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# **Trade (dis)Integration and Imbalances in the EMU**

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## **Abstract**

The aim of this paper is to assess the role of competitiveness and financial integration on trade flows for countries belonging to the European Monetary Union (EMU). We argue that these two factors contributed both to the dynamics of trade imbalances and to the reduction of intra-EMU share in total trade. The latter effect adds to the physiological reduction of intra-EMU trade due to lower than average growth and competitiveness losses. We use a gravity-type bilateral trade model in order to estimate the impact on both imports and exports, providing a more detailed explanation for the developments of total and net trade. The results indicate that both competitiveness and financial opening significantly increased trade imbalances, particularly within the EMU. In addition, financial opening also played a strong role in the reduction of the intra-area trade share.

JEL Codes: C23, F15, F32, F36, O52

Keywords: Imbalances, euro area, Competitiveness, Financial flows, Panel data

## 1. Introduction

From the introduction of the euro in January 1999 to the explosion of the global financial crisis, there has been a divergent trend in the external position of a large number of European member states. Such divergence in both trade and current account balances reflects a clear dichotomy between the core and the periphery of the European Monetary Union (EMU) in terms of structural competitiveness.<sup>1</sup> Up to the global financial crisis, the development of imbalances was considered the result of the proper functioning of a monetary union in line with the catching up assumption implied in the main theoretical contributions (see Blanchard and Giavazzi 2002). Nevertheless, the productivity catch up did not happen and peripheral countries developed, in some cases, a growth model based on asset bubbles and dependence on foreign capital (Giavazzi and Spaventa 2010).

The applied literature identifies two main determinants of the rise in imbalances among EMU countries. First is the role of financial integration and financial flows from core countries, above all Germany, driven by the reduced risk premia and the positive interest rate differential with peripheral countries. Second is the divergence in the competitive position between core and periphery in terms of unit labour costs (ULC) and other measures of competitiveness (Dullien and Fritsche 2009, Belke and Dräger 2013). The latter also includes increased competition from emerging countries—China and the countries participating in its regional production network in particular (Guerrieri and Esposito 2012, Giovannetti et al. 2013, Chen et al. 2013).

After the global financial crisis, peripheral countries in the EMU started to adjust their imbalances, driven mainly by consolidation policies imposed by the European Commission. Such asymmetric adjustment was based on the view that rebalancing should not compromise the competitiveness of the EMU as a whole (European Commission 2012). With no room for expansionary fiscal policies, due to constraints of the Stability and Growth Pact, and with further pressure from financial markets as a result of the European Sovereign debt crisis, the adjustment consisted mainly of recession-induced prices and import compression, with little or no effect on the structural competitiveness of these countries (Canofari et al. 2015, Canofari and Messori 2015, Esposito and Messori 2015). Demand contraction also had the effect of reducing intra-EMU surpluses of core countries, particularly Germany and the Netherlands.

Alongside the development of imbalances, a second, mostly overlooked, phenomena is that trade flows among the first twelve countries belonging to the EMU have grown at a less than average rate since the early 1990s, leading to a continuous reduction in the share of intra-area trade.

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<sup>1</sup> With reference to the first 12 member of the EMU, peripheral countries include Greece, Ireland, Italy, Spain and Portugal. The remaining countries represent the core of the EMU12.

While this phenomena could simply be explained by the area's lower than average GDP growth with respect to the most important emerging markets in particular, and by the generalized loss in cost competitiveness, this outcome might have been fostered by a peculiar development within the area resulting from the introduction of a single currency. This interpretation is consistent with the most recent evidence on the euro effect on trade (Kalejan et al. 2012, Sousa 2012, Camarero et al. 2014a/b, Glick and Rose 2015), which finds the creation of the monetary union having little or no impact on the relative size of intra-area trade flows.

We argue that the reduction of intra-EMU shares is partly a by-product of the development of imbalances, and it is therefore influenced by the same factors determining first the divergence, and then the rebalance of net trade positions. The importance of looking at intra-EMU trade flows from this perspective is linked to the expectation that, through having a larger single market, the monetary union should have brought about an increase in trade. What we observe instead is an opposite tendency, with most of the countries trading more intensively with extra-EMU and extra-EU markets, particularly after the European sovereign debt crisis forced many member states to reduce their domestic demand due to fiscal consolidation requirements. This led to a reduction in the size of the single market and to a record-level current account surplus for the euro area, driven by German net exports in particular.

The aim of this paper is to assess the role of the above-described factors in explaining the development of both trade imbalances and the lower intra-EMU share in total trade. This will be done for the two periods before and after the global financial crisis. We deviate from the standard multilateral analysis of trade and current account imbalances based on panels with a small number of units (macro panels) and instead use a bilateral approach built on a general form of the gravity model of trade (Bergstrand 1985, Baltagi et al. 2003, Anderson and van Wincoop 2003, Anderson 2010, Santos Silva and Tenreyro 2006 and 2011).

