Current Account Imbalances in the Euro Area

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Abstract

The dispersion in current account balances among countries in the euro area has widened markedly over the past decade-and-a-half, and especially since 1999. We decompose current account positions for euro area countries into intra-euro-area balances and extra-euro-area balances and examine the determinants of these balances. Regarding intra-euro-area balances, we present evidence that capital tends to flow from high-income euro area economies to low-income euro area economies. These flows have increased since the creation of the single currency in Europe.

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1. Introduction

The observation of rising and persistent global imbalances has been the focus of lively debate among policymakers and academic economists in recent years. Most of that debate has concentrated on the large U.S. current account deficit and its main counterpart, the large current account surpluses of countries in Asia. Europe has not attracted much attention in this debate, most likely because European countries and the European Union as a whole have a long tradition of keeping their current accounts relatively close to balance (see Ahearne and von Hagen, 2005). Nevertheless, current account developments in Europe deserve attention for several reasons. For starters, current account imbalances within the EU and, in particular, among the countries participating in European Monetary Union (EMU) have grown considerably in recent years. A natural question to ask is whether these imbalances can be explained by fundamental economic factors or whether they might point to a potential non-sustainability of the common currency.

In addition, as argued in Ahearne and von Hagen (2005), Europe, and the euro area in particular, might be forced to run significant current account deficits in the future, if the United States takes action to close its current account deficit or the U.S. dollar depreciates sharply and the Asian countries insist on running surpluses and start accumulating euro reserves instead of dollar reserves. The question here is: What are the consequences of a significant appreciation of the euro for the euro area's current account position?

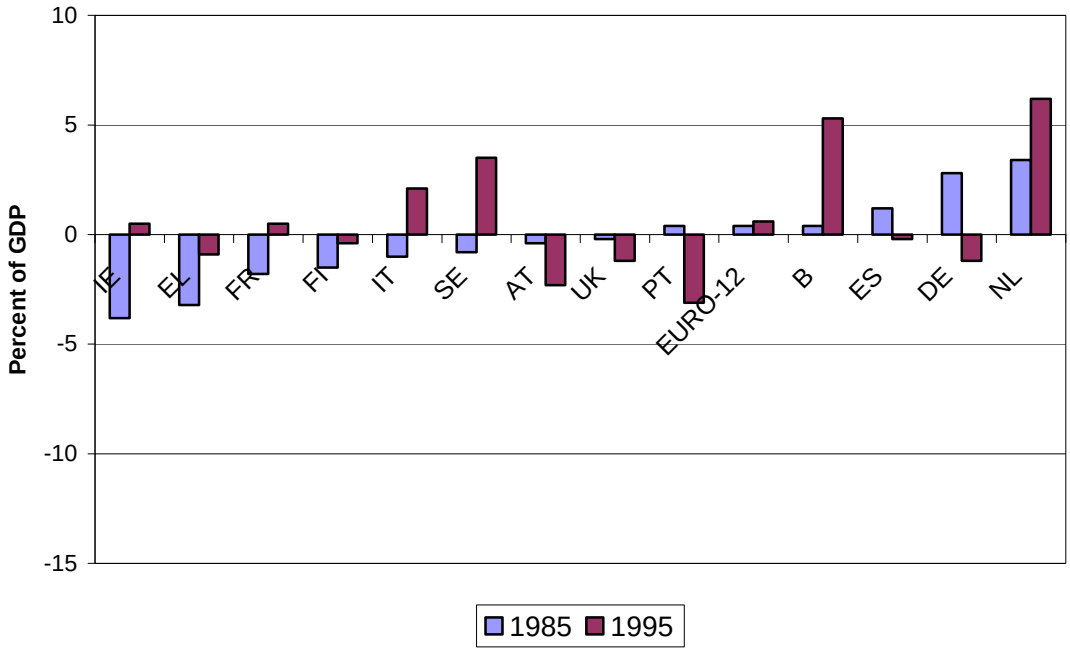
This paper explores the determinants of the current account balances of the euro area and individual member countries of the euro area. We are interested in both intra-euro-area and extra-euro-area current account balances. Below, we look at the issue from the following perspective. We interpret current account balances as the counterpart of capital flows and asks to what extent they can be explained by economic convergence among countries with different per-capita incomes.

We have divided the paper into 5 sections. After this brief introduction, we present some stylised facts on current account balances in the euro area. In Section 3, we present evidence that capital tends to flow from high-income euro area economies to low-income euro area economies. These flows have increased since the creation of the single currency in Europe. We close with a few concluding remarks.

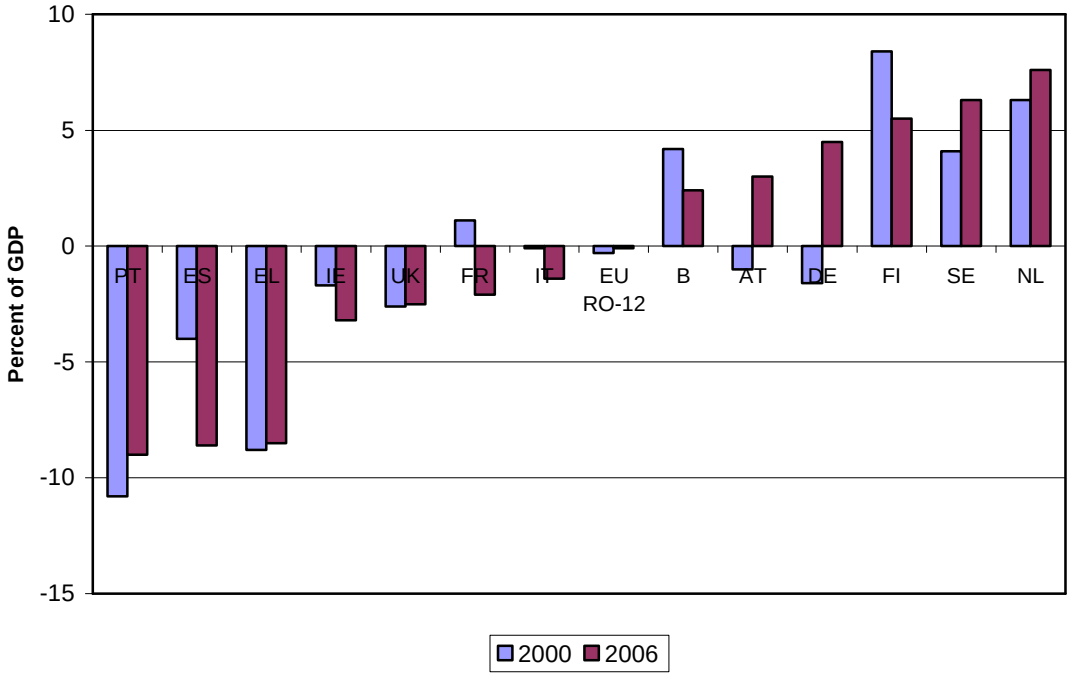
2. Stylized facts

This section presents some of the main stylised facts about individual EMU member countries' current account balances. Figure 1 shows the current account balances for the euro area as a whole and for individual EU countries in selected years since 1985. As an aggregate, the euro area tends to be financially largely self-contained and contribute little to absorb current account imbalances in other parts of the world. Current account balances were typically small over this 20 year period, with 1995 being a noticeable exception. This is not withstanding the fact that some EU countries have sizable current account imbalances. Germany, for example, has recorded annual surpluses of around $100 billion in recent years. Germany's surplus is estimated to have reached 4¼ percent of GDP in 2006. This has brought Germany back to its traditional position of surplus, which we observe in 1985. Finland, Sweden, and the Netherlands have run even larger surpluses relative to GDP in the past six years. In contrast, Portugal's current account deficit was nearly 10 percent of GDP in 2006, while deficits in Greece and Spain exceeded 8 percent of GDP. All three countries have had sizeable deficits since the start of EMU.[1]

Figure 1: European current account balances (% of GDP)



[1] See Blanchard and Giavazzi (2002) for a discussion of Greece and Portugal in this regard..



