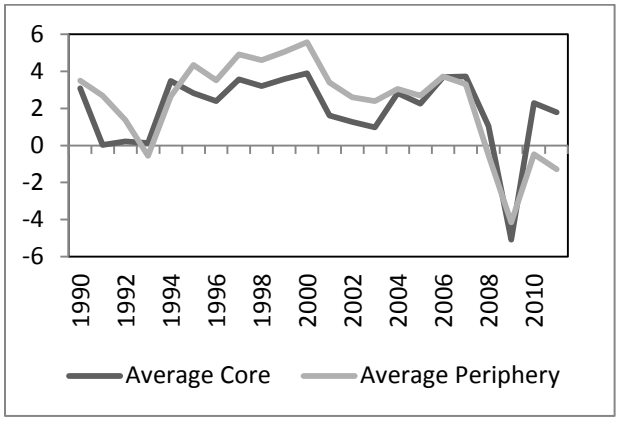
The investment boom and decline in savings in the Eurozone periphery would in turn be expected to boost domestic demand and GDP growth, thus validating the expectation of real convergence. Strong GDP growth was indeed observed in the periphery, consistently surpassing GDP growth in the core by 1-2 percentage points per year for about a decade prior to the crisis (Figure 4a). Strong growth in the periphery seems associated with vigorous domestic demand rather than with a surge in labor productivity growth. Except for a temporary spike in the late 1990s, labor productivity growth in the periphery was generally on a declining trend throughout the time period considered and was surpassed, before the crisis, by a surge in productivity growth in the core (Figure 4b).

Faster growth in the Eurozone periphery compared to the core seems weakly related to a divergence in fiscal positions. Primary fiscal balances have not significantly diverged among the Eurozone periphery and core countries from the mid-1990s to the 2008-09 financial crisis (Figure 4c). In the second half of the 1990s, reflecting the Maastricht criteria for euro membership, fiscal policy was tightened, with primary fiscal surpluses increasing in both core and periphery countries. However, both core and periphery countries took advantage of the lower interest payments on public debt after the introduction of the euro to ease the fiscal stance as indicated by the decrease in the primary fiscal surplus. This was not reflected into a larger overall fiscal deficit thanks to reduced interest payments on public debt. Fiscal balances diverged markedly in the aftermath of the global financial crisis, which hit to a much larger extent the

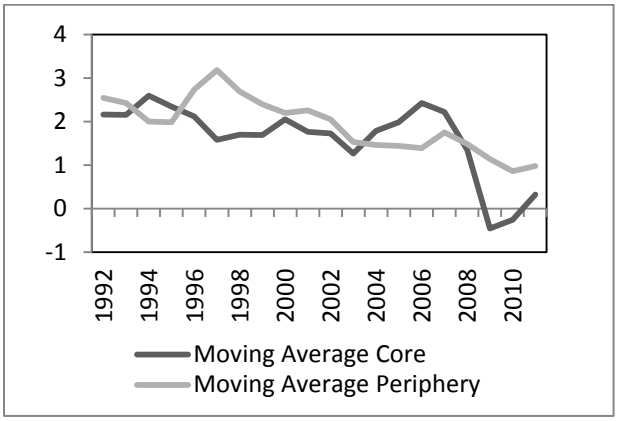
budgets of the Eurozone periphery countries.[5] Moreover, strong growth in the periphery does not seem to be associated with a boost to domestic demand from growing real wages. Although real wage growth in the periphery accelerated after the introduction of the common currency, this only put a floor to the declining trend of labor income in proportion to nominal GDP since the early 1990s (Figure 4d). The decline in labor income share is also characteristic of the Eurozone core, with the difference, however, that the downward trend continued until the 2008-09 crisis as a result of wage restraint adopted in several countries, most notably in Germany. Overall, in both the periphery and the core nominal wage growth lagged behind GDP growth.

Figure 4: Stylized facts of growth in the Eurozone core and periphery (1990-2011)

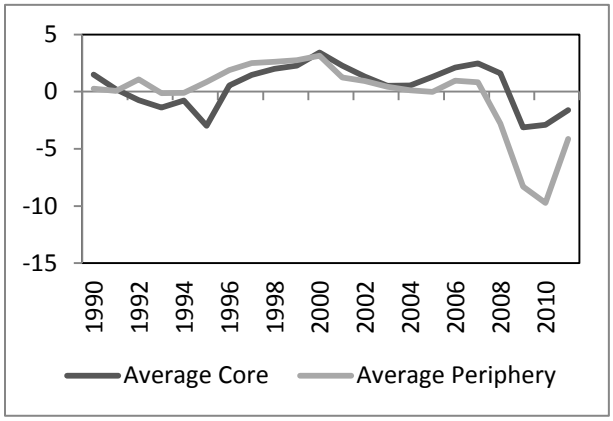
(a) Real GDP growth (in % per year)



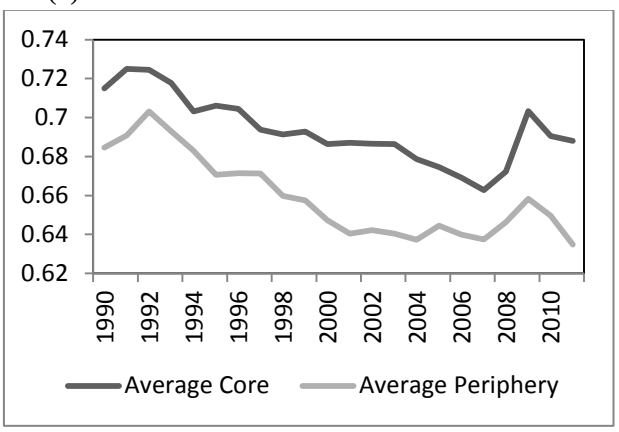
(b) Labor productivity growth (3-year moving average)



(c) Primary fiscal balance (in % of GDP)



(d) Ratio of total labor cost to nominal GDP



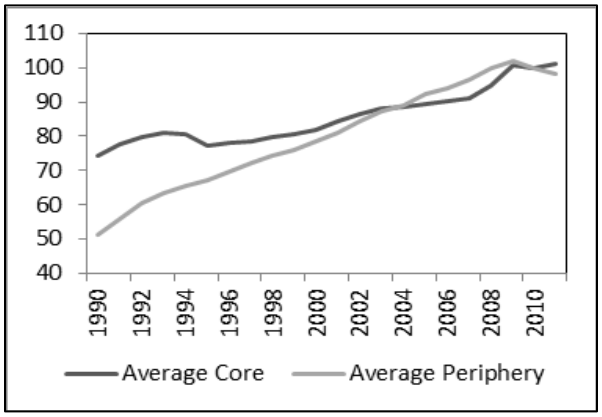
Source: WDI and OECD Economic Outlook databases.

[5] This partly reflects the collapse of tax revenues linked to pre-crisis booming sectors such as construction but also the support provided to ailing banks in some periphery countries. It also partly reflects the fiscal fragilities of those periphery countries which used reduced interest payments on debt and buoyant tax revenues to expand public spending, thus leaving their budgets vulnerable to a loss of revenue as public expenditure was difficult to cut on short notice (see also IMF, 2011).

