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The Determinants of Current Account Imbalances in the Euro Area: A Panel Estimation Approach

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Abstract

The purpose of this paper is to explore the main macroeconomic, financial and structural factors that influenced current account developments in the euro area countries over the period from 1980 to 2008. The analysis, which theoretically rests on the intertemporal approach, uses a panel consisting of the twelve EU member states that initially joined the euro area, which is then expanded to seventeen countries with the aim to see whether the enlargement or potential enlargement of the euro area would alter the identified set of current account determinants. The results show that factors such as the level of development, demographics, macroeconomic policies and competitiveness, are important in explaining current account positions of individual euro area countries. Moreover, the analysis of short-run dynamics indicates that the EMU has resulted in longer periods of adjustment of current account imbalances.

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1. Introduction

The pattern of current account imbalances of the euro area countries in recent years, shows widening current account deficits in some countries (e.g. Greece, Portugal, Spain and Cyprus) which are mirrored by increasing surpluses in some other countries (e.g. Germany, the Netherlands, Luxembourg and Austria). The existence of chronic current account imbalances and the macroeconomic risks attached to a possible disorderly unwinding of these imbalances are highly relevant to policy debate and macro-prudential surveillance.

The aim of this paper is to identify the economic, financial and other factors that influence longer-run trends of the current account of the euro area countries and examine to what extent external imbalances are driven by the same set of factors across countries. The analysis, which theoretically rests on the intertemporal approach, treats the current account as the outcome of national saving and investment decisions. The paper draws upon similar studies by Debelle and Faruqee (1996), Chinn and Prasad (2003), Gruber and Kamin (2007), Afonso and Rault (2008) and Schmitz and von Hagen (2009).

The paper also explores whether participation in EMU has altered the importance of various fundamental factors that typically determine current account positions, or the speed of current account adjustment. As regards the latter, there are two main channels through which a monetary union may contribute to slower adjustment of current account imbalances. The first channel relates to the fact that, in the absence of national currencies, country-specific shocks tend to result in more persistent current account imbalances.[1] The second channel is associated with deeper financial market integration, as markets become more transparent and transaction costs are diminished. The increased financial integration among the countries that participate in a monetary union usually leads to larger financial flows, as the home bias that normally characterises national financial portfolios tends to be reduced[2], making external financing more readily available. This, in turn, implies that countries would run current account deficits (or surpluses) for longer periods of time compared with the situation where they face borrowing (or lending) constraints.

[1] Friedman (1953) argued that exchange rate flexibility contributes to lower current account persistence. Some studies provide empirical support to Friedman's hypothesis (e.g. Ghosh *et al*., 2008), while others do not (e.g. Chinn and Wei, 2008). See also Decressin and Stavrev (2009).
[2] See Lane (2008), Faruqee and Lee (2008) and Schmitz and von Hagen (2009).

As a starting point for our empirical analysis we use a panel of countries that consists of the initial eleven EU member states that joined the euro area in 1999 plus Greece that joined in 2001 (EU-12), covering the period from 1980 to 2008. Then, we expand our sample to seventeen countries by adding Cyprus and Malta, which have become members of the euro area in 2008,[3] as well as Denmark, Sweden and the United Kingdom (EU-17). The aim is to see the extent to which the enlargement or potential enlargement of the euro area would alter the identified set of current account determinants of the countries within the EMU.

2. Some stylised facts

A basic question concerning current account balances in the euro area is whether the shift to the single currency has led to larger imbalances. Figure 1 shows the average current account balances as percent of GDP for all individual EU-12 countries as well as for the EU-12 as a whole in the decades prior and after the introduction of the euro (i.e. in the periods from 1989 to 1998 and from 1999 to 2008, respectively). According to Figure 1, while the average current account balance for the EU-12 as a whole was quite low during both periods under review, it appears to be by two-thirds smaller during the decade following the advent of the euro. This can be interpreted as largely reflecting the growing economic integration among euro area members.

However, as Figure 1 also shows, this aggregate balance is associated with large current account imbalances at individual euro area country level, which during the decade following the introduction of the euro, became significantly larger. In particular, Greece, Portugal and Spain, which have been mostly running current account deficits, moved to considerably larger deficits during the period from 1999 to 2008. In contrast, current account surplus countries, such as Germany, Finland, the Netherlands and Luxemburg witnessed growing surpluses during the same period. Overall, all euro area countries shifted to larger current account imbalances during the latter period, with the notable exception of Belgium and France.

An alternative way to examine the effect of EMU on current account balances is to compare the EU-12 with the EU-17. Figure 2 plots the dispersion of current

[3] Slovenia and Slovakia are excluded from our empirical analysis since a considerable part of the sample extends over a period during which these countries were still under central planning.

account balances across countries in each of the two groups for the entire sample period, defined as the unweighted cross-section standard deviation. The scope of this exercise is twofold. First, we want to examine the time trend of the dispersion of current account balances among the EU-12 countries and see whether it increased after the introduction of the euro. Secondly, we want to check whether the dispersion is affected by the inclusion of the other five EU member states (two of which are already members of the euro area).

Figure 2 clearly shows that the dispersion of current account balances of the EU-12 countries has been trending upwards since 1996 and more remarkably since 1999. Thus, while during the 1980s it was close to zero, this dispersion has followed an increasing trend since the mid-1990s, a period during which the introduction of the common currency also took place. Looking at how the EU-12 countries compare with the expanded group (EU-17) we see that the latter's dispersion of current account balances has also increased in the last decade but to a lesser extent compared to EU-12.

3. The determining factors of the current account

Following the national accounts aggregate identities, the current account *(CA)* is equal to the difference between domestic saving *(S)* and investment *(I)* as depicted in the private and the public sectors. For normalisation purposes all variables are expressed as percentages of GDP. We specify the current account to GDP ratio *(CA/Y)* as a function of various economic, financial and other variables, including domestic real GDP per capita (Y/N) relative to the real GDP per capita of a reference country (Y^*/N^*), the real effective exchange rate *(REER)*, the ratio of the general government fiscal balance to GDP $((S_G - I_G)/Y)$, the ratio of private investment to GDP (I_P/Y), the credit to the private sector as percent of GDP *(CRP)*, the real interest rate *(RIR)* and, finally, the dependency ratio *(DEM)*.