With respect to the multilateral analysis of trade and current account imbalances, the use of gravity-type models has several advantages. First, by focussing on bilateral export flows, we are able to estimate the effect of competitiveness and financial integration on both imports and exports, providing a better description of the mechanism underlying the development of imbalances and intra-EMU trade. Second, the bigger sample size of bilateral datasets allows for the introduction of a number of group-specific coefficients, which can help to better test whether differentiated effects are present among different groups of countries. These two features are particularly important since imbalances are strictly connected with changes in geographical composition of trade flows. An additional advantage of a big sample size is the ability to test for structural changes, which may have occurred with the introduction of the single currency and with the global and European crises.

It also allows us to estimate a separate specification for each of the two post-EMU periods without running into a small sample problem. The ability to estimate a separate specification for the post-crisis period allows us to make some preliminary assessments on the pro-competitive effect of austerity measures in the EMU periphery. Finally, we deviate from the standard approach, which estimates the euro effect as a level shift (a dummy variable), and we assess instead whether regime shifts in financial opening and competitiveness would explain the shrinking share of intra-EMU trade.

The structure of the paper is as follows. Section 2 summarizes the main literature on the euro effect on trade, as well as on the determinants of imbalances in Europe, and explains our strategy. Section 3 provides a description of the evolution of intra-EMU trade shares and trade balances, in light of the developments of cost competitiveness and financial integration. The econometric model and the results of the estimates are presented in section 4, and section 5 lists our conclusions.

## **2. Imbalances and intra-EMU trade: survey of the literature**

In this section, we provide a survey of the main evidence for the causes of trade relocation and current account imbalances in Europe, and among the countries of the EMU in particular. In section 2.1, we discuss the main literature on imbalances and their determinants, while we survey the main studies on the effect of the single currency on the size of trade flows in the EMU in section 2.2. Section 2.3 puts the pieces together and explains our strategy for the joint analysis of imbalances and intra-EMU trade shares.

### *2.1 Determinants of intra-European imbalances*

Until the global financial crisis, the development of imbalances was considered a result of the proper functioning of a monetary union, in line with the catching up assumption implied in the main theoretical contributions (see Blanchard and Giavazzi 2002). According to this view, the single currency should have favoured the catching up process, thanks to the increase in financial flows from the core to the periphery, stimulated by the convergence of interest rates. The increased availability of cheap capital in the periphery should have fostered productivity increases, which allow for improvements in the external position thanks to higher export competitiveness and to lower demand for imports. What happened instead is that financial flows generated investment bubbles, especially in the real estate sector, and caused a consumption boom not properly supported by improvements in the productive structure in some cases. This means that the high growth

recorded in some peripheral countries, such as Spain and Ireland, was not the outcome of a catching up process, but the result of a model based on asset bubbles and dependence on foreign capital (Giavazzi and Spaventa 2010, Croci-Angelini and Farina 2010).

While it is true that the divergence between core and peripheral countries is partly the result of the lack of proper structural reforms in the latter (Dullien and Fritsche 2009, Zamanek et al. 2010, Belke and Nitsch 2014), other factors connected with the introduction of the euro have contributed to this outcome. In particular, we can divide the main literature on the determinants of the rise of imbalances among EMU countries into two groups. First are studies pointing to the role of financial integration and financial flows (Barnes et al. 2010, Jaumotte and Sodsriwiboon 2010, Schmitz and Von Hagen 2012, Lane and Pels 2012, Croci-Angelini and Farina 2012, Hobza and Zeugner 2014, Cesaroni and De Santis 2015) from the core to the periphery. Second are studies pointing to the development of productivity and cost competitiveness, both within the EMU (Dullien and Fritsche 2009, Zamanek et al. 2010, Belke and Nitsch 2012, Belke and Dräger 2013, Sanchez and Varoudakis 2013, Algieri 2014) and with respect to emerging countries (Guerrieri and Esposito 2012, Giovannetti et al. 2013, Chen et al. 2013).

The role of financial integration and financial flows in the EMU has been tackled from several points of view. General studies include Schmitz and Von Hagen (2011), Hobza and Zeugner (2014), Jaumotte and Sodsriwiboon (2010). Schmitz and Von Hagen (2011) provide evidence of a significant increase in the elasticity of financial flows to per capita income in the EMU and argue that the introduction of the euro might have led to financial diversion. Holba and Zeugner (2014) argue that bilateral financial transactions are effective in transmitting shocks in the EMU. Jaumotte and Sodsriwiboon (2010) find evidence that financial integration has a negative effect on the current account balances in 49 advanced and emerging economies, including 27 EU countries.

The reasons for the unbalanced effect of financial flows on trade and current account balances are mainly connected to the development of asset bubbles and excessive domestic demand (Croci Angelini and Farina, 2012). Asset bubbles, particularly in the construction sector, are found to be significant determinants of imbalances in the EMU (Giavazzi and Spaventa 2010, Barnes et al. 2010). Furthermore, Lane and Pels (2012) maintain that the discrete expansion in current account imbalances during the 2002-2007 period can be attributed to a strengthening in the link between growth forecasts and current account balances. The argument is that optimism about future growth was associated with lower savings and higher construction investment, rather than investment in productive capital. Finally, Cesaroni and De Santis (2015) provide direct econometric evidence of the differentiated effect of financial integration on core and peripheral countries.