A common narrative of the alternative diagnosis of external imbalances, emphasizing the deterioration of Eurozone periphery competitiveness, attributes this development to labor cost growth surpassing productivity growth, partly as a result of over optimistic convergence expectations and partly reflecting insufficient product and labor market reforms. Excessive growth of unit labor costs in the periphery would lead to an appreciation of the real exchange rate and erosion of the periphery's competitiveness.[6] By contrast, wage moderation in the core, especially in Germany, is seen as a key underpinning of improved competitiveness and current account surpluses in the core over time. Indeed, the emergence of current account deficits in the periphery was associated with a steady increase in unit labor cost, which caught up with the average level in the Eurozone periphery at around mid-2000s, starting from a much lower level in the early 1990s (Figure 5a). In parallel, external imbalances went in tandem with a steady appreciation of the periphery countries' real effective exchange rate of nearly 21 percent over 2000-2008 (Figure 5b). The real effective exchange rate appreciated much less in the core, by about 10 percent, indicating a loss of competitiveness for the Eurozone periphery against the core that may have contributed to the rising external imbalances. The difference in real exchange rate appreciation among the two groups of countries since the introduction of the euro reflects lower inflation in the core, partly as a result of compressed labor cost growth (Figure 4d) and partly because of a spike in productivity gains prior to the 2008-09 crisis (Figure 4b). The sharp appreciation of the periphery's real effective exchange rate provides the context for attributing the periphery's external imbalances to weak competitiveness.

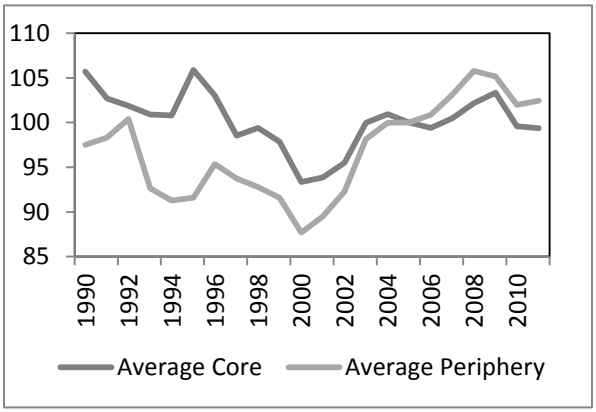
Figure 5: Competitiveness gaps in the Eurozone core and periphery (1990-2011)

(a) Unit labor cost (2010=100)



Source: OECD

(b) Real effective exchange rates (2005=100)



Source: IFS and BIS databases

[6] This view is well epitomized by Sinn (2011): "The euro brought about a convergence in interest rates, lowering all euro members' borrowing costs down to German levels. But it proved to be a mixed blessing. The competitiveness of these countries was severely eroded in the process, since their wages and prices rose excessively over the period. To come out of the crisis, the GIPS [Eurozone periphery countries] now need to depreciate in real terms, i.e. reduce wages and prices relative to their trading partners, a painful process that requires harsh austerity programs, straining the social fabric and causing significant political strife."

A variant of the competitiveness diagnosis emphasizes what Eichengreen (2010) called "bad external imbalances" — to be distinguished from the "good imbalances" that foster convergence through higher investment in tradables and productivity growth. "Bad external imbalances" may arise when capital flows to less developed countries fail to boost investment rates (as in Greece and Portugal), or concentrate into non-tradable goods sectors (such as construction in Ireland and Spain) where the potential for productivity gains is limited. Foreign-financed growth driven by non-tradables is likely to become unsustainable as it will not generate the exports needed to repay today's external debt. At the same time, the appreciation of the real exchange rate because of excess demand and inflation in non-tradables will further erode the competitiveness of tradable goods sectors (Giavazzi and Spaventa, 2010).[7] Distortions to competition that create rents in non-tradable sectors, inadequate regulation of mortgage lending and the banking sector, misallocation of government spending, could all contribute to concentration of capital inflows to low-productivity non-tradables (IMF, 2011; Zemanek, Belke, and Schabl, 2009).

The different interpretations of Eurozone external imbalances have different policy implications. Emphasizing financial integration and domestic demand growth spurred by easy finance directs attention to mitigating the risk of excess spending. Emphasis on competitiveness brings to the fore reforms to contain labor cost growth but also to improve non-price competitiveness. Which of these explanations has greater plausibility is, in our view, an empirical matter that this paper aims to further examine (see section 3). Analytically, however, it can be argued that the stylized facts associated with the Eurozone imbalances do not provide sufficient evidence to disentangle these interpretations. This is because, as underscored by Wyplosz (2013), both external imbalances and changes in competitiveness may occur simultaneously, without any direct causal relationship, for reasons related to the influence of other factors.

Greater financial integration and the resulting massive capital inflows to the periphery are precisely factors that not only spur domestic demand but, at the same time, lead to real exchange rate appreciation, a shift of production to non-tradable goods sectors and, eventually, greater external imbalances. A simple inter-temporal framework of current account and real exchange rate determination can be sketched to demonstrate this point (see Annex 1). It provides a simple account of the stylized facts in the Eurozone periphery: Greater financial integration, lower interest rates, and the anticipation of fast income convergence would be likely to increase current consumption in the periphery. The higher demand for both tradables and non-tradables would result in larger current account deficits in the periphery, but also in an appreciation of real exchange rates to make possible (under decreasing returns) a shift of production to non-tradable goods sectors. These developments would be symptoms of a competitiveness loss but without a causal link between loss of competitiveness and external imbalances. The policy relevant

[7] The competitiveness of tradable goods sectors can even be affected more directly by rising prices of non-tradables to the extent that non-tradable goods and services are used as inputs in the production of tradable goods.

question, to which we now turn, is the empirical significance of the different possible underlying factors in accounting for the external imbalances in the Eurozone.

3. An empirical model of external imbalances in the Eurozone

Using a multivariate time series analysis, the objective of this section is to quantify the relative contribution of the main factors driving the current account balance in Eurozone countries. The model is estimated over different Eurozone country samples and time periods, first, to explore if any significant differences exist in the dynamics of the current account balance between the Eurozone core and periphery and, second, to assess if the introduction of the euro has affected the external balance dynamics in the member countries.

3.1 Estimation methodology and choice of model

We build and estimate a panel-data Vector Autoregressive (panel VAR) model. In choosing this methodology, we take a "data driven approach", since VAR models are "atheoretical" in the sense that they are relatively free of ad hoc identifying assumptions. In addition, this methodology presents an important advantage compared to more standard single panel regression studies. Owing to the multiple interactions and simultaneity among aggregate macro variables and the current account, a simple panel regression could produce large bias on the coefficients if the endogeneity problem is not properly treated. The VAR addresses this problem by treating all the variables in the system as endogenous.