Source: Estimates from IMF WEO September 2006

Figure 2 shows the evolution of current account balances under EMU. There is a group of countries consisting of Luxembourg, Finland, the Netherlands, and Germany, that consistently ran surpluses during the past five years. Germany registered small current account deficits averaging about 1 percent of GDP during most of the 1990s. The German balance swung into surplus in 2002 and the surplus has widened steadily over recent years as German exports have outpaced imports. Recent years have also seen a marked increase in the current account surplus in the Netherlands, while Finland's surplus has returned to roughly its level at the beginning of EMU, after widening to nearly 10 percent in 2001.

At the other end of the spectrum, Greece, Portugal, and Spain have consistently run current account deficits in the past five years, and their deficits have widened significantly under EMU and during the period in the run-up to EMU. All three countries had current account positions close to balance around the mid-1990s. Recent years have seen an especially sharp decline in Spain's current account balance from roughly 3½ percent of GDP in 2003 to an estimated 8¼ percent of GDP in 2006.

Current account deficits of the magnitudes seen in Greece, Portugal, and Spain at present are unprecedented among euro area countries, with the exception of Ireland in the mid-1980s and Portugal in the 1970s (European Commission, 2006). Current

account deficits of more than 8 percent of GDP are also large compared with other non-euro-area advanced economies. Continual current account deficits accumulate to the net international investment position. Net external liabilities relative to GDP have soared to nearly 80 percent in Greece, 60 percent in Portugal, and 40 percent in Spain.

One interpretation of the evolution of current account balances under EMU is that the increased dispersion of current account positions has been driven by trade flows that reflect shifts in relative competitiveness within the euro area. (See, for example, Blanchard 2006, European Commission 2006, and Munchau 2006).

Figure 2a: Current account balances under EMU (% of GDP)

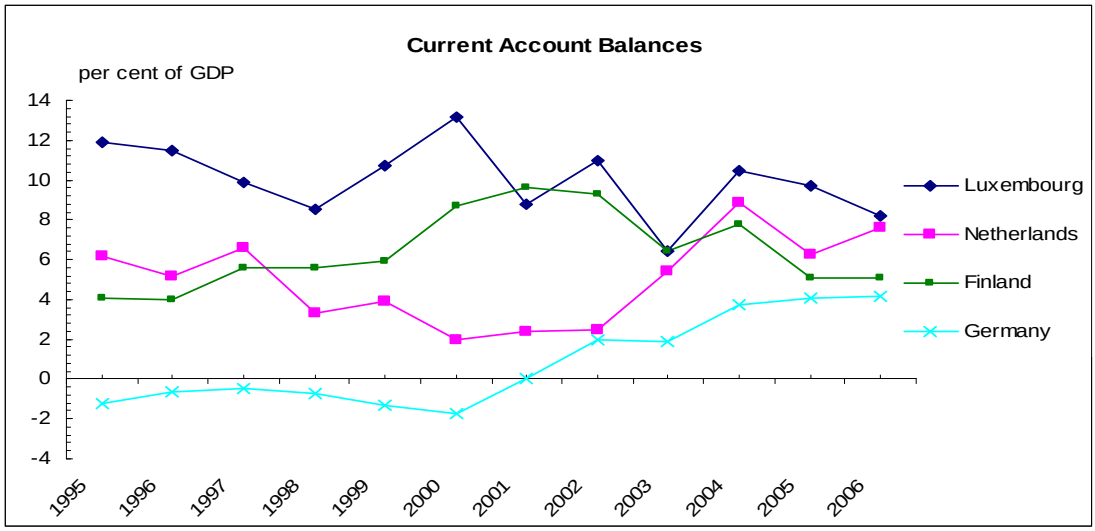


Figure 2b: Current account balances under EMU (% of GDP)

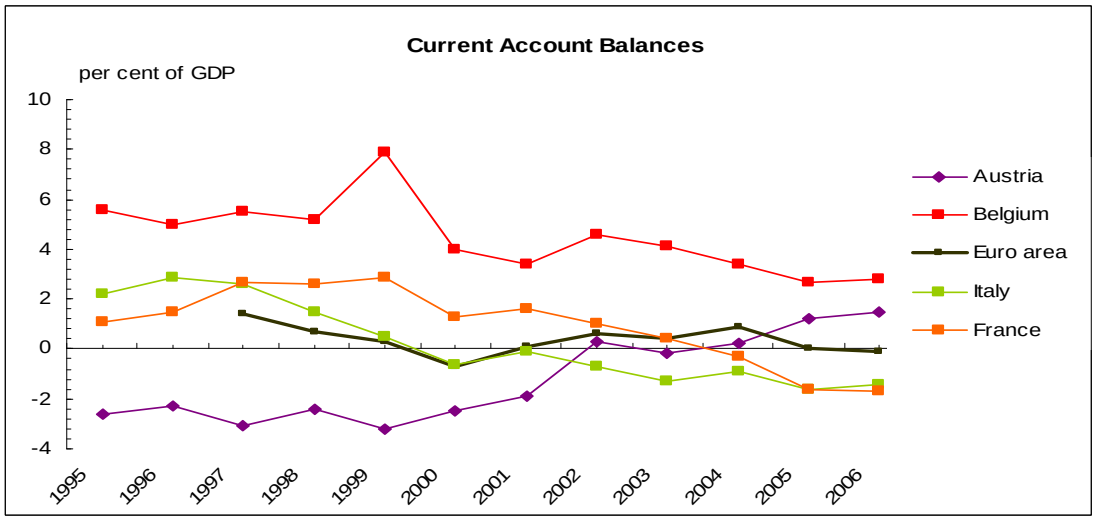
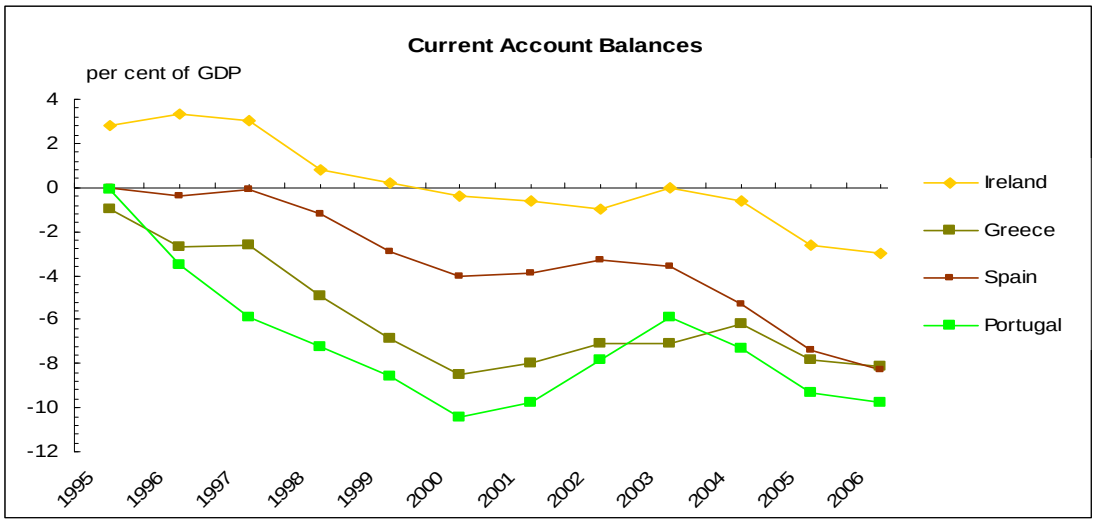


Figure 2c: Current account balances under EMU (% of GDP)



Source: IMF. Estimates for 2006 from IMF WEO September 2006.