Among the various studies on the relation between competitiveness and external performance of the EMU, Sanchez and Varoudakis (2013) argue that changes in competitiveness have been of lower importance with respect to demand shocks in the periphery, while the opposite is true for core countries. A different point of view is expressed by Zamanek et al. (2010), Belke and Dräger (2013) and Belke and Nitsch (2014). Zamanek et al. (2010) argue that structural reforms are fundamental in explaining the competitiveness loss of peripheral countries. This view is shared by Belke and Dräger (2013), as well as Belke and Nitsch (2014). The former further shows that a lack in competitiveness is the main explanation for the external deficits of peripheral countries, along with the development of government debt. Contrary to the standard argument of Blanchard and Giavazzi (2002), they find few effects of the catching up process in the periphery.

With respect to external trade, there is a wide consensus in the literature on its dependence on competitiveness. Several recent studies investigated this relation for some or all the EMU countries (Chen et al. 2013, Guerrieri and Esposito 2012 and 2013, Algieri 2014, Giovannetti et al. 2013). Chen et al. (2013), as well as Guerrieri and Esposito (2012 and 2013), stress the role of asymmetric trade developments with countries outside the euro area and point to the role of integration with Central and Eastern Europe. Import competition from Chinese products on domestic and external markets is found to be significant in determining the deterioration of the position of southern European countries. This kind of competition effect is particularly relevant for Italy (Guerrieri and Esposito 2013, Giovannetti et al. 2013) and is the result of a deterioration of both price and non-price competition factors (Algieri 2014).

After the global financial crisis, some progress at the European level has been achieved in terms of financial regulation, banking union, and management of large public debts. Nevertheless, trade and current account imbalances have been strongly reduced thanks mainly to the implementation of fiscal consolidation measures which affected the external balance primarily through demand compression and wage moderation (Esposito and Messori 2015). Although structural reforms and nominal devaluation are considered a necessary step to restore competitiveness in peripheral countries and to rebalance external flows (European Commission 2012, Sinn 2014), there is skepticism over the effect of cost reductions when the previous accumulation of deficits was due to demand booms driven by financial integration (Sanchez and Varoudakis 2013). In addition, austerity-driven demand collapse and implied deflation (Canofari and Messori 2015) seem to be the main causes for the stabilization and reduction of unit labour costs in the periphery when there is little or no sign of improvement in structural competitiveness with respect to productivity (Canofari et al. 2015, Esposito and Messori 2015). The implication is that the recovery of GDP growth will bring about a new increase in imbalances.



## *2.2 Trade integration and the euro*

Since the introduction of the euro, numerous empirical analyses aimed at estimating the effects of the single currency on total trade—the so called Rose effects (Rose 2000)—have been carried out. All these studies model the introduction of the euro as a treatment for some countries, usually captured by a dummy assessing whether two trade partners are in the euro area or not. The results are not univocal. Earlier literature (Glick and Rose 2002, De Nardis et al. 2008, Baldwin 2006, Chintrakam 2008, Cafisio 2011; see Havranek 2010 for a comprehensive survey of the literature), based on a standard version of the gravity model for bilateral trade (Baltagi et al. 2003, Anderson 2010), finds a positive effect of the euro on trade flows. Ranges for the magnitude of the euro effect vary from 5%-10% (Baldwin 2006) to 9%-15% (Chintrakam 2008), with an estimated maximum long-run impact of up to 19% (De Nardis et al 2008). As pointed out by Havranek (2010), the results of this literature are strongly influenced by the econometric design and by a publication bias, implying that the true effect might be lower than those found in most of the studies.

Recent works take into account some methodological problems in the measurement of the euro effects on trade. Kalejan et al. (2012) used a spatial econometrics framework to control for spatial correlation, and they found almost no significant effect of euro membership on exports. De Sousa (2012) estimates a time-varying impact and finds that the euro effect fades over time. Camarero et al. (2014a/b) apply panel cointegration techniques and treat the euro effect as a series of long-run policy changes—in particular, the Single European Act (1986)—finding a much smaller, but still positive, effect of the single currency on intra-EMU trade flows. The most recent study on the subject has been carried out by Glick and Rose (2015). The authors reverse the conclusions from their previous study (Glick and Rose 2002) and admit that the results change largely among estimation techniques and that a precise effect, positive or negative, cannot be estimated.

The lack of precision of euro effect estimates is connected with the inability to correctly estimate the impact of a dummy variable after controlling for main determinants of the multilateral resistance term (MRT). Better results can be obtained by looking at the main variables contributing to the euro effect and testing for a regime shift in their impact. Beyond trade cost reduction, most studies do not investigate additional channels through which the euro can affect trade. Some authors (Camarero et al. 2014a, Kalejan et al.2012) point to the competition effect for the most productive firms. De Sousa (2012) argues that trade and financial liberalisation at a global level reduces the

importance of currency unions and their effect on trade. None of these studies provide a clear explanation for the decrease of intra-EMU share in total trade, which might be better understood when considering the literature on trade and current account imbalances.