Let us consider the following panel VAR model:

$$y_{n,t} = \Gamma_0 + A_n(L)y_{n,t-1} + f_n + \varepsilon_{nt} \qquad (1)$$

where y_{nt} is a five-dimensional vector {*CA, REER, R, YGAP, GR*}of variables for each of the N countries, *n*=1,..*N*. *CA* represents the balance of the current account (in percent of GDP); *REER* is the real effective exchange rate based on consumer prices; *R* is the real interest rate on long-term government bonds (with the nominal interest rate deflated by the consumer price inflation rate); *YGAP* is the per capita GDP of country *n* in proportion to the per capita GDP of the average of the European Union (measured in logs); and *GR* is the annual real GDP growth. f_n is a country-specific intercept and $A_n(L)$ is a lag polynomial with the VAR coefficients. Γ_0 is the vector of constant parameters, and ε is the vector of the residuals (assumed not auto-correlated, with *0* mean, and a country-specific constant variance-covariance matrix).[8]

[8] Actual inflation rate is admittedly a crude measure of expected inflation. An alternative would be to use a backward looking approach to compute expected inflation. For instance, MacDonald and Nagayasu (2000) use a one-sided moving average filter consisting of four quarterly lags of actual inflation. Another alternative would be to

The choice of the macro variables included in the specification is motivated by the literature on the key underpinnings of savings and investment imbalances that affect the external current account. At the same time, we acknowledge that the real exchange rate is an endogenous variable, determined jointly with the current account balance (as in the rudimentary open economy model presented in the Annex). Higher expected income growth is expected to reduce savings through consumption smoothing over time, raise investment, and boost imports of goods and services.[9] Per capita income convergence to the average of the Eurozone in a given country (an increase in YGAP) is expected to reduce savings and boost capital inflows to this country. A higher real interest rate is assumed to increase savings, reduce investment, and encourage capital inflows to the country. An appreciation of the real exchange rate reduces competitiveness and is thus expected to lead to lower investment and a larger deficit in the trade balance for goods and services. The current account and the real exchange rate are also affected by other variables, such as -- the dependency ratio, fiscal policies, the terms of trade, foreign demand—but our VAR model focuses on the main determinants debated in the literature, namely, growth, competitiveness and interest rates. Although the VAR model is not a full-fledged model of current account and real exchange rate determination, it is intended to capture some important relationships among these variables and some of their key determinants in a simultaneous equation system.

Our panel includes annual data from 1975 to 2011 for 13 Eurozone countries: Austria, Belgium, Denmark, Finland, France, Germany, The Netherlands and Slovenia for the core group; Greece, Ireland, Italy, Portugal and Spain, for the periphery group.[10, 11] The panel is unbalanced and only becomes highly balanced after the mid-1990s. As we are not focused on the high frequency fluctuations of the current account but rather on the medium-term variations, the use of quarterly data is not considered.

We estimate the multivariate model (1) using the first-differenced Ordinary Least Square (OLS) panel estimator. Since the number of cross-sections is small in our sample (N=13), using the more standard mean-differencing procedure would not be appropriate because the sampling properties of this procedure depend on this number (see e.g. Wooldridge, 2013).[12]

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use indexed-inflation bonds to calculate expected inflation. However, not all the Eurozone countries issue these type bonds.

[9] We use actual growth as a measure of expected growth, despite the limitations of this assumption, in line with previous studies in the empirical literature of external current account determination (Chinn and Prasad, 2003; Barnes et al., 2010).

[10] Long term government bonds, the consumer price index series, and the *REER* series are taken from the IFS database of the IMF. *REER* series is also complemented with BIS data. *YGAP* and *GR* series come from the WDI database of the World Bank. Finally, *CA* is taken from the BPS database of the IMF.

[11] Slovakia adopted the euro in 2009 so consequently we do not include it in the sample. Luxembourg, Cyprus, and Malta are excluded from the panel because of their relatively small economic size and the large size of their financial sector (implying that the dynamics of the current account can be potentially driven by very different factors than for the other members of the Eurozone).

[12] Using the first-differenced OLS presents an additional advantage since it highly increases the likelihood of obtaining a stable VAR system.

On the other hand, the most common ways to eliminate fixed effects previous to estimation in a dynamic panel (through mean-differencing or first-differencing procedures) generate a bias because of the presence of lagged endogenous variables as regressors —the so called Hurwicz-type bias, (see e.g. Nerlove, 1967, or Nickell, 1981). A Generalized Method of Moments (GMM) system in which the lags of the endogenous variables in the system are used as instruments can be used to address this problem (Arellano and Bond, 1991; Arellano and Bover, 1995). Nevertheless, we decided not to draw on the GMM estimation in our baseline estimation because of two reasons. First, as it has been shown in the literature, the properties of the GMM estimators hold for a large number of cross-sections, so they can be severely biased and imprecise in a panel data with a small "N" as ours. Second, as it has been well documented (see e.g. Blundell and Bond, 1998) the GMM estimator in a first differenced model can have very poor finite sample properties in terms of bias and precision when the series are persistent and when the number of time series observations is relatively small, as the lagged levels of the series provide weak instruments for first differences in this case. As a robustness exercise, however, we replicated all the exercises we report in the following sub-section using a "just identified" GMM estimation in which the first lag of each endogenous variable in the system is used as instrumental variable. The main qualitative results remain mostly unchanged but unsurprisingly, we obtain higher confidence intervals for the impulse response functions.[13]

3.2 Empirical results

Based on the Hannah-Quinn, Akaike information, and Bayesian information criteria one lag is found to be enough to eliminate any autocorrelation in the residuals for each of the panel VAR specifications.[14]

The results presented below are based on generalized impulse responses (GIR) and generalized variance decompositions (GVD). The GIRs and GVD are increasingly used in the literature as an alternative to the standard orthogonalized impulse-responses and variance decompositions. The traditional Choleski orthogonalization of the variance-covariance matrix of errors implies a choice of a specific order of variables in a multivariate framework, where the variable considered the most exogenous is placed at the top of the model and the less exogenous variable is placed at the bottom. In practice, different orderings often give different results, especially when the number of endogenous variables is large, as in our specification (see e.g. Stock and Watson, 2001). In addition, using annual data make the identifying assumptions in the Choleski orthogonalization —or in any other identification scheme— stronger. The reason for this is that this identification scheme constrains some variables not to impact other endogenous variables within a given year. With the GIR and GVD, no order has to be imposed. Finally, it is important

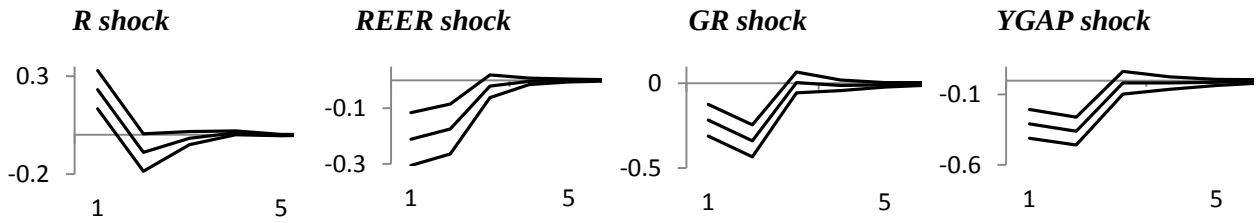
[13] All the robustness results are available upon request.
[14] Not always these three criteria results coincide. However, one lag is always selected by the majority of criteria in the different specifications.

to notice that this approach does not attempt to recover any structural shocks. Instead, this methodology describes how the system reacts after a specific historical shock, taking into account the correlation among shocks (see Pesaran and Shin, 1998, for a full description of the procedure).