Thus, the current account equation can be expressed as:

$$CA = f\left(\frac{Y/N}{Y^*/N^*}, REER, (S_G - I_G), I_p, CRP, RIR, DEM\right) \qquad (1)$$

Note that the linear representation of the above equation (see Section 4 for its general form) is built in such a way as to also check the extent to which the Ricardian equivalence and the Feldstein-Horioka hypothesis hold.[4]

Relative real GDP per capita reflects the level of development of a country. Countries with lower real GDP per capita normally import capital to finance their higher investment needs in an environment of low domestic savings and thus run current account deficits at their earlier stage of development. As the economy catches up, GDP per capita gradually reaches that of the reference country.[5] Thus, we expect relative real GDP per capita to be positively related to the current account.

An appreciation of the real effective exchange rate increases the purchasing power of domestic residents in terms of foreign goods, as well as the value of their wealth. This, in turn, is expected to have a favourable impact on consumption, reducing at the same time the propensity to save. Thus, an increase in real effective exchange rate is expected to adversely affect the current account balance.

According to the Keynesian view, a higher fiscal deficit $(S_G - I_G)$, increases disposable income and thereby consumption, lowering national saving and leading to a higher current account deficit ("twin-deficit" hypothesis). On the other hand, according to the Ricardian equivalence hypothesis, economic agents' perceive that a currently higher budget deficit would lead to higher taxes in the future. As a result, they respond by saving more at present, so that they maintain their long-run rate of consumption against reduced future disposable income. To the extent that private agents do not adjust their saving more than the change in the fiscal balance, we expect the current account to respond positively to the fiscal balance.[6]

The impact of private investment on the current account balance largely depends on whether the Feldstein-Horioka (1980) hypothesis holds. Thus, to the extent that higher private investment is financed through higher domestic saving, it does not affect the current account. However, it affects the current account when financed though international capital inflows. This latter outcome appears to have

[4] For a more detailed analysis of the model specification, see Brissimis *et al*. (2010).
[5] See, also, Roldos (1996) and Chinn and Prasad (2003).
[6] For a more complete discussion see a recent paper by Afonso and Rault (2008). The authors used panel cointegration tests to ascertain the effect of budget balances on current account balances, and their results were mixed. See, also, Briotti (2005), Bussiere *et al.* (2005) and Debelle and Faruqee (1996).

gained plausibility in the latest years of the sample when home bias in portfolio allocation had been on a declining trend (see, Ahearne et al., 2004). This understandably should be more so in the case of the euro area member states.

The ratio of bank credit to private sector to GDP, which in the case of our panel analysis is an indication of the degree of financial integration and deepening in the euro area, is used as a proxy for the borrowing constraints imposed on the private sector. In this respect, a higher level of financial integration and deepening implies lower borrowing constraints and, in principle, increases bank lending; therefore this variable tends to be associated with wider current account deficits through lower private saving. In particular, in the case of the countries in the EU-12 group, the effect of greater financial market integration, primarily due to the adoption of the euro, is expected to generate larger capital flows among the member countries, which, in turn, may lead to higher credit expansion and thus deterioration of the current account balances.[7]

A rise in the real interest rate increases the return on saving and thus has a positive impact on the current account. This variable is expected to have a considerable effect on the current account of many euro area countries as the drop in interest rates following the process to EMU accession and the subsequent introduction of the euro, is likely to have led to higher spending (lower saving) and thus to higher current account deficits. Finally, as regards the dependency ratio, it is expected to have a negative impact on the current account balance, as an increase in the dependency ratio among the population tends to reduce domestic saving.[8] However, other factors such as pension uncertainty might produce the opposite result.

4. Methodological issues and data

As discussed, we empirically explore the determinants of the current account in a sample of selected EU countries over the period from 1980 to 2008. In more detail, the seventeen EU countries that are used in the extended panel are Austria, Belgium, Cyprus, Denmark, Germany, Greece, Finland, France, Ireland, Italy,

[7] A more detailed analysis is given by Schmitz and von Hagen (2009). Furthermore, the introduction of the euro has led to higher cross-border asset and liability positions in Europe than in the rest of the world. See Lane (2006) and Lane and Milesi-Ferretti (2008).

[8] According to the life-cycle hypothesis the young and the old are net consumers, while the working individuals are net savers. See also Brissimis *et al*. (2010).

Luxemburg, Malta, the Netherlands, Portugal, Spain, Sweden and the United Kingdom (EU-17). We start off by testing whether there is a long-run (equilibrium) relationship between the current account and several "fundamental" determinants of net national saving. We first estimate the long-run relationship for the whole panel and then for each individual country, by applying standard econometric techniques.

Before estimating the long-run relationship, we test for the order of integration of the variables. Standard tests for the presence of a unit root based on the work of Im *et al.* (2003) were estimated to test the hypothesis that each panel data series has a common unit root. In addition, the Hadri (2000) test for the presence of a unit root in a heterogeneous panel was employed. In contrast to the previous test, this test examines the null hypothesis of stationarity against the alternative hypothesis of unit roots in panel data.

Before estimating equation (1) panel co-integration tests were employed to test the hypothesis that a long-run relationship exists among the variables. Kao (1999) and Pedroni (1999, 2004) developed several tests to examine the existence of co-integration in a multivariate framework. The proposed statistics test the null hypothesis of no co-integration versus the alternative of co-integration. Pedroni (1999, 2004) developed several tests to test for no co-integration in a dynamic panel allowing for heterogeneity among the individual countries.[9] The estimated tests permit heterogeneity in co-integrating vectors and the dynamics of the underlying error process across the cross-sectional units are estimated as residuals tests. Seven tests were estimated to examine whether the error process of the estimated equation is stationary (see Table 3). The first four statistics were based on pooling along within-dimension. Specifically, four statistics tested the null hypothesis of no co-integration for all cross-sectional units versus the alternative hypothesis of the existence of co-integration for all cross-sectional units. The latter three statistics were based on pooling along between-dimension, permitting distinct slope values (heterogeneous panel). The Kao test follows the same basic approach as the Pedroni test.

[9] Pooling time series has resulted in a substantial trade-off in terms of the permissible heterogeneity of the individual time series. Testing for co-integration among the variables should permit for as much heterogeneity as possible among the individual countries of the panel. If pooled results rely on homogeneous panel, then common slope coefficients are imposed. Pesaran and Smith (1995) show that if a common estimator is used when there are differences among the individual countries then the variables are not co-integrated.