### *2.3 Imbalances and trade integration: putting the pieces together*

Most of the empirical literature on imbalances is based on macro panels where the number of individuals and the total sample size are typically small. Alongside standard static panel techniques used in most of the literature, some studies estimate long-run relations using time series analyses (Algieri 2014), dynamic panels (Cesaroni and De Santis 2014) or panel cointegration techniques (Camarero et al 2014a/b, Belke and Dräger 2013). Only Belke and Nitsch (2014) deviate from this approach and use a bilateral trade model to investigate the relation between trade balances and the exchange rate for EMU countries. The use of long time spans, while increasing the sample size, is required in order to control for pre-existing trends in trade and current account developments at a global level and to test for the stationarity of the series.

In this paper, we deviate from the standard approach followed by most of the literature and use a gravity-type model of bilateral trade. With this framework, we investigate the determinants on imbalances and intra-EMU trade by looking at the effects of competitiveness and financial integration on export and import flows. With respect to the standard multilateral analyses, the use of gravity-type models for the analysis of trade imbalances has some advantages. First, by focussing on bilateral export flows, it is possible to estimate the effect of competitiveness and financial integration from the point of view of both import and exports, providing a better description of the mechanism underlying the development of imbalances. Second, the big sample size of bilateral datasets allows for the introduction of a number of group-specific coefficients, which can help to better test whether differentiated effects are present among the different groups of countries. Third, an additional advantage of the big sample size is the ability to focus on the period after 1999 and to estimate a separate specification for the years before and after the global financial crisis. These features are particularly important as imbalances are strictly connected with changes in the geographical composition of trade flows that occurred in the last 20 years, as well as with changes in policy, favouring pro-cyclical measures after the global financial crisis. With respect to the latter, we will assess whether the recent rebalancing of net trade should be attributed to unit labour cost reductions or the mechanical effect of negative GDP growth and disinflation.

Finally, in order to test whether changes in competitiveness and financial integration after the creation of the EMU contributed to the reduction of intra-area share in total trade, we will test

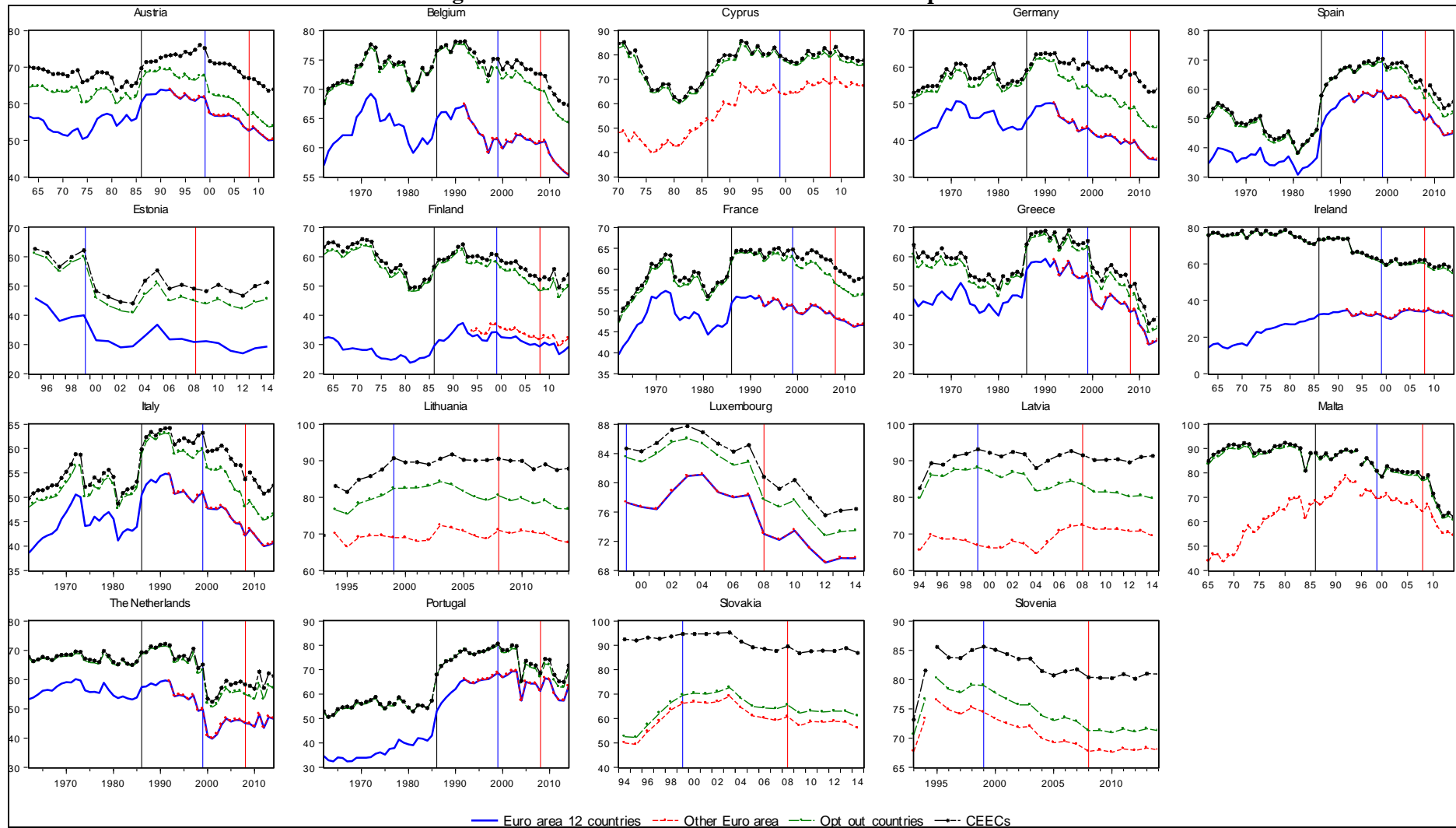
the significance of a regime shift with respect to their impact on countries belonging to the EMU. By focusing on slope changes, we do not need to rely on the size and significance of a dummy variable in order to test for euro effects on trade. This overcomes the problems pointed out by Glick and Rose (2015) and other authors, allowing us to better define the mechanism through which the introduction of the single currency should have affected trade performance.