Even though confidence intervals based on the asymptotic normal distribution is valid in large-sample stationary models, the distribution of impulse response estimates can be extremely biased and skewed in small-samples (Killian, 1998). Consequently, we construct confidence intervals for our impulse-responses running Monte Carlo simulations, which are typically used when analytical intervals are unreliable. We randomly generate a draw of the coefficients in our panel VAR using the estimated coefficients and their variance-covariance matrix and recalculate the impulse responses. We repeat this procedure 500 times (we experimented with 1000 and a larger number of repetitions and obtained similar results). We generate the 5th and 95th percentiles of this distribution, which we use as a confidence interval for the impulse responses.

Figure 6 show selected GIR for the current account balance variable (*CA*). The external balance reacts negatively to increases in economic growth (*GR*) and to economic convergence as measured by increases in the GDP per capita relative to the average of the European Union (*YGAP*). This result is consistent with the hypothesis that accelerated income growth, along with good prospects for future income through convergence, make households consume more out of their actual income since they expect to be able to pay back their debt in the future and encourages firms to invest more to expand production capacity to meet higher demand. Lower savings and higher investment would thus increase the external deficit (or reduce an existing surplus). An appreciation of exchange rates, unsurprisingly, has a negative effect on the current account balance (negative competitiveness effect). Finally, increases in real interest rates have -likely through their positive effect on savings and negative effect on investment- a positive effect on the current account balance, although insignificant after one year.

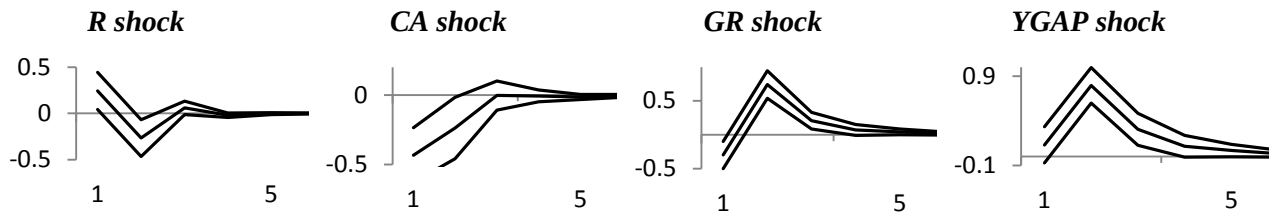
Figure 6: Responses of *CA* to one standard deviation shocks <u>for Eurozone countries</u>, <u>sample 1975-2011</u>



Note. The y-axis measures deviations from the baseline, while the x-axis represents years after shock.

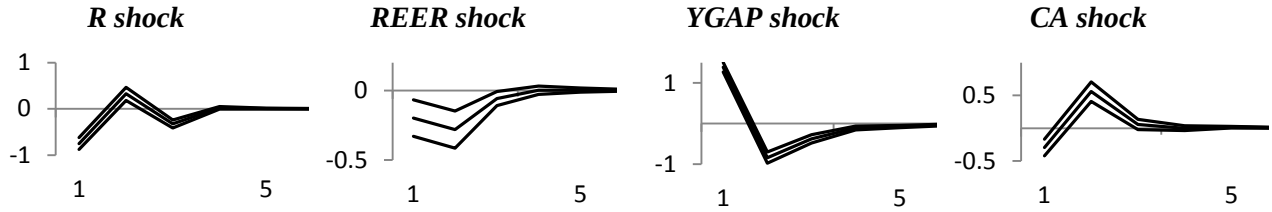
GIR for *REER* and *GR* are presented in Figures 7 and 8. Overall, these responses are in line with previous empirical and theoretical results in the literature. The appreciation following an increase in interest rates is consistent with a standard model of exchange rate determination based on uncovered interest rate parity. The appreciation of *REER* in response to higher *GR* and *YGAP* is in line with the Balassa-Samuelson effect and our stylized model of an open economy (Annex 1). Moreover, an exogenous improvement in the current account balance is associated with a depreciation of the real exchange rate in conformity with the results noted by Obstfeld and Rogoff (2000) in the case where monetary policy places a substantial weight on price stability as in the Eurozone. Real interest rate increases and *REER* appreciation have, unsurprisingly, negative effects on economic growth.

Figure 7: Responses of the *REER* to one standard deviation shocks for **Eurozone countries [1975-2011]**



Note. The y-axis measures deviations from the baseline, while the x-axis represents years after shock.

Figure 8: Responses of the *GR* to one standard deviation shocks for **Eurozone countries [1975-2011]**



Note. The y-axis measures deviations from the baseline, while the x-axis represents years after shock.

Table 1 reports the forecast error GVD for the current account over periods of two and four years ahead. Two general comments on the results (also valid for the alternative specifications considered below) are in order: First, external balance fluctuations seem to be explained mainly by its own shocks — a result commonly found in VAR studies of the determinants of endogenous time series variables. Second, the variance decomposition results do not seem to be very sensitive to the different horizons considered, implying that no shocks seem to gain relative stronger weight in explaining *CA* fluctuations over time. More specific to this estimation, *GR* and

YGAP shocks explain together more than 8 percent of the *CA* variance over any time horizon considered. The exchange rate and the interest rates account only for 2.5 and 2 percent, respectively, of the variance of *CA* either in the short or long run.

Table 1: Forecast error GVD for Eurozone countries [1975-2011]: percent of variation in *CA* explained by column variable

Baseline VAR

Years ahead	*R*	*REER*	*GR*	*YGAP*	*CA*
2	2.02	2.57	6.08	2.39	86.93
4	2.03	2.58	6.07	2.41	86.9

Alternative VAR *(replacing REER by ULC)*

Years ahead	*R*	*ULC*	*GR*	*YGAP*	*CA*
2	2.13	1.27	5.70	2.77	88.13
4	2.15	1.28	5.70	2.81	88.06

Our results imply that real exchange rate movements have played only a minor role in the external balance dynamics in the Eurozone countries as a whole. Moreover, economic growth changes seem to have been a key determinant of external current account fluctuations. One reason for the relatively limited role of *REER* shocks in the external balance could be that the loss of competitiveness depresses internal demand (via slower GDP growth), which leads to a reduction in imports, thus, partially compensating the negative effect of an exchange rate appreciation on the external balance.