Panel data estimation was used in the empirical analysis to estimate equation (1). Panel data have the advantage that they increase the sample size, are better suited to examine the dynamics of the model and estimate complicated behavioural models. However, panel data estimation faces several estimation and inference problems since it should combine cross section and time series dimensions. In our analysis three panel data estimation methods were employed, that is the "Fixed Effects", the "Seemingly Unrelated Regression" (SUR) and "Fully Modified OLS" (FMOLS). The linear representation of equation (1) that was estimated was, in its general form, the following:

$$CA_{it} / Y_{it} = \beta_0 + \beta' X_{it} + \mu_i + \lambda_t + \nu_{it} \qquad (2)$$

where X_{it} is a vector of explanatory variables used in the regression estimation and ν_{it} is the error term. The fixed effects model takes into account that certain unobservable country-specific variables, that are constant over time *t*, may influence the current account balance and are correlated with the explanatory variables in the equation. Under this assumption, a country-specific constant term, μ_i, is added to the right-hand side of equation (2) to allow the equation to contain the country-specific effects. In addition another term, λ_t, which is individual-invariant but changes over time, is added to equation (2) to capture time-specific effects. Thus, using the fixed effect model including country-specific and time-specific effects to estimate equation (2) is likely to produce unbiased and consistent estimates of the coefficients.

The second estimation method is SUR. This estimation method produces an efficient and unbiased estimator in the presence of cross-section dependence. This approach is feasible when the cross-sectional dimension is smaller than the time dimension. However, the estimation of the current account equation raises the issue of endogeneity in the regressors and the unobserved heterogeneity across countries. The endogeneity problem can arise because of the simultaneous existence of reverse causality. Several of our explanatory variables, such as the fiscal balance, private investment, real effective exchange rate and real interest rate may be jointly determined with the current account balance. FMOLS is a popular method used in time series analysis to address successfully the issue of endogeneity and serial correlation. Pedroni (2000, 2001) proposed two methods to apply the FMOLS to panel co-integration, the within-panel FMOLS estimator and the group-mean

(between-group) FMOLS estimator. In the empirical analysis the second estimator is used, since it allows for greater flexibility in the presence of heterogeneous co-integrating vectors.

The empirical analysis was carried out using panel data for the period from 1980 to 2008. The current account variable (CA/Y) is the ratio of the current account balance to nominal GDP, the fiscal balance $((S_G - I_G)/Y)$ is equal to general government saving minus investment as percent of GDP and the private investment rate (I_P/Y) is private investment as percent of GDP. *REER* is the CPI-deflated real effective exchange rate. An increase in *REER* implies appreciation of the currency. $\frac{Y}{N}/\frac{Y^*}{N^*}$ is calculated as the ratio of real GDP per capita in country i and the United States. Credit to private sector (CRP) is the ratio of claims of banks on resident sectors other than the government sector to GDP. The real interest rate *(RIR)* is the real deposit rate and the total dependency ratio *(DEM)* is an age-population ratio of those typically not in the labour force (the *dependent* part) to those typically in the labour force (the *productive* part). The dependent part includes those under the age of 15 and over the age of 64 and the productive part includes those between 15 and 64. The sources for all the data used in the analysis are provided in the Appendix, while Table 1 presents the descriptive statistics for all countries and the panels employed in the empirical analysis.

5. Empirical panel results

All country data in levels and first differences were tested for stationarity employing the ADF, PP and KPSS tests. The combined results from these tests suggest that all the individual country series, except the interest rate, appear to be I(1) processes.[10] Table 2 presents the unit root tests results for the EU-12, employing the Im, Pesaran and Shin test and the Hadri test. Both tests were estimated for the level and first difference of each variable. The first test does not reject the null hypothesis of unit root for all variables with the exception of the interest rate but rejects it for the first differences. Similarly, according to the second test, the null hypothesis of

[10] The results for the unit root tests for country specific data are available upon request.

stationarity is rejected at the 1 percent level of significance for all variables but the interest rate in levels.

Table 3 summarises the results of panel co-integration analysis among the variables of the group of EU-12 using the Pedroni and Kao statistics. Five out of seven Pedroni tests reject the null hypothesis of no co-integration using both the panel and group versions of the Phillips-Perron and ADF tests. In addition, the Kao test rejects the null hypothesis of no co-integration. Thus, the estimated statistics provide evidence of co-integration, suggesting that there is a co-integrating relationship among the variables in the EU-12 panel. The same tests are applied to test for the existence of co-integration for the EU-17 panel and the results are similar.

The equation (2) was estimated employing balanced panel data for the EU-12 panel using the fixed effects, SUR and FMOLS estimation methods (see Table 4). In the first method, fixed-country and time-specific effects are employed, and it is assumed that all the explanatory variables are predetermined. The Wald test suggests that the null hypothesis that country effects, time effects and jointly country and time effects are not significant is rejected at 1 percent level of significance. Table 4 shows that all the variables, except for the real interest rate, are statistically significant. In addition, all the estimated coefficients, except for the estimated coefficient of the demographic variable, have the right sign. The SUR estimation method produces similar results and only the size of the estimated coefficients is different. These results seem to suggest that the life-cycle hypothesis does not find support in the EU-12 panel and real interest rates do not play a role in explaining changes in the current account balance.

Next, the FMOLS method is applied to solve the theoretical problem of endogeneity of the regressors and the heterogeneity in the panel. The results for the EU-12 panel are reported in the last column of Table 4 and a number of interesting results emerge. First, the stage of development matters. The positive estimated coefficient of relative real GDP per capita implies that the current account balance will improve as real GDP per capita in the group approaches that of the reference country (i.e. the United States). Thus, real economic convergence (i.e. the catching-up process) is expected to induce lower current account deficits in the future. Second, the estimated coefficient of the fiscal balance is statistically significant and its value is greater than zero and less than one. This result implies that an increase in the fiscal

deficit is only partially offset by an increase in private saving, thus worsening the current account balance. Therefore, there is evidence against full Ricardian equivalence, while the twin-deficit hypothesis is partially supported since the estimated value is less than one. Third, the significant negative effect of credit to the private sector on the current account indicates that the relaxation of the borrowing constraints for the private sector following further financial integration and deepening has led to increased consumption, lower saving and a sizeable deterioration of the current account balance during the period under review. Fourth, the estimated coefficient of private investment is statistically significant, which means that a rise in private investment decreases the current account. Thus, domestic saving only partially finances private investment, indicating rejection of the Feldstein-Horioka hypothesis. Fifth, the significance of the coefficient of the real effective exchange rate suggests that an appreciation of this rate can influence adversely the current account not only through worsened international competitiveness and reduced net exports (trade channel) but also through reduced saving due to higher purchasing power in terms of imported goods and increased value of accumulated financial and real assets. Sixth, the significance of the demographic variable implies that demographic trends have life-cycle implications, which influence negatively savings and hence the current account. As the share of the economically dependent population (young and old) increases national consumption and reduces national savings, the current account balance deteriorates. Finally, the estimated coefficient of the real interest rate is positive and significant implying that the substitution effect is greater than the income effect and an increase in real interest rate will increase savings and improve current account balance. .