### **3. Trade flows, competitiveness, and financial opening in the EMU: descriptive evidence**

In this section, we provide some descriptive evidence on the relation between total and net trade on the one hand, and indicators of cost competitiveness and financial opening on the other. Referring to trade flows, Figure 1 shows the long-run evolution of intra-EMU and intra-EU shares in total trade for countries belonging to the monetary union. For most of the original 12 members of the area, the share of intra-EMU trade fell after the introduction of the single currency. The only exceptions to this pattern are Ireland, whose share remained constant until very recently, and the Netherlands, which stabilized its intra-EMU trade share during the first half of the last decade after a deep fall between 1998 and 2001. For most other countries, the fall started in 1999 (Austria, Belgium, France, Greece, Italy, Portugal, and Spain), though it dates back to the first half of the 1990s in the case of Germany and Finland. This evidence is the first indication that the introduction of the euro brought about a regime shift in external trade.

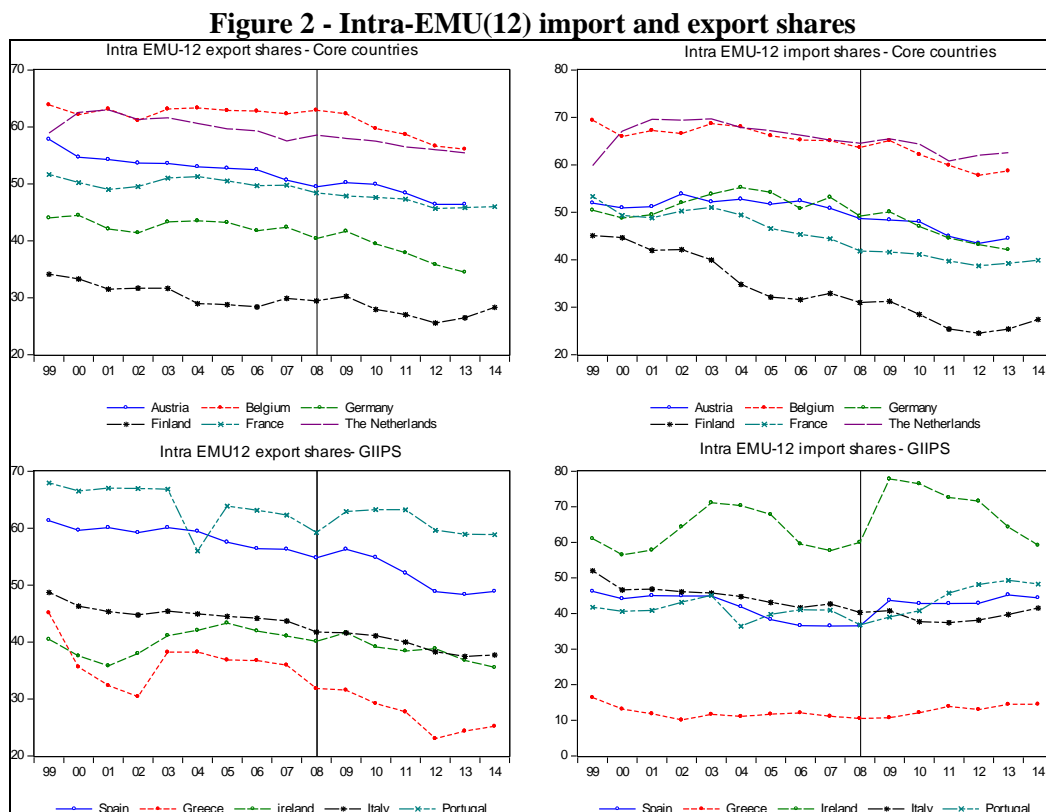
The reduction of intra-EMU trade share might be the result of the integration of Central and Eastern European Countries (CEECs) into the European production network. In Figure 1, we see that this effect is important only for Austria, Germany, and Italy, whose trade share with CEECs is around 8%-10%. In any event, most of the increase took place during the 1990s and stabilized afterwards. Germany is an exception, with its trade integration with CEECs continuing into the 2000s, confirming the important role that outsourcing played in fostering the country's export success (Timmer et al. 2014, Marin 2006). Nevertheless, even after taking into account the relocation toward Eastern Europe, the average tendency is a reduction of intra-EU trade share.