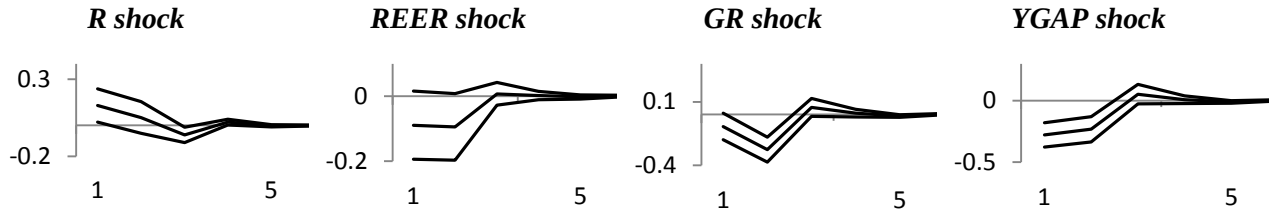
Replacing the *REER* variable with the unit labor cost (*ULC*), as an alternative measure of competitiveness in the VAR specification, provides a robustness exercise.[15] As is shown in Table 1, the qualitative results of the alternative VAR (where *REER* is replaced by *ULC*) remain unchanged.

The finding of limited contribution of real exchange rate (or unit labor cost) changes to the external imbalances of Eurozone countries may, to some extent, reflect the merging in a single group of periphery and core countries with large and opposite external imbalances especially in recent years. Dynamics of the current account balance in core and periphery countries have been mostly asymmetric in recent years while patterns of real exchange movements have been less markedly divergent (see Figures 1 and 5b). It is then suitable to split the sample in two groups (core and periphery) to explore if any significant differences exist in the dynamics of the external balance between these two groups.

[15] The *ULC* series are taken from the OECD database.

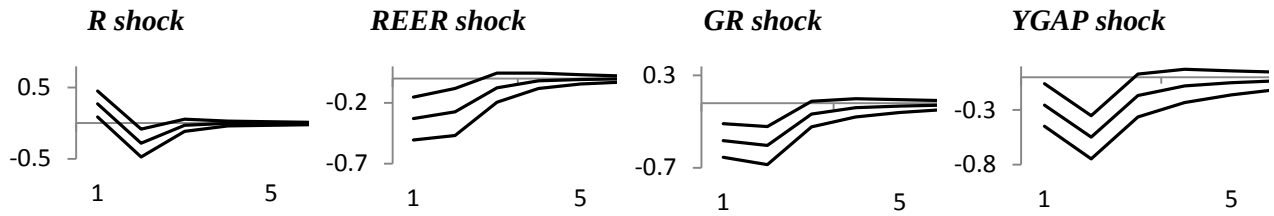
The qualitative results from the GIR for the Eurozone core and periphery are in line with our previous findings (Figures 9 and 10). In the two groups, the external balance responds negatively to *GR*, *YGAP* and *REER* shocks and positively to *R* shocks. However, results from the forecast error GVD reveal interesting differences (Tables 2 and 3). For the Eurozone core, the current account balance is explained almost entirely by its own shocks and to a lesser extent by shocks in *GR* and *YGAP* (3.6 and 3.5 percent respectively); while *REER* and *R* only play a minor role (around 1 percent for each variable—see Table 2). On the other hand, the external balance in the periphery is also explained mainly by its own shocks, but a higher proportion of the variance is explained by the other endogenous variables (Table 3). Growth and relative per capita income explain together more than 12 percent of *CA* fluctuations, whereas *REER* and *R* explain together less than 8 percent of the variance (around 3.5 and 4 percent respectively). Thus, as in our baseline results, the real exchange rate appears to have played a minor role in current account fluctuations either in the core or in the periphery. However, economic growth has played a more important role in external balance fluctuations in the periphery than in the core. The results obtained using the alternative VAR are overall in line with the results from the baseline VAR. The main difference is that in the Eurozone core the *ULC* variable now explains around the same part of the variance of the current account balance as *GR* or *YGAP* (Table 2). However, these contributions remain low and are not statistically different. By contrast, for the periphery countries the contribution of *ULC* changes to external imbalances appears negligible (Table 3). Finally, it is worth noting that these results remain unchanged when the composition of the two country groups is modified, with Italy included in the core country group (see Annex 2).

Figure 9: Responses of the *CA* to one standard deviation shocks for **Eurozone core [1975-2011]**



Note. The y-axis measures deviations from the baseline, while the x-axis represents years after shock.

Figure 10: Responses of the *CA* to one standard deviation shocks for **Eurozone periphery [sample 1975-2011]**



Note. The y-axis measures deviations from the baseline, while the x-axis represents years after shock.

Table 2: Forecast error GVD **Eurozone core [1975-2011]**: percent of variation in *CA* explained by column variable

Baseline VAR

Years ahead	*R*	*REER*	*GR*	*YGAP*	*CA*
2	0.86	1.14	3.61	3.51	90.88
4	1.05	1.15	3.68	3.51	90.60

Alternative VAR *(replacing REER by ULC)*

Years ahead	*R*	*ULC*	*GR*	*YGAP*	*CA*
2	0.64	4.10	3.25	2.55	89.45
4	0.81	4.18	3.51	2.59	88.92

Table 3: Forecast error GVD for **Eurozone periphery [1975-2011]**: percent of variation in *CA* explained by column variable

Baseline VAR

Years ahead	*R*	*REER*	*GR*	*YGAP*	*CA*
2	3.36	4.07	10.34	1.41	80.82
4	3.35	4.17	10.71	1.72	80.05

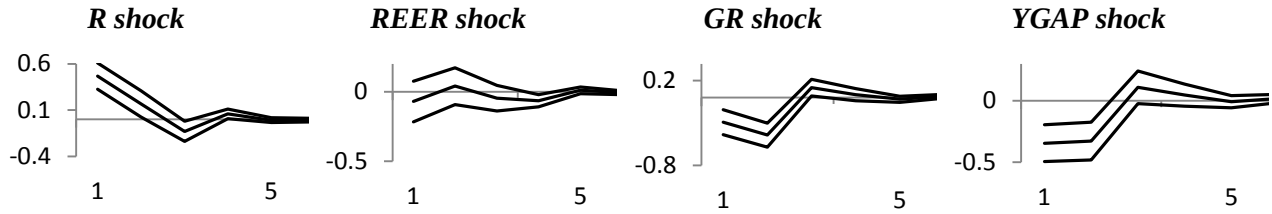
Alternative VAR *(replacing REER by ULC)*

Years ahead	*R*	*ULC*	*GR*	*YGAP*	*CA*
2	3.55	0.03	8.79	2.68	84.94
4	3.55	0.05	9.11	3.28	84.00

As it has been suggested in the literature, we also examine whether the introduction of the Euro has significantly modified the dynamics of external balance fluctuations. The virtual elimination of exchange rate risk, along with the reduction of sovereign risk perceived by the markets prior to the crisis, and the loss of independent monetary policy have most likely changed the transmission and variance of macro-shocks in Eurozone countries. The deepening of financial integration and the greater availability of credit could have increased the interest-rate elasticity of savings, thus possibly increasing the impact of interest rate on the current account of individual countries.