On this account, aggregate demand was too strong in some countries and too weak in others, resulting in persistent differences in inflation rates across countries. In fact, the size and persistence of inflation differentials at the national level is one of the most widely recognized and documented facts relating to the start of EMU. As a result of persistent differences in inflation across countries, euro area economies have experienced very sizeable swings in the real exchange rates vis-à-vis their peers, as shown in Figure 3. In turn, the changes in competitiveness associated with these movements in real exchange rates may have played a role in bringing about the large swings in current account balances. The relationship between real exchange rate developments and current account balances portrayed in Figure 4 appears to confirm that countries that have gained (lost) competitiveness relative to other euro-area countries during EMU are now running large current account surpluses (deficits).

In particular, Blanchard (2006) ascribes Portugal's economic boom in the late 1990s to the sharp drop in interest rates and heightened expectations for faster convergence that resulted from participation in EMU. Rapid economic growth and a decline in unemployment lead to an increase in wage growth to a rate substantially above the growth in labour productivity. As a result, competitiveness deteriorated sharply, export growth weakened, and Portugal's trade and current account deficits widened markedly. Ahearne and Pisani-Ferry (2006) document that over the period 1999-2005, cumulative growth in Portugal's gross exports was as much as 10

percentage points below the euro area average. Greece, Italy, and Spain also experienced relatively sluggish growth in gross exports over this period.

Figure 3a: Real exchange rates

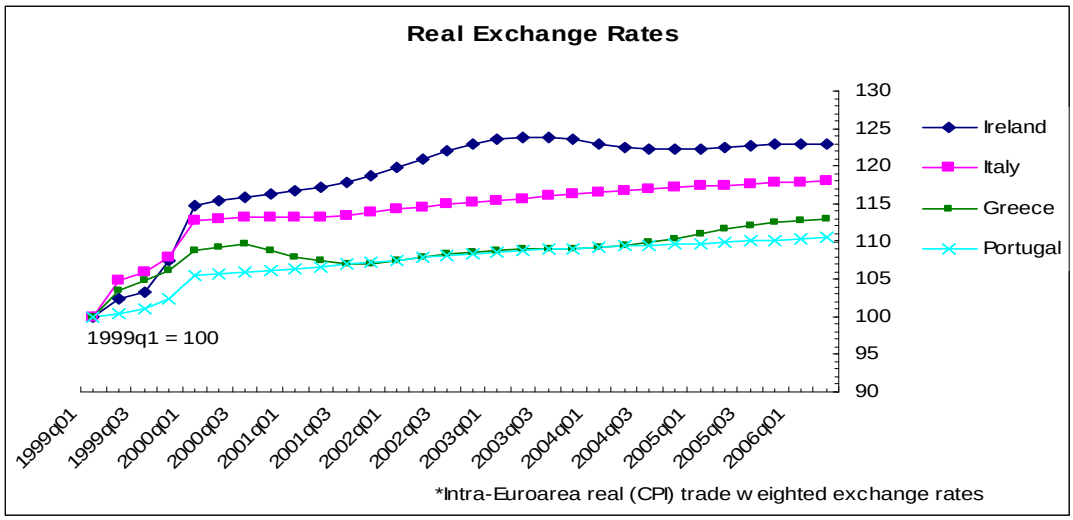


Figure 3b: Real exchange rates

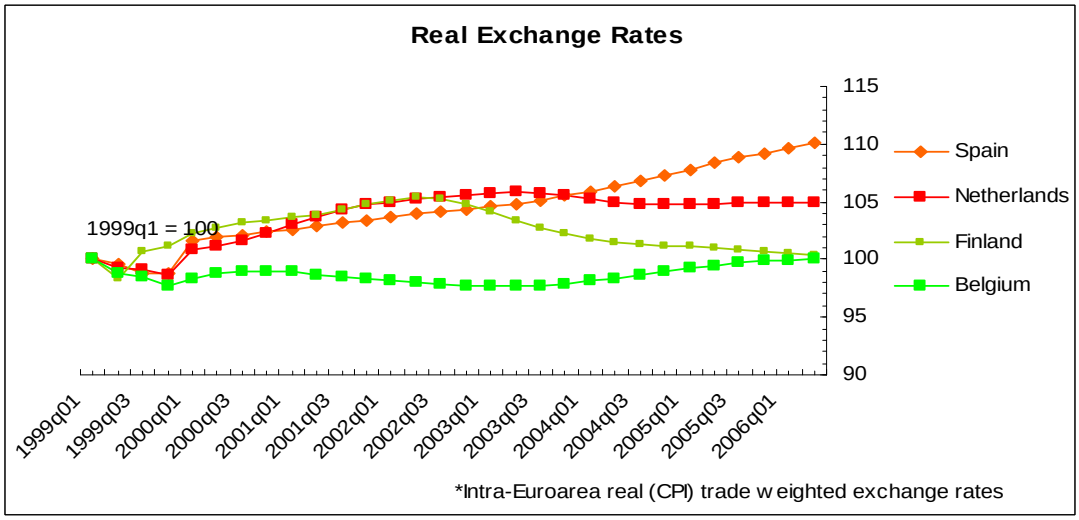
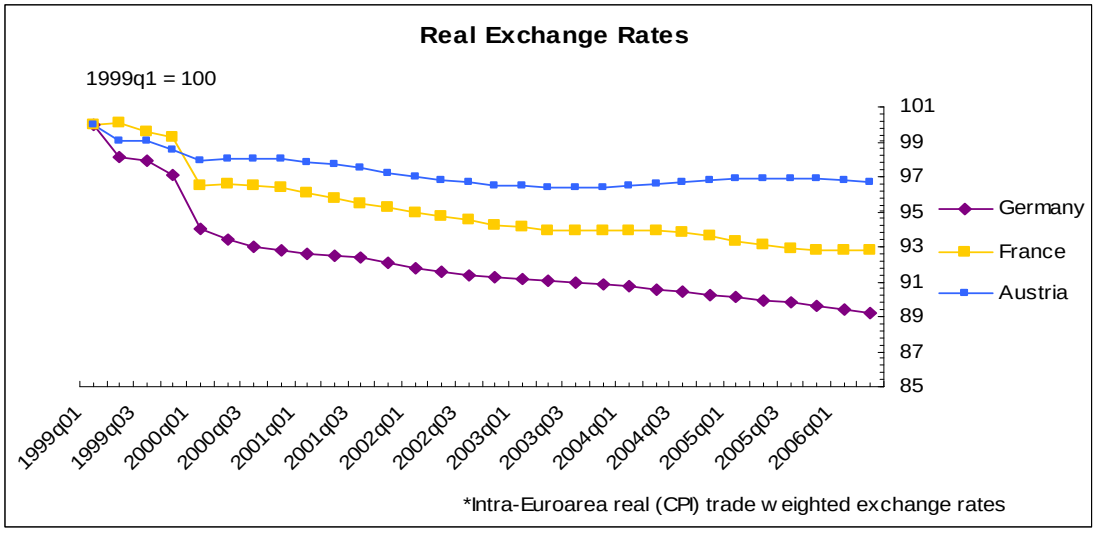
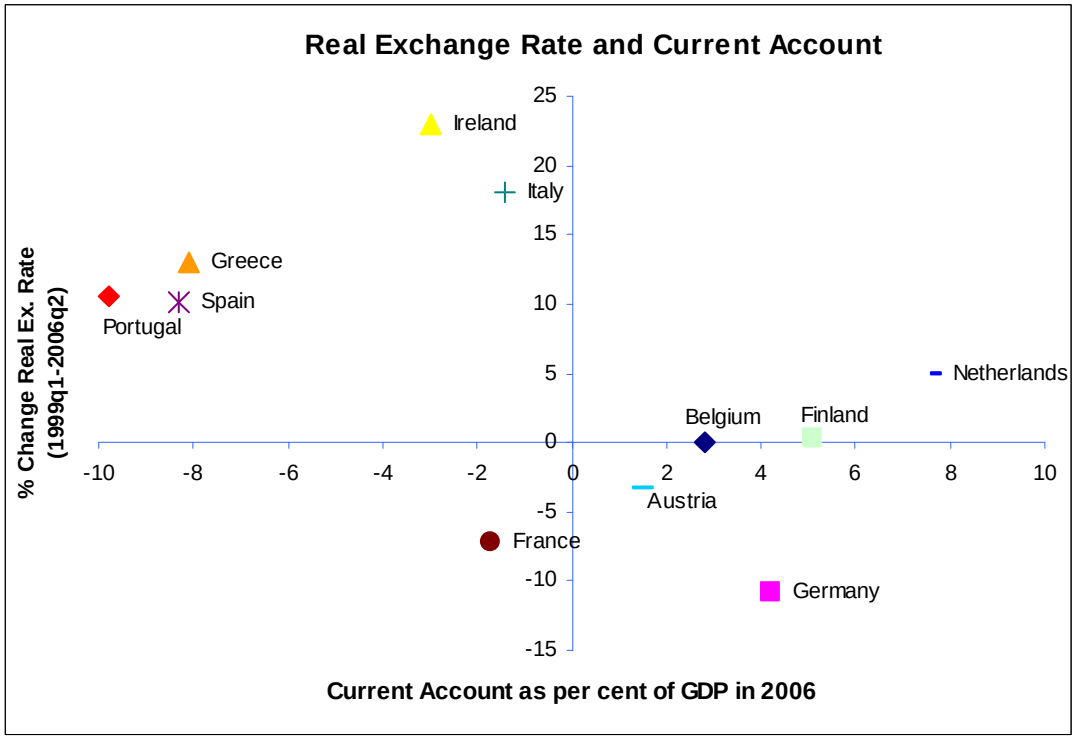