The same estimation methods are applied for the EU-17 panel and the results are reported in Table 5. FMOLS estimates are reported in the last column of the corresponding tables. The panel coefficients for fiscal balance, credit to the private sector, private investment, real effective exchange rate and real interest rate variables carry correct signs and are statistically significant at different levels of significance. In terms of magnitude, the estimated coefficients are similar and only minor differences exist compared to the EU-12 panel. The only notable difference refers to the economic convergence variable, which is not significant in the EU-17 panel. Besides that, there are no significant differences among the two panels implying that the

"fundamental" determinants of net national savings sufficiently explain long-run movements of the current account balance in the two groups of EU member states.

As a final step, we test for the short-run current account dynamics by estimating error correction models that correspond to the SUR and FMOLS estimation methods. A parsimonious version of the error correction model is estimated. It includes the error correction term and the first lags of the current account and the real exchange rate variables. The coefficient of the error correction term is statistically significant in both versions indicating a slow adjustment to equilibrium, although the speed of adjustment appears much slower in the FMOLS version. In order to examine the impact of EMU on current account adjustment, we differentiate the effect of long-run current account balances in the pre-EMU and post-EMU periods by using an appropriate dummy variable. The results are in line with the prior assumption discussed in Section 1 that the EMU may have resulted in longer periods of adjustment of current account imbalances (see Table 6). The difference in the speed of adjustment is more pronounced in the case of the FMOLS estimation method, which indicates that in the post-EMU period the current account can be considered as a weakly exogenous variable.

5. Empirical individual country results

In view of growing concerns over the sizeable and persistent current account imbalances across the euro area countries, we proceed with estimating, using the FMOLS method, the factors that explain current account developments at individual country level. The results for the countries in the EU-12 panel are reported in Table 7. Our empirical model seems to capture well the driving forces underlying current account divergences amongst the old euro area countries (with the exception of Belgium and to a lesser extent Portugal).

The estimated coefficient for the stage of development variable is positive and significant for four deficit and surplus countries (i.e. Greece, Portugal, Italy and the Netherlands), negative and significant for Ireland and Austria and not significant in the other countries. In addition, the value of the estimated coefficient is high in Greece and Portugal implying that the catching-up process mainly influences, as

expected, countries with relatively low income, contributing to large current account deficits.

The estimated coefficient of the fiscal balance variable is positive and statistically significant in five deficit and surplus countries (i.e. Greece, Ireland, France, Italy and Finland) and its value is greater than zero and less than one, supporting the twin-deficit hypothesis. On the contrary, it is not statistically significant in six countries (i.e. Portugal, Spain, Belgium, Austria, Germany and the Netherlands). This implies that in the case of these countries an increase in the fiscal deficit will increase private saving, thus leaving unaffected the current account balance and offering evidence in favour of the Ricardian equivalence.[11] For one country, Luxemburg, the estimated coefficient of fiscal balance is negative providing evidence for the so-called twin-divergence (Kim and Roubini, 2007).

The effect of the credit variable on the current account is significant and negative in six deficit and surplus countries (i.e. Greece, Spain, Ireland, Italy, Austria and Germany). Greece has the highest estimated coefficient implying that the relaxation of the borrowing constraint for the private sector and the lower financing costs resulting from the financial liberalisation during the process to EMU accession and later the financial integration and deepening in the euro area have led to large decreases in private saving and, thus, to a sizeable deterioration of the current account balance. Germany has the second highest estimated coefficient, possibly suggesting that relatively weak lending activity to the domestic private entities by the banking sector, has partly contributed to subdued consumption and higher gross saving ratios. In some countries such as Portugal, Finland, France, Luxemburg and the Netherlands, the estimated coefficient is not statistically significant, while in Belgium is significant with the opposite sign, implying that the relaxation of the borrowing constraint has led to a current account balance improvement.

The estimated coefficient of private investment variable is statistically significant and has the right sign (negative) in all countries in the EU-12 panel except for Spain, implying rejection of the Feldstein-Horioka hypothesis in these countries.

[11] The evidence of the existence of Ricardian equivalence in the long-run equation for Belgium, Austria, Germany, the Netherlands and Spain seems to be in line with the relatively high savings ratios recorded in those countries since the introduction of the euro, but seems at odds in the case of Portugal, where significant decrease in the national saving ratio has been observed since 1999. This finding might suggest a shift of the private sector in Portugal towards a more Keynesian behaviour after 1999.

As theory would predict, an increase (decrease) in private investment seems to lead to worsening (improving) current account positions. In this respect, the positive and highly significant coefficient for Spain constitutes a rather uncommon and puzzling finding. An additional interesting empirical result is that the private investment coefficient is mostly significant in those euro area countries that have run current account surpluses, such as Finland, Germany, the Netherlands and Luxembourg.

The real effective exchange rate has negative and statistically significant coefficient in only three countries (i.e. Greece, Austria and Luxemburg). In all the other countries, except Finland and Ireland (positive sign), whose exports seem to benefit from a favourable product mix effect rather than being adversely affected by deteriorating price competitiveness, the REER coefficient is not significantly different from zero.

The demographic variable is negative and significant in three countries (i.e. Greece, Ireland and Germany) and positive and significant in Portugal, Spain and Luxemburg. In all the other countries is not statistically significant. The estimated positive and significant coefficient implies that an increase in the economically dependent population will not reduce savings, thus providing no support to the life-cycle hypothesis. Differences in intra-family financial support structures, as well as in pension and insurance schemes and coverage partly explain the divergent response of dependent population across countries in the period under review.

Finally, the estimated coefficient for the real interest rate is positive and significant in five countries (i.e. Greece, Portugal, France, Germany and the Netherlands), and insignificant in the rest. The estimated coefficient is negative and rather significant in Austria, implying that an increase in real interest rate will reduce savings since the income effect dominates the substitution effect. A summary of the above analysis appears in Table 8, which reports for every variable of the model the number of countries that correspond to each of the three levels of significance (i.e. 1, 5 and 10 percent).

In sum, the policy-relevant conclusions that derive from the individual euro area country results are as follows:

- The current account in most of the euro area countries seem to have been driven in the long run by developments in the private sector and to a much lesser extent by

developments in the public sector. The fiscal balance seems to have played a crucial role only in the case of Ireland.