Figure 11 shows GIR for the sub-sample 1996-2011, including the 3 years preceding the formal launch of the euro in 1999, as expectations of this fact seem to have driven behaviors well ahead of its realization. Again, the direction of the response of the current account to different shocks remains mostly unchanged compared to the previous estimation. Nevertheless, the effect of *REER* on *CA* becomes insignificant. The results from the forecast error GVD of *CA* contain some further insights (Table 4): In particular, the importance of real interest rate shocks appears to have notably increased in determining external balance fluctuations (8 percent after four periods against 2 percent when the estimation covers the period prior to 1996—see Table 1). This is not a result of larger interest rate shocks (as measured by unexpected interest rate variations) but a result of greater transmission of these shocks on the current account.[16] Furthermore, the combined contribution of *GR* and *YGAP* to *CA* variance remains practically unchanged compared to the full period while, consistent with the GIRs, the contribution of *REER* is negligible. These results remain unchanged when the alternative VAR, with the *REER* replaced by *ULC*, is used to obtain the relative contributions of the factors explaining the current account balance.

Figure 11: Responses of the *CA* to one standard deviation shocks for **Eurozone countries [1996-2011]**



Note. The y-axis measures deviations from the baseline, while the x-axis represents years after shock.

[16] Actually, the standard deviation for the *R* shocks in the baseline VAR in the full sample [1975-2011] is higher (1.62) than in the more recent sample [1996-2011] (1.35).

Table 4: Forecast error GVD for **Eurozone [1996-2011]**: percent of variation in *CA* explained by column variable

Baseline VAR

Years ahead	*R*	*REER*	*GR*	*YGAP*	*CA*
2	7.25	0.38	7.23	1.26	83.87
4	7.79	0.42	7.29	1.26	83.23

Alternative VAR *(replacing ULC by REER)*

Years ahead	*R*	*ULC*	*GR*	*YGAP*	*CA*
2	6.34	1.82	9.11	1.53	81.21
4	6.82	2.40	9.06	1.53	80.20

The estimation was finally conducted separately for the Eurozone core and periphery countries over the 1996-2011 period (Table 5). The GIR remain qualitatively similar to the ones for the Eurozone sample as a whole (Figure 8) and are not shown separately (available upon request). The GVD for the current account of core countries over this more recent period reveal, however, significant differences compared to the full Eurozone sample: First, *REER*, *GR*, and *YGAP* are now equally important in explaining the external balance fluctuations in the Eurozone core (each variable accounting for around 4, 6 and 5 percent, respectively). Second, the contribution of interest rate shocks to the variance of current account changes is much lower compared to the full Eurozone sample (less than 3 percent after four years compared to 8 percent for the full sample). When we compute the GVD using the alternative VAR, the qualitative results remain unchanged. However, the contribution of *ULC* increases further and becomes equal to the total contribution of growth and convergence (sum of *GR* and *YGAP*).

Similarly, the GVD for the current account of periphery countries over this more recent period present also significant differences compared to the full Eurozone sample: Importantly, the contribution of changes in the four variables (*R*, *REER*, *GR*, and *YGAP*) to the variance of current account changes is much higher, reaching 50 percent after two years. Changes in growth and relative per capita incomes explain, as earlier, a major part of *CA* variance, now exceeding 30 percent for *GR* and *YGAP* combined. Moreover, the contribution of changes in real interest rates is much higher, reaching 16 percent. In line with our previous finding for the full sample, the strong role of *R* in *CA* fluctuations in the periphery is explained by the stronger transmission of real interest rate shocks rather than the larger variance of these shocks, indicating possible savings elasticity changes to interest rates.[17] As in the previous estimations, the contribution of real exchange rates to *CA* variance remains minor, reaching only about 3 percent. The alternative

[17] Indeed, the standard deviation for the R shocks is 1.81 for 1996-2011, compared to 2.12 for the entire period [1975-2011].

VAR shows similar results, the main difference being the decrease of the contribution of the *YGAP* to the external balance fluctuations.

Table 5: Forecast error GVD for **Eurozone core [1996-2011]**: percent of variation in *CA* explained by column variable

Baseline VAR

Years ahead	*R*	*REER*	*GR*	*YGAP*	*CA*
2	0.99	3.96	5.89	5.39	83.78
4	2.60	3.98	6.39	5.35	81.67

Alternative VAR *(replacing ULC by REER)*

Years ahead	*R*	*ULC*	*GR*	*YGAP*	*CA*
2	1.01	10.74	7.03	3.50	77.73
4	2.64	10.90	7.21	3.51	75.74

Table 6: Forecast variance decompositions for **Eurozone periphery [1996-2011]**: percent of variation in *CA* explained by column variable

Baseline VAR

Years ahead	*R*	*REER*	*GR*	*YGAP*	*CA*
2	16.10	2.82	20.95	9.39	50.74
4	16.26	2.81	21.28	9.44	50.22

Alternative VAR *(replacing ULC by REER)*

Years ahead	*R*	*ULC*	*GR*	*YGAP*	*CA*
2	15.06	0.34	19.02	0.43	65.15
4	15.78	0.64	18.84	1.60	63.14

To summarize, the estimation over the more recent period 1996-2011 reveals three main differences in the determinants of external imbalances among the two country groups: (i) A much stronger role played by real interest rates in the periphery than in the core; (ii) a much stronger influence from growth fluctuations and income convergence in the periphery than in the core; and (iii) a stronger role of competitiveness changes in the core, when measured by changes in unit labor costs, while competitiveness does not appear to have been a prominent factor of external imbalances in the periphery. These findings suggest that strong GDP growth and low

interest rates associated with financial integration have been the key drivers of external deficits in the Eurozone periphery until 2008, surpassing by far the impact of weaker competitiveness as a result of real exchange rate appreciation and high unit labor cost growth. Similarly, severe growth contractions and the spike in real interest rates since 2009 have been mostly associated with the diminishing external imbalance in the periphery post-crisis. At the same time, favorable trends in unit labor costs in the Eurozone core, often as a result of sustained wage restraint as in Germany, have played a role in the emergence of external current account surpluses in these countries. Although further research is warranted on this topic, a possible explanation could be that wage restraint and increased competitiveness enabled Eurozone core countries to take advantage from strong demand growth in emerging market economies, especially in China, prior to the global financial crisis (see also findings by Chen et al., 2012).

4. Discussion of policy implications and conclusion

A key finding of our empirical analysis is that GDP growth fluctuations have played a greater role in explaining current account fluctuations in the Eurozone periphery compared to changes in competitiveness as measured by changes in the real exchange rates or unit labor costs. The broader policy implications of this finding depend on the fundamental causes of changes in GDP growth. In an open economy, three fundamental factors may drive changes in GDP growth:

(i) domestic demand shocks;
(ii) supply-side developments that may cause medium-term accelerations or slowdowns of potential GDP growth;
(iii) external demand shocks.

Factors associated with domestic demand booms or contractions typically include fiscal impulses, monetary policy changes, or capital flows that affect the availability and cost of credit. Supply-side developments that may affect potential GDP include productivity growth and innovation, physical or human capital accumulation, and labor force growth. External demand shocks are usually exogenous and may reflect changes in foreign GDP, the emergence of new competitors in world markets, or changes in the terms of trade.