Figure 3c: Real exchange rates



Source: own calculations based on Eurostat data.

Figure 4: Real exchange rate and current account balances



Source: Eurostat and IMF. Estimates for 2006 current account balances are from IMF WEO, September 2006.

Some commentators have linked the strong performance of German exports over recent years to gains in competitiveness associated with a rate of inflation that has been persistently below the euro area average (see Ahearne and Pisani-Ferry, 2006; Münchau 2006). According to this view, wage restraint, facilitated by a decline

in unionization in Germany's labour market, has kept growth in unit labour costs well below the euro area average, boosting the competitiveness of German exporters. Revealingly, two-thirds of the 1.2 percent annual average growth in German GDP over the period 1999-2005 came from net exports, with only one-third from growth in domestic demand (Ahearne and Pisani-Ferry, 2006).

The policy implication from this perspective is that, in order to achieve internal balance, deficit countries in the euro area need fiscal contractions to slow down aggregate demand and that the surplus countries ought to boost aggregate demand. One problem with this prescription, however, is that Germany and the Netherlands had troubles meeting their obligations under the Stability and Growth Pact until recently and have little room for manoeuvre with regard to fiscal policy. Most of the adjustment would thus have to come from the deficit countries.

An important question is how the large current account deficits in Greece, Portugal, and Spain are being financed. The European Commission (2006) documents that a large part of the net financial inflows into these countries during EMU have taken the form of bank loans. For Greece, net portfolio inflows have also been important. Outflows of foreign direct investment have generally exceeded inflows in each of the three countries. In Germany, lending abroad by German banks exceeded foreign borrowing by German banks to the tune of about 2½ percent of GDP annually on average over the period 1999-2005.

In contrast, in the period 1992-1998, German banks were significant net borrowers from the rest of the world. One hypothesis is that by eliminating exchange rate risk, the creation of the single currency in Europe has boosted financial flows from high-income to low-income countries in the euro area. Financial flows from high-income countries in the euro area to low-income countries outside of the euro area have not increased. Of course, EMU has coincided with other efforts to promote increased financial integration in Europe. In the next section, we examine in more detail the pattern of net financial flows between European countries and between European and non-European countries.

3. Net financial flows and EMU

The alternative interpretation of current account imbalances is that they reflect capital flows. Neoclassical growth theory predicts that capital should flow from rich

countries to poor countries. Poor countries have lower levels of capital per worker—in part, that explains why they are poor. In poor countries, the scarcity of capital relative to labor should mean that the returns to capital are high. In response, savers in rich countries should look at poor countries as profitable places in which to invest.[2]

In this section, we present some simple econometric evidence on the determinants of capital flows between countries in the euro area and between euro area countries and non-euro area countries. Ideally, we would use individual country data on intra-euro area and extra-euro area current account positions to measure financial flows, but these data are not readily available. As a proxy for current account balances, we therefore use intra-euro area and extra-euro area trade balances.[3] Our main aim is to examine whether capital tends to flow from rich to poor euro area countries and whether the creation of the single currency in Europe has affected these flows.

3.1 Data

Since current account data do not exist neither on a bilateral basis among the euro area countries nor on the basis of individual EMU member countries and the euro area as a whole, we use trade data from the IMF's *Directions of Trade Statistics* to construct trade balances between each euro area country and the euro area and each euro area country and the rest of the world. We use annual data on exports and imports of goods over the period 1981-2005, but we do not include exports and imports of services because of lack of reliable data. We measure trade balances relative to national GDP. Our sample covers the EMU members, and we aggregate Belgium and Luxembourg because of the former monetary union between the two. We also consider the trade balances of the United Kinddom (UK), Denmark, and Sweden, which did not adopt the euro but are members of the EU. Data for all other variables are taken from the European Commission's AMECO data base.

[2] In reality, surprisingly little capital flows from rich countries to poor countries (see Lucas, 1990). Several possible explanations have been put forward, including differences in human capital between rich and poor countries as well as failures in international capital markets that might account for the lack of flows. However, none of these candidates can come near to explaining quantitatively the observed shortage of capital flows relative to what economic theory would predict.

[3] Based on the AMECO data used below, the correlation between total trade balances and current accounts is above 0.91 for all countries except the UK (0.73) and Ireland (-0.16).

Since we use trade balances as proxies for current account balances, a natural question is, how large is the correlation between the two? Taking simple correlation coefficients between a country's annual trade balance and its current account balance, both relative to GDP, we estimate correlation coefficients above 0.90 for all EU-15 countries except the UK and Ireland. For the UK the correlation is 0.75, while for Ireland it is less than 0.50. A suggestive explanation is that the balance on factor incomes is much more important for the two countries than for the rest of the sample. For the UK, the most likely reason is the importance of the London financial market in the global financial system, while for Ireland it is the role of foreign-owned companies.