- The easy access of the private sector to low cost financing, as a result of the financial liberalisation and integration in the EMU, seems to have been one of the main determining factors (via low private savings) in explaining the large current account deficits recorded in some countries.

- On the contrary, the large current account surpluses in the euro area are mainly explained by the evolution of private investment.

- Price competitiveness does not explain, on average, long-run current account configurations. In the case of Greece, however, the persistent losses in terms of price competitiveness have adversely affected the evolution of the current account balance.

- Ageing population is likely to adversely impact the current account position of Greece, Ireland and Germany.

6. Conclusions

This paper explored the determinants of the current account in a sample of selected European countries over the period from 1980 to 2008. Two groups of countries were analysed, starting with the twelve countries that first joined the euro-area (EU-12) and extending the sample to include five more EU countries (EU-17). Standard econometric techniques were employed to test the existence of a long-run (equilibrium) relationship between the current account and several fundamental determinants of net national saving. Long-run current account specifications for the panel as a whole and for each individual country of the EU-12 group were estimated.

The empirical model used seems to explain well current account developments in the selected EU countries. In particular, all the determinants of net national saving, which were included in the model, such as the level of development, demographics, credit and fiscal factors and competitiveness, were important in explaining current account positions in the EU-12. The inclusion of more countries in the panel did not alter the determining factors of the current account in any meaningful manner, also verifying the robustness of the econometric specification. When comparing the results for the EU-12 countries to the extended sample of the EU-17 countries the only

significant difference is the impact of the variable capturing the stage of development. However, when the United Kingdom, Denmark and Sweden are added to the sample the effect vanishes as the particular variable becomes statistically insignificant. This is explained by the fact that the larger panel includes in addition countries with a high level of income and this cancels the effect of this particular variable.

Finally, our empirical results from the analysis of the short-run dynamics confirm the hypothesis according to which post-EMU current account imbalances are corrected at a slower pace than in the pre-EMU period, thus making longer and potentially more difficult the adjustment process.

References

Ahearne, A.G., Griever, W.L., Warnock, F.E., 2004. Information costs and home bias: an analysis of US holdings of foreign equities. Journal of International Economics, Elsevier, vol. 62(2), 313-336.

Afonso, A., Rault C., 2008. Budgetary and External Imbalances Relationship: A Panel Data Diagnostic. ECB Working Paper No. 961.

Briotti, M.G., 2005. Economic reactions to public finance consolidation: a survey of the literature. ECB Occasional Paper No. 38.

Brissimis, S.N., Hondroyiannis G., Papazoglou, C., Tsaveas, T.N., Vasardani A.M., 2010. Current account determinants and external sustainability in periods of structural change. ECB Working Paper No.1243.

Bussière, M., Fratzscher, M., Müller, G.J., 2004. Current account dynamics in OECD and EU acceding countries – an intertemporal approach. ECB Working Paper No. 311.

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

Chinn, M.D., Wei, S.J., 2008. A Faith-based Initiative: Do We Really Know that a Flexible Exchange Regime Facilitates Current Account Adjustment? NBER Working Paper No. 14420.

Debelle, G., Faruqee, E., 1996. What determines the current account? A cross-sectional and panel approach. IMF Working Paper No. 58.

Decressin, J., Sravrev, H., 2009. Current Accounts in a Currency Union. IMF Working Paper No. 127.

Faruqee, H., Debelle, G., 1998. Saving-investment balances in industrial countries: an empirical investigation. In Isard, P., Faruqee, H. (Eds.), Exchange Rate Assessment Extensions of the Macroeconomic Balance Approach. IMF Occasional Paper No. 167, 35-55.

Feldstein, M., Horioka, C., 1980. Domestic saving and international capital flows. Economic Journal 90, 314-329.

Gruber, W.J., Kamin B.S., 2007. Explaining the global pattern of current account imbalances, Journal of International Money and Finance, 26, 500-22.

Hadri, K., 2000. Testing for stationarity in heterogeneous panel data. Econometric Journal, 3, 148-161.

Im, K.S.M., Pesaran, H., Shin, Y., 2003. Testing for unit roots in heterogeneous panels. Journal of Econometrics, 115, 53-74.

Kao, C., 1999. Spurious regression and residual based tests for cointegration in panel data. Journal of Econometrics, 90, 1-44.

Lane, P., 2006. Global Bond portfolios and EMU. International Journal of Central Banking, 2, 1-23.

Lane, P., 2008. EMU and Financial Market Integration. Towards the First Decade of Economics and Monetary Union: Experiences and Perspectives, 36th Economic Conference 2008, Oesterreichische Nationalbank, 90-95.

Lane, P., Milesi-Ferretti, G.M., 2008. The drivers of Financial Globalization. American Economic Review, 98(2), 327-32.

Pedroni, P., 1999. Critical values for cointegration tests in heterogeneous panels with multiple regressors. Oxford Bulletin of Economics and Statistics, 61, 653-70.

Pedroni, P., 2004. Panel cointegration: Asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. Econometric Theory, 20, 597-625.

Pesaran, M.H., Smith, R., 1995. Estimating Long-run Relationships from Dynamic Heterogeneous Panels. Journal of Econometrics, 68, 79-113.

Schmitz, B., von Hagen, J., 2009. Current account imbalances and financial integration in the euro area, CEPR Discussion Paper No. 7262.