The association of higher (lower) GDP growth with larger (smaller) external imbalances indicated by the impulse response functions suggests that the first two groups of factors (namely, domestic demand shocks and supply-side determinants of potential growth) have been dominant in Eurozone countries. Both types of shocks would boost expected income growth, leading to lower savings, possibly higher investment, and larger external imbalances. By contrast, if external demand shocks were predominant, changes in GDP growth would be inversely associated with external imbalances as positive (negative) external demand shocks would lower (broaden) the deficit of the current account.

Even though both domestic demand shocks and supply-side factors affecting potential GDP may lead to external imbalances, domestic demand shocks are (and should be) more of policy concern. External current account deficits driven by domestic demand booms will have to be sooner or later absorbed through a retrenchment of domestic demand and an economic contraction, as the economy will need to generate the savings necessary for the repayment of debt accumulated during the expansion. By contrast, external current account deficits underpinned by accelerations in potential GDP growth are less of policy concern as future income for debt repayment could be generated from a larger productive potential. This is particularly so when productivity improvements and capital accumulation are concentrated in the tradable goods sector, directly generating the income needed to repay the accumulated foreign debt.

The stylized facts in the Eurozone (section 2) corroborate the view that, up until the 2008-09 crisis, the acceleration in GDP growth in the periphery was mainly driven by a domestic demand boom, rather than by favorable supply-side developments boosting productivity growth—even though some countries, especially Ireland, experienced more sustained productivity gains. The credit boom and sharply declining real interest rates in the periphery, together with the absence of notable productivity growth improvements in the periphery compared to the core, substantiate this point. The domestic demand boom was made possible by greater financial integration and the resulting surge in credit and intra-regional capital flows. As indicated by our empirical results, the growing external imbalances of the periphery reflected primarily this domestic demand boom that boosted GDP growth, and less the loss of competitiveness owing to the appreciation of the periphery countries' real exchange rates or the strong growth of unit labor costs. Conversely, shrinking domestic demand has been the main factor of the decrease in current account deficits since 2010.

A first corollary of these findings is that preventing imbalances from building up in a context of growing financial integration and easy finance warrants attention to mitigating excess domestic demand growth. This would entail enhanced mutual surveillance of fiscal imbalances, but also better regulation of credit markets to prevent excess leverage and excessive concentration of lending in investments prone to speculative bubbles. Macro-prudential measures to tame cyclical credit swings and mitigate over-concentration of lending in non-tradable goods sectors may help — such as, for example, stricter limits on loan-to-value ratios in housing lending. A challenge would be to reconcile country-specific macro-prudential policies with the process towards a uniform regulation of the banking system across the Eurozone. Structural reforms that open up competition and remove rents in often protected non-tradable goods sectors, especially in services, would also help prevent excessive concentration of resources in these sectors that may erode the production potential of tradables and exacerbate external imbalances. On the fiscal front, the EU fiscal compact, adopted in 2012, attempts to strengthen fiscal discipline and could contribute to preventing domestic demand booms fuelled by unsustainable fiscal policies.

At the same time, using fiscal retrenchment to offset domestic demand pressures powered by surging credit and intra-regional capital flows might be, to some extent, counterproductive. Fiscal contractions may conflict with other objectives of fiscal policy while their feasibility may be questionable if public debt is low and fiscal accounts are on a sound footing. It is worth noting that in at least two Eurozone periphery countries (Ireland and Spain) fiscal imbalances were non-existent before the 2008-09 global economic crisis, while public debt was at very low levels. This made it difficult to resort to fiscal tightening as a means of countering the domestic demand boom fuelled by the surge in credit growth.[18] A more coordinated approach to fiscal policy across the Eurozone would facilitate the management of external imbalances without placing an excessive — and often unwarranted — burden on fiscal tightening in countries affected by credit booms. Coordination of fiscal policies could be achieved by rebalancing the fiscal stance across periphery and core countries so as to alleviate the burden of fiscal adjustment in the periphery while boosting domestic demand in the core through some degree of fiscal easing. Fiscal expansion in the surplus countries — to the extent their fiscal positions are sustainable — would boost the external demand faced by deficit countries and would contribute to a more efficient absorption of the external imbalances triggered by periphery domestic demand booms. The EU Commission's new Macroeconomic Imbalance Procedure could thus benefit by placing symmetric emphasis on steps to restore external balance in deficit countries and on options to reduce excessive surpluses in other countries by expanding demand (also see European Parliament, 2012). More flexibility in the EU's fiscal compact may also be needed to make possible adjustments to national fiscal policies that would facilitate absorption of intra-zone external imbalances through offsetting changes in the fiscal stance of deficit and surplus countries.

A second corollary of our findings is that the policies of internal devaluation implemented in Eurozone periphery countries, aimed at containing labor cost growth and promoting external competitiveness, may have had only limited effectiveness in restoring the external balance to equilibrium. Internal devaluation through direct wage cuts or aggressive labor market deregulation to contain wage growth certainly helps absorb part of the external imbalances by depreciating the real exchange rate or by reducing unit labor costs. However, our results suggest that the current account adjustment that has been achieved through this channel appears to be relatively minor as the competitiveness channel has not been the main driver of the periphery's external imbalances. On the other hand, internal devaluation may have certainly contributed to a contraction of domestic demand and, through this channel, helped absorb external imbalances in the Eurozone periphery. However, the policy goal of restoring the external balance would have been achieved inefficiently (if Pareto-efficiency is a criterion for policy making), through the

[18] In 2006-07, on average, the overall fiscal balance was in surplus, at 1.5 and 2 percent of GDP respectively in Ireland and Spain. Gross public debt in proportion to GDP was 25 percent in Ireland and 38 percent in Spain. During the same period, the average fiscal deficit in the Eurozone was 1 percent of GDP while public debt was, on average, 67.5 percent of GDP (IMF, Fiscal Monitor, October 2012).

“unintended consequences” on domestic demand of a potentially large redistribution of income at the expense of wage earners.

To be sure, competitiveness does matter for economic performance. The impulse response functions of our model suggest that changes in external competitiveness, as measured by changes in the real exchange rate or unit labor costs, are positively associated with changes in real GDP growth: A real exchange rate appreciation (depreciation) slows (boosts) GDP growth over an initial period of 2-3 years — and similarly for an increase (decrease) in unit labor costs. Consequently, a loss of competitiveness could well lead to slower growth and loss of jobs, although the impact of this development on the external balance could be, according to our results, muted.

Ensuring that labor cost growth remains in line with productivity growth would be an enabler of sustained growth over time by preventing a loss of competitiveness when wage costs come under pressure in the face of booming domestic demand. Structural reforms that improve productivity and productivity-enhancing and cost-saving investments seem, however, to hold the key to sustained improvements in competitiveness and stronger growth over the medium term (see World Bank, 2012). This broader structural reform agenda, as well as the complementary, productivity-enhancing public investments in physical and human capital, should not be lost from sight by the excessive focus on labor cost competitiveness as a remedy to external imbalances in the drive to prevent future crises.