Figure 5 plots the dispersion across countries of five different types of trade balances over time, each defined as the unweighted cross-section standard deviation. The dispersion in trade balances against the euro area has seen an upward trend since the mid-1980s, with a period of decline in the immediate run-up to the EMU in 1995-1997. Relative to the rest of the world, the dispersion of trade balances began to increase much later, i.e., after the breakdown of the European Monetary System in 1992. The observation of widening differences among the total trade balances of EU member states from the mid-1980s to the early 2000s matches the evidence in Blanchard (2006), who looks at the total current account of each country with the rest of the world and shows that the dispersion also increases among OECD countries. Figure 5 shows that the dispersion of trade balances with the euro area is consistently larger than the dispersion of trade balances with the rest of the world, and that the former has risen faster than the latter since the mid-1980s. Separating euro and non-euro countries from the EU-15 group makes no significant difference.

Figure 6 shows the behavior of the (unweighted) average of trade balances over the past 25 years. It indicates that the average EU country moved from a small deficit against the euro area in the 1980s to a small surplus in the 1990s and 2000s regardless of whether or not it is a member of the euro area. The average trade balances with regard to the rest of the world was exposed to larger swings in the 1980s, but remained in a range of zero to minus one afterwards. We also counted the number of years in which a country's trade balance against its EU partners had the same or the opposite sign compared to its trade balance against the rest of the world. Greece had the same sign on both balances in all 25 years, Portugal in 23 years and Spain in 21 years. In contrast, Germany and the Netherlands had opposite signs on the

two balances in all 25 years. Thus, countries running deficits against their euro area partners consistently in past years tended to borrow from those and from the rest of the world. In contrast, Germany and the Netherlands tended to borrow from the rest of the world and lend to other EU countries, thus positioning themselves as financial intermediaries in Europe.

Figure 5: Dispersion of Trade Balances
(Standard deviation, % of GDP)

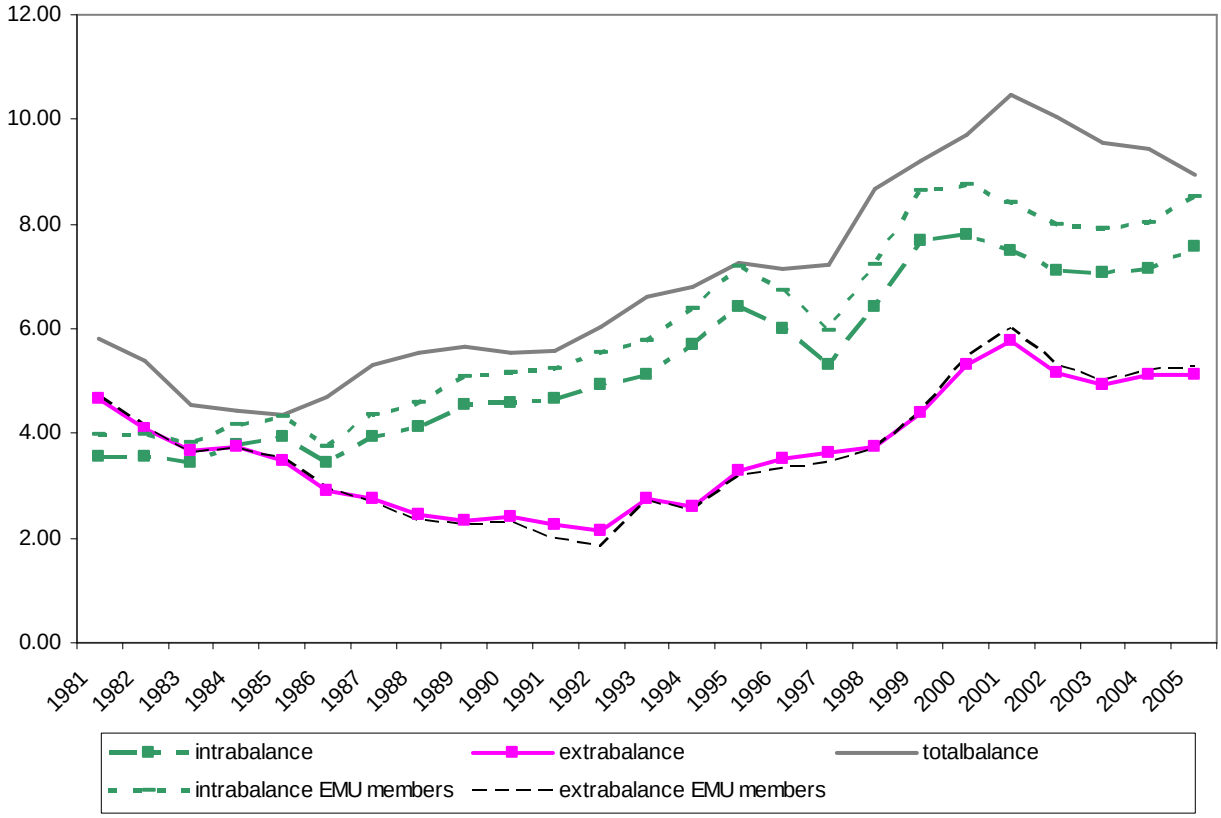


Figure 6: Average Trade Balances
(% of GDP)

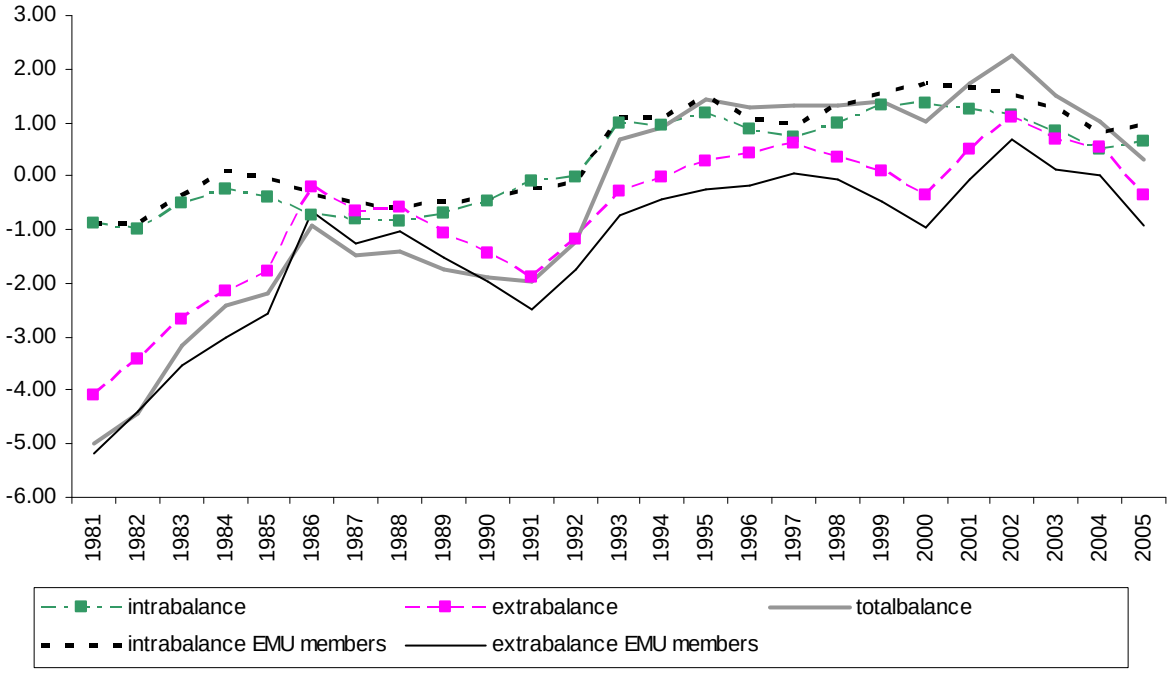


Table 1: Correlation between Intra and Extra-Euro-Area Trade Balances

	1981-2005	*1981-1998*	*1999-2005*
Belgium and Luxemburg	0.33	0.45 *	-0.55
Germany	0.75 ***	0.71 ***	0.85 **
Greece	0.17	-0.39 *	0.21
Spain	-0.31	-0.38	0.84 **
France	-0.10	0.54 **	0.76 **
Ireland	0.85 ***	0.84 ***	0.06
Italy	0.66 ***	0.81 ***	0.27
Netherlands	-0.94 ***	-0.80 ***	-0.63
Austria	-0.11	0.23	-0.54
Portugal	-0.48 **	-0.40 *	0.75 **
Finland	0.63 ***	0.61 ***	0.67 *
Denmark	0.62 ***	0.66 ***	-0.43
Sweden	0.17	0.25	-0.27
UK	-0.04	0.10	-0.24