Table 1a								
Summary statistics by country and panel: average and standard deviation values, 1980-2008								
Country	Current account balance/GDP	Relative income per capita	General government balance/GDP	Credit to private sector/GDP	Investment/ GDP	Real effective exchange rate	Age dependency ratio	Real short-term deposit rate
Austria	0.09 (1.71)	75.07 (1.85)	-2.42 (1.82)	95.21 (13.18)	22.42 (1.07)	96.86 (5.33)	48.37 (1.04)	2.60 (1.60)
Belgium	2.86 (2.48)	79.81 (1.64)	-4.93 (4.50)	60.88 (23.98)	19.89 (1.44)	96.79 (5.24)	50.79 (1.52)	3.12 (2.27)
Cyprus	-4.64 (4.35)	40.80 (1.42)	-3.49 (2.32)	120.17 (47.28)	22.15 (4.06)	94.20 (5.41)	53.29 (5.18)	1.80 (1.49)
Germany	1.78 (2.82)	73.58 (2.41)	-2.15 (1.28)	102.51 (10.74)	21.63 (2.44)	103.97 (5.41)	46.38 (2.52)	3.04 (1.69)
Denmark	0.27 (2.68)	94.22 (2.02)	-0.61 (3.56)	75.77 (60.49)	19.69 (1.49)	94.52 (5.60)	49.89 (1.26)	3.68 (2.71)
Spain	-2.86 (3.16)	37.67 (2.14)	-2.99 (2.60)	96.53 (36.72)	23.55 (3.88)	94.39 (8.15)	48.90 (3.82)	3.45 (3.34)
Finland	1.72 (4.44)	74.07 (4.20)	1.17 (4.03)	40.31 (7.76)	21.26 (3.97)	108.68 (11.15)	48.92 (1.18)	4.27 (3.13)
France	0.31 (1.30)	71.68 (2.51)	-3.14 (1.21)	86.87 (8.90)	19.68 (1.26)	99.97 (3.71)	52.97 (0.76)	3.53 (2.20)
Greece	-5.09 (3.64)	38.67 (2.79)	-7.30 (3.28)	47.09 (20.14)	20.61 (1.74)	89.91 (9.08)	49.90 (2.19)	1.22 (3.94)
Ireland	-1.31 (3.35)	81.18 (20.36)	-2.69 (4.83)	85.62 (52.49)	20.21 (3.63)	93.05 (7.19)	56.08 (8.26)	3.68 (3.55)
Italy	-0.54 (1.74)	61.09 (2.21)	-6.91 (4.01)	66.02 (17.05)	20.86 (1.40)	98.59 (7.24)	48.09 (2.28)	3.48 (2.64)
Luxembourg	5.38 (5.38)	131.22 (19.18)	2.14 (1.88)	107.68 (29.17)	20.52 (1.98)	96.84 (4.84)	46.78 (2.15)	2.23 (2.72)

Table 1b

Summary statistics by country and panel: average and standard deviation values, 1980-2008

Country	Current account balance/GDP	Relative income per capita	General government balance/GDP	Credit to private sector/GDP	Investment/ GDP	Real effective exchange rate	Age dependency ratio	Real short-term deposit rate
Malta	-2.50 (5.24)	27.57 (2.70)	-4.82 (2.73)	79.31 (25.88)	20.17 (1.92)	96.28 (7.90)	48.42 (2.57)	2.37 (1.89)
Netherlands	4.85 (2.38)	73.77 (1.83)	-2.55 (2.35)	167.17 (28.40)	20.98 (1.18)	95.19 (4.07)	46.79 (1.27)	3.16 (2.27)
Portugal	-4.70 (4.59)	31.93 (2.61)	-5.14 (2.20)	94.12 (42.99)	25.30 (3.13)	88.52 (10.55)	50.39 (3.11)	1.71 (3.56)
Sweden	2.41 (3.79)	88.22 (3.35)	-1.13 (4.43)	62.20 (32.63)	18.38 (2.31)	111.80 (11.03)	55.10 (1.40)	1.43 (2.01)
United Kingdom	-1.74 (1.36)	74.51 (2.49)	-2.66 (2.37)	114.89 (42.54)	17.52 (1.37)	89.49 (8.87)	53.04 (1.17)	4.48 (1.90)
EU-12 panel	***-0.03*** ***(4.67)***	***68.95*** ***(26.09)***	***-3.19*** ***(4.12)***	***86.08*** ***(41.68)***	***21.63*** ***(3.08)***	***96.74*** ***(9.09)***	***49.84*** ***(4.45)***	***2.82*** ***(3.34)***
EU-17 panel	***-0.38*** ***(4.64)***	***67.77*** ***(26.29)***	***-3.02*** ***(3.95)***	***86.29*** ***(43.85)***	***21.06*** ***(3.24)***	***97.06*** ***(9.90)***	***50.49*** ***(4.35)***	***2.73*** ***(3.18)***

Notes: Standard deviations are in parenthesis. The EU-12 panel includes Austria, Belgium, France, Finland, Germany, Greece, Ireland, Italy, Luxemburg, the Netherlands, Portugal and Spain. The EU-17 panel includes the EU12 panel plus Cyprus, Malta, Denmark, Sweden and the United Kingdom.

Table 2				
Panel unit root tests for EU-12 panel				
Variable	**Level**		**First difference**	
	Hadri Z-test	Im, Pesaran and Shin W-test	Hadri Z-test	Im, Pesaran and Shin W-test
CA/Y	6.06***	-0.65	1.52	-11.72***
$\frac{Y}{N}/\frac{Y^*}{N^*}$	10.61***	0.11	0.99	-8.63***
$(S_G - I_G)/Y$	7.59***	-1.24	0.43	-15.00***
CRP	8.72***	4.77	3.53	-6.41***
I_P / Y	6.38***	-1.39	1.19	-10.72***
REER	6.15***	-0.05	-0.24	-10.77***
DEM	9.56***	-1.14	3.15	-2.79**
RIR	4.19***	-3.16***	0.99	-17.70***
Notes: **, *** indicate rejection of the null hypothesis at 5 and 1 percent level of significance, respectively.				

Table 3	
Panel co-integration tests for EU-12 panel	
Co-integration statistics	**Value**
Pedroni co-integration tests	
Panel ν-statistic	-1.170
Panel ρ-statistic	1.847
Panel t-statistic (non-parametric)	-3.158***
Panel t-statistic (parametric)	-3.202***
Group ρ-statistic	2.884
Group t-statistic (non-parametric)	-3.505***
Group t-statistic (parametric)	-3.630***
Kao co-integration test	-3.084***
Notes: *** indicate rejection of the null hypothesis of no co-integration at 1 percent level of significance.	

Table 4			
Estimation of the long-run current account specification for EU-12 panel			
Variables	**Fixed Effects**	**SUR**	**FMOLS**
Constant	0.273 (1.48)	0.300*** (4.67)	
$\frac{Y}{N} / \frac{Y*}{N*}$	0.239*** (11.88)	0.219*** (21.39)	0.101*** (2.92)
$(S_G - I_G)/Y$	0.296*** (4.92)	0.238*** (10.52)	0.202*** (4.76)
CRP	-0.045*** (-4.92)	-0.045*** (-13.13)	-0.052*** (-7.65)
I_P / Y	-0.514*** (-7.37)	-0.678*** (-27.96)	-0.660*** (-11.69)
REER	-0.151*** (-5.46)	-0.090*** (-9.61)	-0.059*** (-3.48)
DEM	0.105*** (3.64)	0.038*** (3.24)	-0.072** (-1.98)
RIR	-0.00001 (-0.13)	0.0002 (0.86)	0.001** (2.86)
Fixed effects (country-specific)	31.24***	131.40***	
Fixed effects (time- specific)	2.40***		
Fixed effects (country- specific and time- specific)	10.07***		
Adjusted R-squared	0.72	0.71	
Notes: The numbers in parenthesis are the t-statistics. ** and *** indicate significance at the 5 and 1 percent level, respectively.			