**Figure 1 – Trade shares of EMU countries with respect to the EU**



Source: Elaboration on COMTRADE data, accessed through WITS

The fall of intra-EMU trade share after 1999 is the result of differentiated dynamics in import and export shares between the core and the periphery. In Figure 2, we see intra-EMU export shares falling for both core and peripheral countries, with the former also experiencing a reduction in import share. In peripheral countries, the import share instead remained constant over the whole period. The overall reduction continued after the global financial crisis, due to the weakness of domestic demand in all member states and particularly in those showing high deficits, both in current accounts and budget balances.



A clearer picture derives from the changes in the relative distribution of intra-EMU trade. In Table 1, we report such a distribution for the years 1999, 2007, and 2013. We add an additional group to the standard distinction between core and deficit countries. More specifically, in the latter, we separate the so-called GIPS (Greece, Ireland, Portugal, Spain) from Italy, which forms a separate group together with France. This aggregation is chosen because of the similar dynamics in the two countries in terms of trade and current account deteriorations, as well as similar problems with respect to public finances.<sup>2</sup> The main evidence is an increasing integration among the core

<sup>2</sup> It must be said that France is considered to be one of the surplus countries because of its role of hub in intermediating financial capital from outside the EU toward deficit countries (see European Commission 2012, Hobza and Zeugner 2014)

countries (Table 1), which accounted for 47.8% of intra-EMU trade in 2013, gaining more than seven percentage points when compared to 1999. Core countries also increased their share of trade with latecomers in the monetary union (EA-new), while reducing their relative integration with the two groups of deficit countries. Italy and France lowered the importance of their bilateral trade as well as their integration with GIPS, whereas few improvements were recorded in terms of trade with the new member states. Finally, the small share of intra-GIPS trade changed only marginally. The resulting picture is one of intra-EMU trade polarization, with core countries emerging as a growing block at the expense of peripheral countries (GIPS and Italy), which are increasingly marginalized but still substantially dependent on imports from core countries.

The described dynamics are consistent with the adjustment in terms of trade balances. Table 2 shows core countries running a trade surplus with the other three groups, and the excess of exports over imports rose threefold between 1999 and 2007, with respect to Italy and France, and by more than five times with respect to GIPS. The latter also ran an increasing deficit with respect to Italy and France while, similar to the other groups, they are net exporters to the new member states. Between 2007 and 2013, we observe a rebalancing in net trade positions, in particular between core countries and other areas, whereas GIPS turned their deficit with respect to France and Italy into a surplus.

**Table 1 – Shares in intra-EMU trade by area**

Group A	Group B	1999	2007	2013
IT-FR	IT-FR	9.2	7.5	6.5
GIPS	GIPS	3.2	3.5	3.2
EA-core	EA-core	40.6	44.1	47.8
EA-new	EA-new	0.2	0.6	0.9
IT-FR	EA-core	25.9	23.0	23.1
IT-FR	GIPS	8.7	7.7	6.1
IT-FR	EA-new	0.8	1.2	1.2
EA-core	GIPS	9.3	9.2	7.5
EA-core	EA-new	1.9	2.8	3.4
GIPS	EA-new	0.2	0.3	0.3

Source: Elaboration on COMTRADE data, accessed through WITS

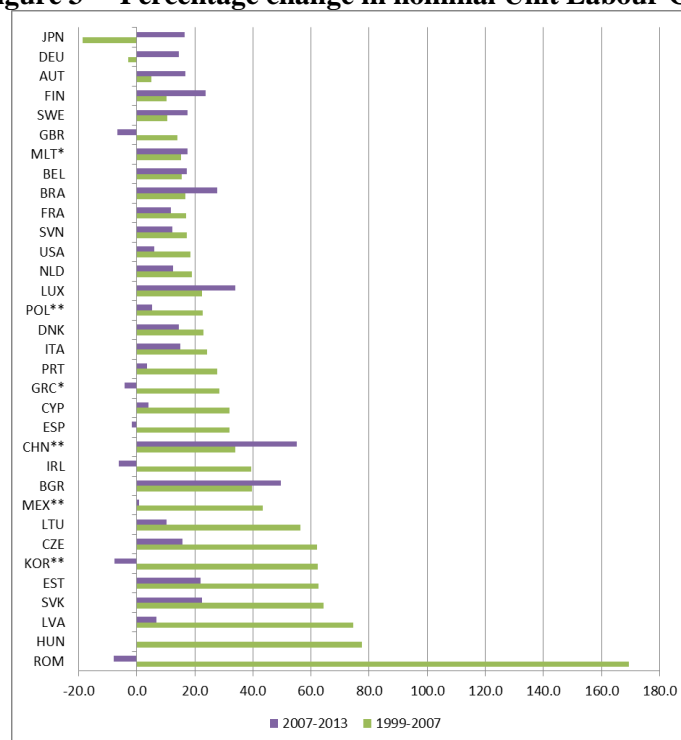
The pattern of both total and net trade are closely related to ULC dynamics. In Figure 3, we show average ULC growth before and after the global financial crisis, which reflects the well-known divergence between core and periphery, with the latter experiencing much higher levels of growth. Indeed, the rise of ULC was stronger in the emerging countries of the EU as well as countries outside the EU. Between 2007 and 2013, the situation partially reversed, with low or negative growth in most peripheral countries, coupled with moderate positive increases in the rest of the area.