Source: own calculations

Table 1 shows the correlation coefficients between the intra- and the extra-euro area trade balances for our sample countries. Six euro area countries have significantly positive correlations, only for the Netherlands and Portugal the correlations are significantly negative. Overall, there is no clear pattern to be detected. Table 2 reports the results of bi-variate causality tests between intra- and extra-euro area trade balances. Generally, dynamic correlations between the two are small and insignificant.

Table 2: Causality Tests Between Intra and Extra-Euro Area Trade Balances

	Intra => Extra	*Extra => Intra*		*Intra => Extra*	*Extra => Intra*
Belgium	0.40	0.44	Netherlands	0.27	0.60
Germany	0.84	0.54	Austria	0.16	0.59
Greece	0.78	0.24	Portugal	0.20	0.14
Spain	0.13	0.08	Finnland	0.09	0.28
France	0.60	0.85	Denmark	0.41	0.12
Ireland	0.07	0.15	Sweden	0.38	0.18
Italy	0.87	0.99	UK	0.18	0.53

Note: Table entries are the p-values of an F-test of the significance of two lags of the potentially causal variable in a regression where two lags of the caused variable are used. All regressions are in first differences. Source: own calculations

3.2 Trade balances and income per capita

We run regressions to examine the determinants of trade balances across individual euro area countries. We are particularly interested in any possible relationship between trade balances (and therefore financial flows) and income per capita. The dependent variable in our regressions is the ratio of the trade balance to GDP. Corresponding to the different measures of the trade balance for the sample countries discussed above we consider two variations of the dependent variable: the trade balance against the euro area (intra balance) and the trade balance against the rest of the world (extra balance).

The main explanatory variable is real per-capita GDP. We also include three dummy variables. "Dummy EMU" equals one if the country belongs to the EMU and the EMU has started[4], otherwise it is zero. "Dummy Non-EMU" equals one if the country did not accept the euro and the common currency has been introduced,

[4] The starting date is 1999 for all euro area members except Greece, which joined in 2001.

otherwise it is zero. Finally, we introduce a dummy variable "DKSEUK" for the countries that do not participate in EMU, the UK, Denmark, and Sweden. We interact the main explanatory variable with these dummies to see whether the introduction of the euro changed the determinants of net capital flows for EMU members.[5] We also add the general government balance as a ratio of GDP and the real price of oil in US dollars. The former is motivated by the effect public sector deficits have on the current account in conventional macro models. The latter is introduced because the EU countries, except the UK, are dependent on oil imports.[6] We also include a constant in the regressions.

Our results are presented in table 3A-B. We report six specifications for each of the dependent variables. We have tested the data for heteroskedasticity, contemporaneous cross-sectional correlation and serial correlation and the results suggest using an estimator which allows correcting for these phenomena. For the first two regressions we use a feasible general least squares estimator (FGLS) and account for panel heteroskedasticty and cross-sectional contemporaneous correlation and a first order common autocorrelation of the residuals.

Beck and Katz (1995) have shown that the full FGLS variance-covariance estimates are unacceptably optimistic when used with the "typical" macroeconomic panel - 10 to 20 panels with 10 to 40 time periods per panel - and propose using OLS or the Prais-Winsten estimator with panel-corrected standard errors instead. In column three and four we show in the respective estimates. Again, the estimator allows for a correction for heteroskedasticity, cross-correlation and serial correlation of the residuals.

The panel structure of our data further enables us not only to benefit from the cross-sectional variation in the data but also from the variation over time. Regression five and six thus are estimated with a fixed-effects panel estimator with clustering on the panel variable.[7] Finally, we add time dummies to the regressions in order to account for the influence of other macroeconnomic variables on the trade balance of the euro area countries, which are, however, not explicitly included.

[5] We also included a dummy variable for the German re-unification, but this turned out to be not statistically significant.
[6] As a robustness check we also introduced a number of additional explanatory variables, namely real GDP-per-capita in the EU and a measure of the real effective exchange rate, but these variables did not appear to be relevant.
[7] This produces an estimator of the variance covariance matrix that is robust to cross-sectional heteroskedasticty and within-panel serial correlation.

Consider table 3A, column 1, we find that trade surpluses within the euro area are a positive function of per-capita income and that the relationship is strongly statistically significant.[8] Generally, countries with larger per-capita GDPs have larger intra EMU trade balances. Before the start of the EMU, the effect of rising GDP per-capita on a country's intra-euro area trade balance is 0.33. The effect is significantly weaker for the group of countries that did not join the euro area in 1999. In fact, the sum of the coefficients on per-capita GDP and the same variable interacted with the dummy for non-euro area countries (DKSEUK) is not significantly different from zero, indicating that capital flows between non-euro area and euro area countries were not determined by different levels of income before 1999. There is thus a distinct difference between the EU-15 countries that formed the monetary union and those that did not. If we take the extent to which net capital flows follow differences in per-capita GDP as an indicator of capital market integration, this difference suggests that the degree of capital market integration among the countries that formed the monetary union was larger than between these and the countries that stayed outside.

With the beginning of the EMU, the positive effect of per-capita GDP becomes notably and significantly stronger for the euro area countries after the beginning of the monetary union, but not so for the non-euro area countries. Thus, net capital flows respond more strongly to differences in per-capita GDP within the monetary union than they did before and they continue to do so with non-members.

Fiscal balances have a significantly positive effect on the intra-euro area trade balance. A rise in the fiscal balance by one percent of GDP raises the trade balance with respect to the euro area countries by 0.04 percent of GDP. The inclusion of time dummies increases that effect to 0.08 percent of GDP. Since the government balance might be considered endogenous relative to the trade balance, e.g. because governments might pursue a current account target for fiscal policy, we also estimate models using an instrument for the government balance based on two lags of the government balance and two lags of the total trade balance as well as using the lagged balance as an explanatory variable. In both cases, the government balance retains a

[8] De Santis and Lührmann (2006) and Chinn and Prasad (2003) find that relative per-capita income has a positive effect on the current account balance in a large panel of countries running from 1970 to 2003. They also employ squared relative income as a regressor. Following their papers, we used squared per-capita income as an additional regressor in the models for the intra- and extra-euro area trade balances but did not find a significant effect.

positive coefficient and its marginal significance level stays below 10 percent.[9] The results suggest that fiscal balances do not contribute much to the existing trade account imbalances in the euro area. Even for Portugal, which had a general government deficit of 5.6 percent of GDP, the latter only explains at most half a percent of a total trade deficit of almost 10 percent. Meanwhile, Spain's trade deficit (8.6 percent of GDP in 2005) would have been even larger had the country not had a government surplus of one percent of GDP.