Table 5			
Estimation of the long-run current account specification for EU-17 panel			
Variables	**Fixed Effects**	**SUR**	**FMOLS**
Constant	-0.179 (-1.13)	-0.075 (-1.54)	
$\frac{Y}{N} / \frac{Y*}{N*}$	0.203*** (9.41)	0.185*** (21.05)	-0.036 (-0.90)
$(S_G - I_G)/Y$	0.382*** (7.13)	0.301** (19.24)	0.187*** (4.95)
CRP	-0.021*** (-3.53)	-0.024*** (-13.60)	-0.036*** (-6.33)
I_P / Y	-0.679*** (-10.98)	-0.703** (-45.06)	-0.636*** (-10.40)
REER	-0.081*** (-3.85)	-0.071*** (-11.18)	-0.052*** (-3.51)
DEM	0.149*** (5.68)	0.114*** (11.46)	-0.088** (-2.89)
RIR	-0.001* (-1.80)	-0.0001 (-0.90)	0.0014*** (3.06)
Fixed effects (country specific)	22.19***	156.07***	
Fixed effects (time specific)	1.52**		
Fixed effects (country specific and time specific)	9.15***		
Adjusted R-squared	0.63	0.64	
Notes: The numbers in parenthesis are the t-statistics. ** and *** indicate significance at the 5 and 1 percent level, respectively.			

Table 6				
Estimation of current account dynamics for EU-12				
Variables	**SUR**		**FMOLS**	
Constant	0.001 (0.57)	0.001 (0.63)	0.001 (0.45)	0.001 (0.47)
ΔCA(-1)	0.125** (2.84)	0.125** (2.87)	0.095** (1.99)	0.086** (1.91)
ECT(-1)	-0.231*** (-5.80)		-0.107*** (-3.98)	
*ECT(-1)*D*		-0.168** (-2.68)		-0.001 (-0.01)
ECT(-1)(1-D)*		-0.269*** (-4.32)		-0.172*** (-4.66)
ΔlogREER(-1)	-0.034* (-1.75)	-0.032* (-1.69)	-0.050* (-2.17)	-0.052* (-2.37)
Adjusted R-squared	0.14	0.15	0.10	0.12
Notes: The numbers in parenthesis are the t-statistics. *, ** and *** indicate significance at the 10, 5 and 1 percent level, respectively.				

TABLE 7a								
Estimation of the long-run current account specification for individual European countries in EU-12 panel								
Variables	**Austria**	**Belgium**	**Finland**	**France**	**Germany**	**Greece**	**Ireland**	**Italy**
$\frac{Y}{N} / \frac{Y*}{N*}$	-0.412*** (-3.12)	-0.066 (-0.27)	0.514 (1.26)	-0.064 (-0.37)	-0.110 (-0.68)	2.443*** (10.42)	-0.148*** (-3.08)	0.251*** (3.78)
$(S_G - I_G)/Y$	0.175 (1.15)	0.155 (0.80)	0.411* (1.77)	0.534** (1.86)	0.386 (1.54)	0.384** (1.81)	0.337*** (6.67)	0.304** (2.31)
CRP	-0.067** (-2.04)	0.081** (2.30)	-0.091 (-1.44)	-0.020 (-0.63)	-0.205*** (-9.27)	-0.270*** (-5.37)	-0.061*** (-4.78)	-0.053** (-2.56)
I_P / Y	-0.832** (-2.45)	-0.197 (-0.77)	-2.365*** (-3.22)	-0.438* (-1.79)	-1.175*** (-3.15)	-0.362** (-1.87)	-0.617*** (-10.22)	-0.314* (-1.72)
REER	-0.203* (-1.68)	-0.157 (-1.28)	0.256* (1.73)	0.003 (0.03)	0.004 (0.07)	-0.459*** (-8.10)	0.132*** (3.43)	-0.032 (-1.37)
DEM	-0.133 (-0.60)	0.065 (0.29)	-0.126 (-0.92)	0.422 (1.57)	-0.644*** (-7.61)	-2.315*** (-6.30)	-0.396*** (-6.54)	0.065 (0.88)
RIR	-0.005* (-1.70)	-0.002 (-0.72)	0.002 (0.72)	0.009*** (3.20)	0.005** (2.85)	0.003** (1.80)	-0.001 (-1.47)	0.003 (1.53)
Notes: The numbers in parenthesis are the t-statistics. *, ** and *** indicate significance at the 10, 5 and 1 percent level, respectively.								

TABLE 7b				
Estimation of the long-run current account specification for individual European countries in EU-12 panel				
Variables	**Luxembourg**	**Netherlands**	**Portugal**	**Spain**
$\frac{Y}{N}/\frac{Y*}{N*}$	-0.032 (-0.64)	0.331* (1.70)	0.805** (2.42)	-0.233 (-1.28)
$(S_G - I_G)/Y$	-0.466** (-2.57)	0.362 (1.41)	0.081 (0.32)	-0.048 (-0.59)
CRP	0.011 (0.32)	0.019 (1.55)	-0.030 (-0.97)	-0.050*** (-3.61)
I_P/Y	-0.972*** (-4.61)	-1.335*** (-5.04)	-0.779** (-2.58)	0.416*** (-3.03)
REER	-0.305** (-1.96)	0.001 (0.00)	-0.219 (-1.53)	-0.033 (-1.41)
DEM	0.985*** (7.02)	0.307 (1.48)	0.437* (1.71)	0.139** (2.13)
RIR	0.001 (0.56)	0.010** (2.71)	0.004* (1.74)	-0.001 (-1.33)
Notes: The numbers in parenthesis are the t-statistics. *, ** and *** indicate significance at the 10, 5 and 1 percent level, respectively.				