**Table 2 – Intra-EMU trade balances (mn€) by country group**

Group A	Group B	1999	2007	2013
IT-FR	EA-core	-29.9	-108.4	-100.5
IT-FR	GIPS	14.8	25.4	-11.5
IT-FR	EA-new	2.3	4.0	3.0
EA-core	IT-FR	29.9	108.4	100.5
EA-core	GIPS	9.4	47.2	2.2
EA-core	EA-new	1.8	8.2	1.9
GIPS	IT-FR	-14.8	-25.4	11.5
GIPS	EA-core	-9.4	-47.2	-2.2
GIPS	EA-new	0.9	1.3	1.7
EA-new	IT-FR	-2.3	-4.0	-3.0
EA-new	EA-core	-1.8	-8.2	-1.9
EA-new	GIPS	-0.9	-1.3	-1.7

Source: Elaboration on COMTRADE data, accessed through WITS

**Figure 3 – Percentage change in nominal Unit Labour Cost**

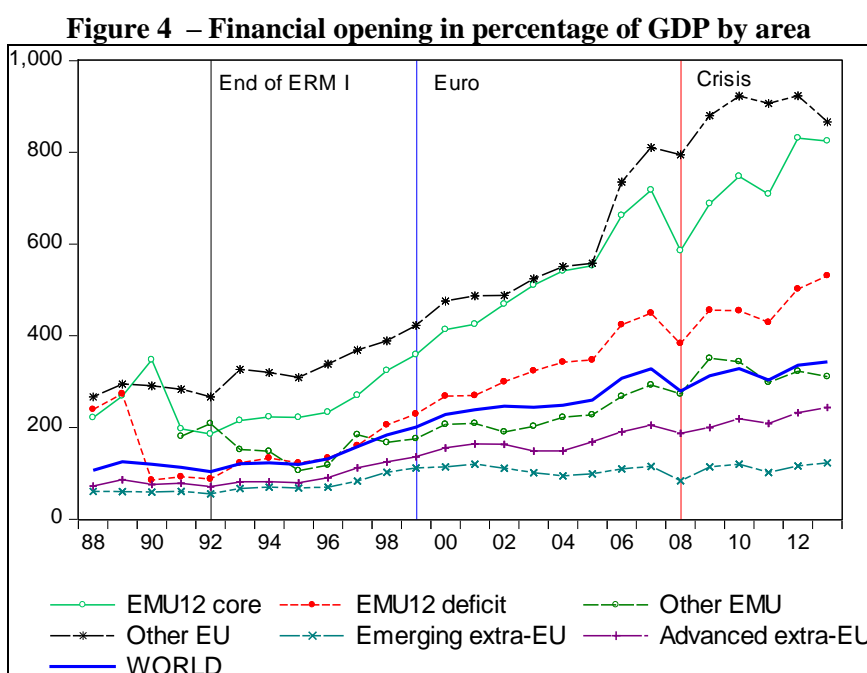


Source: Elaboration on Eurostat, OECD

As for financial opening, we show the most common measure in Figure 4, which is the sum of net foreign assets and liabilities (Lane and Milesi Ferretti 2007) for the main groups. At a global level, we observe an acceleration of growth in the stock of financial capital from the second half of the 1990s as a result of the increased financialization of the world economy. For European countries, this process took place at a faster pace, particularly for the new EMU member states, EMU peripheral countries, and the rest of the EU. In particular, there has been a reversion to the previous pattern at the end of the 1990s in the periphery. This evidence suggests that the process of financial integration in Europe added to the existing global trend, placing greater importance on financial

flows and perhaps generating additional effects on the macroeconomic structure of the member states, especially with respect to trade flows and more so for countries in the periphery of the single currency area.

In the years after 2007, the size of financial capital had a more differentiated path. The average increase slowed down substantially and turned negative in some cases because of the generalized credit crunch, the burst of pre-existing asset bubbles, and the recomposition of financial flows from FDI and portfolio investment to government bonds (Hobza and Zeugner 2014). Without delving into the composition of the flows, this aggregate appears not to be very informative on the post-crisis dynamics of its general long-run impact.