The real price of oil has a significant, negative impact on the intra-euro area trade balances when time dummies are included. Adding these controls does not change the main results regarding the effects of per-capita GDP and the EMU and non-EMU effects.[10]

The remaining specifications show that these results are robust. The inclusion of time dummies increases the effect of per-capita GDP to 0.42 and the effect of the introduction of the euro to 0.25 for euro area members. Using the Prais-Winsten estimator with panel-corrected standard errors indeed results in larger estimated standard errors, but almost all coefficients remain significant at the 1% level. Only the coefficient for the fiscal balance is no longer significantly different from zero. Finally, the fixed effects estimation results show that very similar outcomes can also be found if the time dimension is the only used source of variation.

Next, consider table 3B, column 1, where the dependent variable is now the trade balance with regard to the rest of the world excluding the euro area. Again, we find that trade surpluses are significantly and positively linked to real GDP per capita. The effect is of the same order of magnitude as in the case of intra-euro area trade balances. For the three countries that did not join the euro area, the sum of the coefficients on per-capita GDP and the same variable interacted with the dummy for non-euro area countries (DKSEUK) is not significantly different from zero, indicating that there has not been an impact of per-capita-GDP on extra-euro area trade balances before 1999.

Regarding extra-euro area trade balances, the impact of per-capita GDP does not change for the euro area countries with the introduction of the euro. The

[9] For the extra-euro area trade balance and the total trade balance we also have estimated models using instruments for the government budget balance. The results are similar and are not reported below.
[10] We also find that average EU GDP per capita has a negative effect on the trade balance, which is consistent with what one would expect from theory (e.g., Chinn and Prasad, 2003). However, the effect is not statistically significant and we drop this variable.

coefficient on the interaction term with the EMU dummy is not statistically significantly different from zero. This reinforces the supposition that the introduction of the euro has changed net trade flows within the euro area alone. The results are different, however, for the non-EMU countries. For these countries, the total effect of GDP per capita is significantly positive after the introduction of the euro. The results remain stable across other estimation methods and specifications.

The fiscal balance has a positive and significant coefficient in half of these regressions and the real oil price has a significantly negative effect on the trade balance. The latter effect, however, is only significant in four out of six cases.

These results suggest that EMU has increased capital market integration in Europe with the result that capital flows are now more in line with what neoclassical growth theory predicts. As capital flows from high per-capita GDP to low per-capita GDP countries, they can be expected to promote economic convergence among the euro area countries. This means that the allocation of capital is becoming more efficient in the euro area and that the observed current account imbalances indicate that the monetary union works well. By implication, a fiscal expansion in the surplus countries would tend to absorb more of their domestic savings and slow down capital flows to poorer countries, thus rendering the EMU less efficient.

Our reading of the results is that the monetary union has greatly increased capital market integration among the participating countries. More efficient capital allocation within the region is a major benefit from the monetary union. But note that monetary integration, not unlike trade integration, also seems to have had an effect on capital market integration between the non-euro area countries in the EU and the rest of the world. More specifically, financial market integration appears to have increased between the latter since 1999, but not so between the euro-area countries and the rest of the world. This effect, which is in analogy to the well-known *trade diversion* effect of trade integration, implies a possible worsening of the allocation of capital between the euro area and the rest of the world.

Further Robustness Tests

Absolute vs. relative income

The validity of our results could be affected by the fact that per-capita GDP follows a trend over time. In our first robustness test we therefore use the relative per-

capita GDP as the main explanatory variable. Hereby, we normalize the income variable with respect to the relevant country group. For the regressions with the intra-euro area trade balance as dependent variable we choose the average real per-capita GDP of the euro area. For the regressions explaining the extra-euro area trade balance we consider the OECD countries to be the relevant country group, because the dominant share of capital flows goes to industrialized countries. The relative income is constructed as the ratio of the real per-capita GDP and the average real per-capita GDP of the euro area or respectively the average real GDP per capita of the OECD countries.[11] Consider table 4, column 1-4. We rerun the basic regressions for intra balance and extra balance with the FGLS estimator and the Prais-Winsten estimator. The estimation results show that our findings from above are still valid.

On closer inspection of the newly-formed relative income variables it becomes clear that Ireland could be a special case, since it is the only country which started with a below-average income in 1981 and ended with an above-average income in 2005. We run a comparative set of regressions leaving out the data for Ireland to make sure that this special case does not solely drive our results. Consider table 4, columns 5-8, here we find that leaving out Ireland does not change the picture.

GDP per capita vs. capital stock per capita

As we have said above, neoclassical growth theory predicts that capital should flow from rich countries to poor countries. Poor countries have lower levels of capital per worker—in part, that explains why they are poor. So far we have used per-capita GDP as a measure for the "richness" of a country and not the level of capital. In the following regressions we investigate whether our results still hold when we use the log of the real per-capita capital stock as the main explanatory variable. The respective data series is again taken from the AMECO database. Since we interpret the trade balance, our dependent variable, as capital flows, we have the additional problem of potential endogeneity between the capital stock and the trade balance. With all else remaining equal, higher capital inflows should lead to a higher capital stock. We therefore complement our set of regressions by also showing results for when an instrumental variable approach is applied. We use the fifth lag of the capital stock as the instrument. We try to implement this approach with two different

[11] The euro area average per-capita GDP comes from AMECO database. The OECD average per-capita GDP comes from the OECD National Accounts database.

procedures. First, we perform an instrumental variables regressions (two-stage least-squares) which pools the observations and therefore cannot make explicit use of the time variation in the data, but can account for serial correlation and heteroskedasticity in the residuals. Second, we use a two-stage least–squares random-effects estimator by Balestra and Varadharajan-Kristhakumar (1987) with incorporates the panel dimension of the data but does not provide for the special characteristics of the residuals.

In table 5 we find very similar results in comparison to the regressions which use per-capita-GDP as a main regressor. Consider for instance table 5, columns 1-3. The intra-euro area trade balance depends positively on the capital stock. For Denmark, Sweden, and the UK the sum of the capital stock coefficient and the interaction term is not significantly different from zero, suggesting that the capital stock has not determined the intra-euro area trade balances of the EMU outsiders before 1999. For euro members, however, the effect is even amplified with the introduction of the euro. Also, the control variables have the expected sign. In principal, these results also hold when the instrumental variable estimation approach is used, although standard errors appear to be larger. This leads, in the case of the panel instrumental variables regression, to a non-significant coefficient for the interaction variable between the capital stock and the dummy for Denmark, Sweden, and the UK.

For extra balances the picture is less clear-cut. A look at table 5, column 4, tells us that the extra-euro area trade balance is positively determined by the capital stock. The group of countries which has decided to stay outside the monetary union shows a lower coefficient on average. All EU-15 countries do not show a change in the relationship between the extra-euro area trade balance and the capital stock with the beginning of the EMU. Column 5 presents the results of the pooled iv regression. Here the average positive effect of the capital stock on the extra balance of a country is no longer significant, but the non-euro area countries show a positive influence of the capital stock on the extra balance which increases with the introduction of the euro. This appears to show that capital market integration with the rest of the world has deepened for the euro outsiders and this development has become stronger with the start of the EMU, which can be interpreted as disintegration. The panel iv estimates instead show that there is a positive average effect of the capital stock on extra

balances for all EU countries, but this effect is reinforced for Denmark, Sweden, and the UK after the start of the monetary union.

time vs. group effects

As a result we have so far found that the income effect on the trade balances depends both on the group the country belongs to, euro area members vs. non-euro area members (Denmark, Sweden, and the United Kingdom), and on the introduction of the common currency. An interesting question is now of what relative importance the effects are and how important the introduction of the euro is for the continuous process of financial integration in the EU.