Table 8				
Summary of long-run estimated coefficients for countries in EU-12 panel				
Statistics	**Number of countries where:**			
Variables	**1 percent significance**	**5 percent significance**	**10 percent significance**	**Total**
$\frac{Y}{N}/\frac{Y*}{N*}$	4	1	1	6/12
$(S_G - I_G)/Y$	1	5		6/12
CRP	4		3	7/12
I_P/Y	6	3	2	11/12
REER	2	1	2	5/12
DEM	4	1	1	6/12
RIR	1	3	2	6/12

Figure 1: Average current account balances of the EU-12 countries (% of GDP)

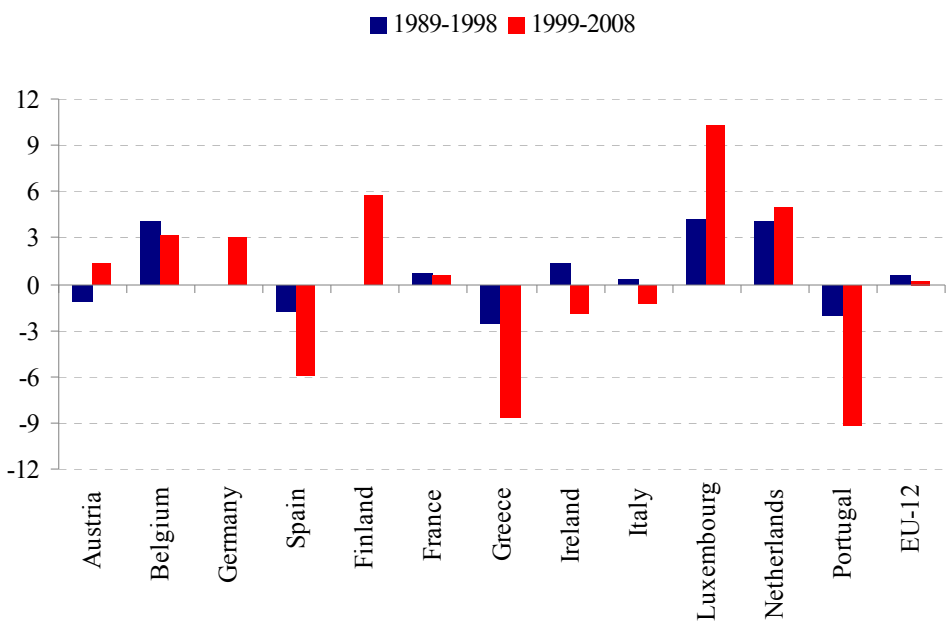


Figure 2: Dispersion of current account balances (standard deviation, % of GDP)

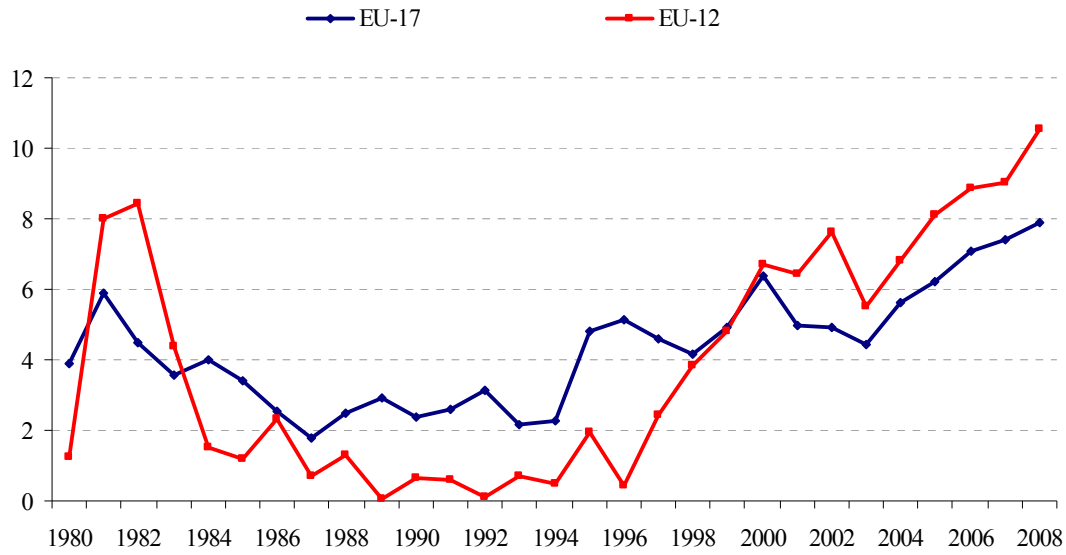
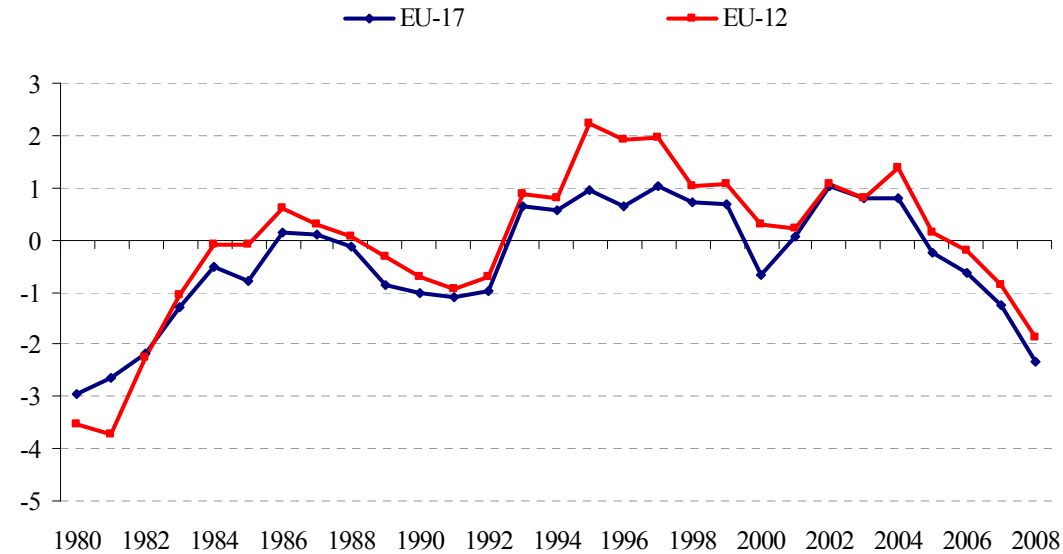


Figure 3: Average current account balances (% of GDP)



Appendix

Data definitions and sources		
Variable	**Definition**	**Source**
CA	Current account balance in US dollars	OECD, WEO
$(S_G - I_G)$	Balance of general government in national currency	OECD, WEO
I_P	Investment in national currency	OECD, WEO
CRP	Credit to private sector in euros	IFS
GDP in US dollars	Nominal gross domestic product in US dollars	OECD, WEO
GDP in national currency	Nominal gross domestic product in national currency	OECD, WEO
Y	Real gross domestic product in national currency	OECD, WEO
REER	Real effective exchange rate based on CPI(index)	IFS
RIR	Real short-term deposit rate	OECD, WEO
DEM	Age dependency ratio (index)	AMECO
N	Population	IFS