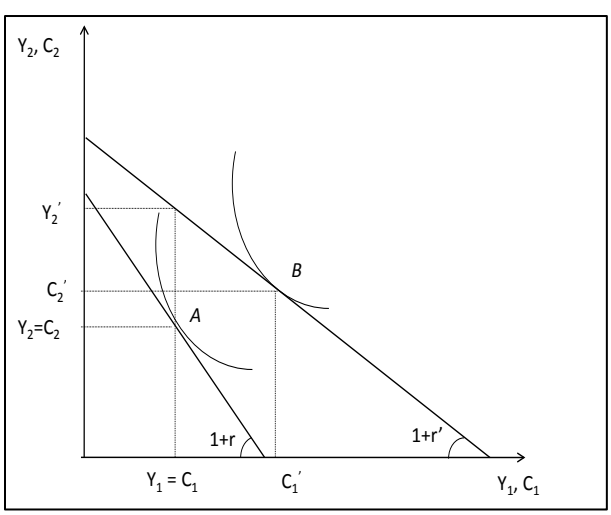
ANNEX 1: Impact of income convergence and lower borrowing costs in a simple intertemporal model of an open economy

Consider a rudimentary two-period, small open economy with no investment, where representative consumers are endowed with predetermined income (Y_1, Y_2) in each period and can borrow from or lend abroad at an exogenous interest rate (r). Consumers have no initial assets or debts so that we can neglect interest payments when looking at the economy's external current account. They decide present and future consumption by maximizing utility over two periods subject to an inter-temporal budget constraint, with future consumption discounted by a certain rate of time preference (β). Assume that the income endowments, the interest rate, the discount rate, and the inter-temporal rate of substitution of present and future consumption are such that the economy is initially in autarky, with consumption (C_1, C_2) equal to income in each period and hence a balanced external current account (Figure A1a, point A).

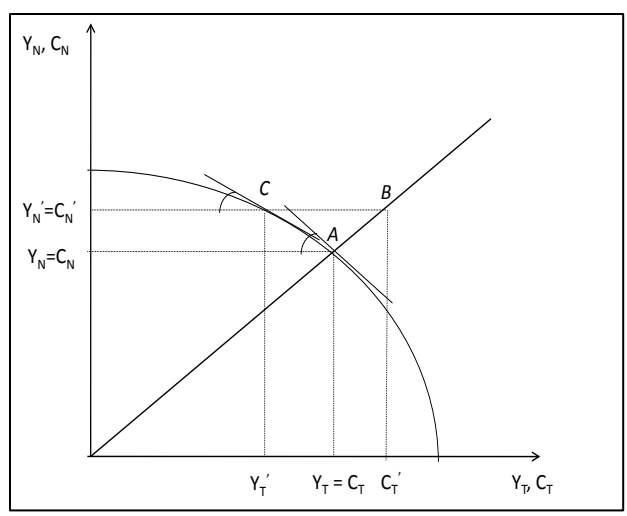
Consider a metaphor meant to illustrate the change in the environment faced by the Eurozone periphery after the introduction of the common currency. Assume that, as a result of international financial integration, the cost of borrowing is reduced to r'‹ r while the expectation of faster convergence raises future income to Y_2'›Y_2 with present income remaining unchanged. It is straightforward to establish that, at the new equilibrium (point B), the rudimentary economy will run a current account deficit (Y_1-C_1') in the first period as the representative agents will attempt to smooth consumption over time by increasing both future and present consumption. A future current account surplus (Y_2'-C_2') will have to match today's deficit so as to repay the debt incurred to increase present consumption.

Figure A1: A rudimentary inter-temporal model of a small open economy

(a) Impact of an increase in future income and a decrease in the interest rate on the current account balance



(b) impact on the production of tradables and non-tradables and on the real exchange rate



Assume next, for simplicity, that tradable and non-tradable goods are consumed in each period according to a fixed proportion, as illustrated by the radiant in Figure A1b, regardless of their relative price—this can be derived, for example, from a Cobb-Douglas type utility function for the two goods. We also assume diminishing returns in the production of the two goods so that point A in Figure A1b illustrates the production of tradable goods (Y_T) and non-tradable goods (Y_N) in the present period, before the increase in expected future income and the decline in the interest rate. As the economy is in autarky consumption of both types of goods equals production. The relative price of tradable goods in terms of non-tradables (P_T/P_N) is measured by the slope of the production possibility frontier at equilibrium and can be interpreted as the equivalent of the real exchange rate. A decline in the relative price of tradable goods (an increase in the relative price of non-tradables) denotes an appreciation of the real exchange rate.[19]

Consider now how the increase in current consumption, induced by the expected growth in future income and the decline in the interest rate, which is reflected in the current account deficit run in the present period, affects the production of tradable and non-tradable goods. The new consumption equilibrium is illustrated by point B (Figure A1b), indicating higher consumption of *both* tradables and non-tradables ($C_T' > C_T$ and $C_N' > C_N$). The higher consumption of non-tradables has to be met through a shift of domestic production from the tradable goods sector to non-tradables, such as illustrated by the new production equilibrium at point C. The economy now produces $Y_N' = C_N' > Y_N$ and $Y_T' < Y_T$. Consumption of tradable goods exceeds their domestic production by an amount ($C_T' - Y_T' > 0$) equal to the economy's current account deficit measured in terms of tradable goods.

Note that in the new production equilibrium (point C) the relative price of tradable goods in terms of non-tradables must decline in order to induce the required shift of resources to the non-tradable goods sector. This is equivalent to an appreciation of the real exchange rate which underlies the current account deficit in the current period. In the future period, when the economy must turn the deficit into a current account surplus to repay its debt, production will have to shift from non-tradable goods to tradables, with a parallel increase in the price of tradable goods—tantamount to a depreciation of the real exchange rate. [20]

[19] Strictly speaking, a change in the relative price of the two goods would violate the assumption of fixed consumer income in each period, measured in terms of tradable or non-tradable goods. However, this is inconsequential for the point made here. A constant returns technology would be consistent with the assumption of fixed income but this would preclude changes in the relative price of the two goods as a result of changes in current consumption.

[20] This adjustment can, however, be brutal if it is triggered by a sovereign debt crisis, as in the Eurozone in 2009-10, when markets doubt that the accumulated debt is sustainable. This would lead to sharply higher interest rates, a fall in domestic demand, and real exchange rate depreciation that may prove contractionary if resources cannot be easily shifted in the short run from non-tradable to tradable goods sectors.

ANNEX 2: Robustness exercise: Italy included in the Eurozone core subsample

Table 2A: Forecast variance decompositions **Eurozone core [1975-2011]:** percent of variation in *CA* explained by column variable

Years ahead	*R*	*REER*	*GR*	*YGAP*	*CA*
2	1.06	1.72	3.14	2.45	91.63
4	1.22	1.72	3.19	2.44	91.43

Table 2B: Forecast variance decompositions **Eurozone periphery [1975-2011]:** percent of variation in *CA* explained by column variable

Years ahead	*R*	*REER*	*GR*	*YGAP*	*CA*
2	3.95	4.11	11.40	1.71	78.83
4	3.93	4.12	12.01	1.90	78.04

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