To shed more light on this issue, we do three things with respect to the intra balance regressions. First, we introduce an additional interaction term into the regressions consisting of per-capita GDP multiplied by a euro membership dummy to extract the group effect of EMU membership. Further, we include an interaction term between per-capita GDP and the start of the EMU to find out the potential average increase in financial integration for all EU-15 countries. Now we can distinguish between a general per-capita GDP effect on the intra-euro area trade balance, an income effect for EMU members only, an income effect related to the start of the EMU for all EU-15 countries and an income effect only for EMU members after the start of the EMU.

Second, we run a regression allowing for a time-varying per-capita GDP coefficient and show the behavior of the coefficient over time.

Third, we are interested in whether the start of the EMU caused a structural change in the estimated parameters. Therefore we look for parameter instability from 1999 onwards. We apply an end-of-sample stability test proposed by Andrews (2003).

The regression results in table 6, column 1, show that the income effects on the intra-euro area trade balance depend strongly on the group the country belongs to. The average income effect with a coefficient of 0.09 is relatively low. Being one of the designated euro area members increases the income effect by 0.33. The start of the EMU increases the income effect on the intrabalance for all EU 15 countries by 0.09, while the euro area members face an additional increase of 0.10. So the membership effect is very important, but there is an extra boost in financial integration because of the introduction of the common currency, which is larger for the EMU members than for the outsiders. Figure 7 shows the time-varying income coefficient estimates for the

EU-15 countries, accompanied by two-standard errors bands. The income coefficient steadily increases over time which reflects the intensifying financial integration in the European Union. The level of integration however appears to differ strongly between the mid 90s and the period after the introduction of the common currency. This evidence supports our idea that the start of the EMU has been an important step forward for financial market integration in the euro area. This finding is further backed by the results of the test of parameter stability, which detects a structural break in 1999 with a significance level of 99%.

For the extra-euro area trade balances we present comparable estimates in table 6, column 2, and in figure 8. The regression results show that income is an important determinant of the extra-euro area trade balance, which is even more pronounced for EMU members. The respective interaction term has a positive coefficient of 0.30. The start of the EMU does not have an effect, neither for the EU-15 countries nor for the EMU members. Figure 8 shows the time-varying income coefficients with two-standard error bands. The income coefficient remains stable between 0.3 and 0.4 for the last 20 years without any remarkable change. We conclude from this evidence that the introduction of the euro has not changed the financial integration with the rest of the world.

Feldstein-Horioka regressions

In a seminal contribution to open-economy macroeconomics, Feldstein and Horioka (1980) showed that, at that time, international capital market integration was much weaker than generally perceived. They did this based on a simple reasoning. With complete international capital market integration, a country's rate of investment should be uncorrelated with its rate of savings. Any excess of investment over savings would simply be absorbed by the current account balance. This suggests that the regression coefficient of the investment on the savings ratio, which is called the savings retention coefficient, should not be statistically different from zero. However, Feldstein and Horioka showed that, in an international panel, this coefficient was much closer to one than to zero. Subsequent literature has shown that the savings retention coefficient has declined in international panels since the 1980s.[12] This is in

[12] See e.g. Obstfeld and Taylor (2004), Hericourt and Maurel (2005) and Coakley, Kulasi and Smith (1998) for a recent and comprehensive surveys.

line with the general perception that the degree of international capital markets integration has increased since then.

Blanchard and Giavazzi (2002) revisit this issue in the context of the EMU. They use annual data for investment and savings ratios of OECD, EU, and euro-area countries from 1975 to 2000 and estimate savings retention coefficients. Blanchard and Giavazzi show that savings retention coefficients generally declined from levels of 0.5 to values close to zero for all three groups of countries.

Showing that savings retention coefficients declined would support our interpretation of the current account imbalances in the euro area, since it is another aspect of looking at capital market integration. With this in mind, we consider Feldstein-Horioka-regressions for our 14 countries and the period from 1981 to 2005. The dependent variable is the gross investment rate, which includes public sector investment. The explanatory variable is the gross savings rate, which includes public sector savings. We further include dummy variables as described above and look at the interactions between these and gross savings. All data are taken from the AMECO data base.

Table 7 reports the results. We tested the data for heteroskedasticity, contemporaneous cross-sectional correlation and serial correlation and the results suggested using an estimator which allows these phenomena to be accounted for. We correct for these phenomena one after the other (estimates in columns 1-3) and for all three togehter in column 4. We again use an FGLS estimator and account for panel heteroskedasticty and cross-sectional contemporaneous correlation and a first order common autocorrelation of the residuals. The coefficient on the gross savings rate varies between 0.32 and 0.45 and is statistically significant. This is lower than what Feldstein and Horioka found, but well in line with Blanchard and Giavazzi (2002). The interaction of the gross savings rate with the EMU dummy[13] yields a negative and highly significant coefficient between -0.24 and -0.52. But also the interaction term with the dummy variable Non-EMU has a negative and significant coefficient of between -0.24 and -0.30. There is also weak evidence that DKSEUK have a higher average savings coefficient since the respective interaction term shows a weakly significant positive coefficient of around 0.10 to 0.15. In summary, it is not clear if

[13] "Dummy EMU" equals one if the country belongs to the EMU and the EMU has started, otherwise it is zero. "Dummy Non-EMU" equals one if the country did not accept the euro and the common currency has been introduced, otherwise it is zero. Finally, we introduce a dummy variable "DKSEUK" for the countries that do not participate in EMU, the UK, Denmark, and Sweden.

the investment and savings data provide evidence for an extra effect for the euro group.[14]

The results of the attempt to dig deeper and to break down the average effect into time and group effects is presented in columns 5-8. One hypothesis could be that the reduction in the savings coefficient is generated only by the introduction of the euro. If this is true, then an interaction term of the savings variable with a shift dummy which turns to 1 from 1999 onward should be significant and should weaken the effect of the other two interaction terms on gross investment. This is not the case as we can see in column 5, where the new interaction term has a small and weakly significant positive coefficient but the other coefficients keep their signs and magnitudes. Testing the hypothesis that the timing is not that important but belonging to the group of countries which committed to the euro is, we introduce a further interaction term with the dummy "euro area member". The interaction term is -0.10 and is significant at the 10% level, the other coefficients remain stable. A possible interpretation of this is that EMU membership itself is not everything, but that the point of the introduction of the common currency is important for financial integration. The results in columns 7 and 8 support the results to the extent that different combinations of interaction terms do not change the general results. The total effect post-1999 is still statistically different from zero.

Looking at a time-varying savings coefficient for the whole EU in figure 9, there is a clear downward movement from 1995 on, which results in time-varying savings retention coefficients that are not different from zero from 1999 on. Thus, domestic investment has more or less been completely decoupled from domestic savings in the EU. Thus, table 7 supports our results that the EMU has increased capital market integration within the region, and has also done this for outsiders.

6. Conclusions

We have documented a growing dispersion in current account balances among countries in the euro area since the early 1990s. The differences in current account positions widened significantly following the creation of EMU. We have shown, first, that EMU has changed the pattern of capital flows within Europe. Specifically, it has

[14] And indeed testing the hypothesis that grosssaving*dummy EMU=grosssaving*dummy No-euro+grosssaving*dummy DKSEUK cannot be rejected.

increased the tendency of capital flows to go from relatively rich to relatively poor countries within the euro area. This suggests that the observed current account imbalances are sign of the proper functioning of the euro area rather than a sign of improper macro economic management.

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