Source: Lane and Milesi Ferretti (2007), IMF-IFS. Financial opening=Net Foreign Assets+Net Foreign Liabilities

To summarize, we have seen a reduction in the share of intra-EMU trade, which appears to be strictly connected with changes in geographical patterns of trade that, since the introduction of the euro, resulted in the emergence of external imbalances. This dynamic is consistent with a change in the specialization pattern taking place up to the global financial crisis, with core countries—above all Germany—gaining at the expense of peripheral countries, which in many cases have been replaced by emerging countries in Central and Eastern Europe and, to a lesser extent, by those in the rest of the world. After the crisis, the further loss in intra-EMU trade is associated with a rebalancing of net positions, but this was obtained through import contraction and a recession in peripheral countries. This resulted in a further increase in the importance of core countries as a single trading block in the EMU and an increased marginalization of the other



countries. To this end, financial integration seems to have played a major role, especially for the EMU periphery, but only until the global financial crisis, whereas competitiveness and trade flows appear to be related in the period after the crisis as well. Nevertheless, the inversion of ULC dynamics after the crisis is taking place at a rather slow pace and seem to be connected mainly to the recession in the periphery. The implication is that imbalances might arise again, in parallel with ongoing recovery in terms of GDP growth (Esposito and Messori 2015).

## **4. Econometric analysis**

### *4.1 The econometric model and strategy*

In this section, we assess the importance of the different causes of trade imbalances in the EMU and relate them to intra-area trade share by running an econometric analysis on a sample of bilateral trade flows among a group of 38 countries. The sample includes the whole EU (excluding Croatia, Malta, and Cyprus) and a group of extra-EU countries comprised of seven advanced economies (Australia, Canada, Japan, New Zealand, Norway, Switzerland, and the United States), and six emerging countries including the BRICS (Brazil, China, India, and Korea), as well as Mexico and Russia. We focus on bilateral trade flows using a gravity type approach (Bergstrand 1985, Baltagi et al. 2003, Anderson and van Wincoop 2003, Anderson 2010), augmented by adding variables related to the two main causes of imbalances identified in section 2, namely financial integration and differences in competitiveness.

The standard theoretical formulation of the gravity model states that trade flows are positively related to the economic size of the two countries and negatively related to trade costs. The latter includes both standard bilateral costs as well as the multilateral resistance term (MRT, Anderson and van Wincoop 2003), which is the cost associated with the change in the relative propensity to import and export to all other countries. Empirically, bilateral trade costs are proxied by the exchange rate and spatial variables such as geographical distance, dummies for neighbouring countries, common language, and similar factors (Anderson 2010).

In terms of estimation procedures for panel data, typically Fixed Effects and Random Effects (FE and RE) models have been used in most studies. The MRT is estimated by adding reporter and partner-specific fixed effects, eventually interacted with time dummies, and by adding pair-specific effects. The latter are introduced in the FE model as deterministic dummies while these effects are modelled with a zero mean random variable for RE. The choice between the two estimators depend on the correlation between fixed effects and regressors. In the case of significant correlation, the FE

estimator is consistent while RE is not. On the flipside, when the correlation can be assumed to be zero, the RE should be preferred as it is both consistent and efficient.

In recent works, gravity models are estimated using a Poisson Pseudo Maximum Likelihood estimator (PPML) (Santos Silva and Tenreyro 2007 and 2011, Soren and Bruemmer 2012, Staub and Winkelmann 2012 ), which is becoming the workhorse for this kind of analyses. The PPML estimator avoids the log-linear transformation of the dependent variable which causes two different problems affecting the reliability of FE and RE estimates (Santos Silva and Tenreyro 2006). First, it log-linearizes the error term, a feature which is not desirable in trade data because expected values of the log-linearized errors will depend on the covariates of the regression, leading to inconsistent estimates. This is relevant particularly when there are endogeneity issues affecting the consistency of the estimates, as might be the case with GDP, and, most importantly, with the index of financial opening. Second, the log-linearization eliminates zero trade flows, therefore omitting some relevant information on the determinants of trade flows. The resulting basic empirical specification is the following:

$$EXP_{i,j,t} = \alpha + \beta_1 mass_{i,j,t} + \beta_2 rer_{i,j,t} + \beta_3 fo_{i,t} + \beta_4 fo_{j,t} + \Omega_{i,j,t} \quad (1)$$

with 
$$\Omega_{i,j,t} = \delta_i + \lambda_j + \theta_t + \gamma_1 mrt_{i,t} + \gamma_2 mrt_{j,t} + Geo_{i,t} + \varepsilon_{i,j,t} \quad (2)$$

where export at current prices from country  $i$  toward country  $j$  ( $EXP_{i,j,t}$ ) is regressed on the following variables: the economic size of the two countries ( $mass_{i,j,t}$ ) given by the log sum of their nominal GDPs; the bilateral real exchange rate ( $rer$ ), given by the nominal exchange rate multiplied by the ratio of exporter's to importer's ULC, is introduced as a measure of the relative competitiveness of the two trading countries. We augment this basic specification with a country-specific measure for financial opening ( $fo$ ), expressed as the sum of net financial assets and net financial liabilities (Lane and Milesi-Ferretti 2007, see section 2.2). Finally, in all specifications, we use alternatively, as dependent variables, total export flows excluding energy (TNE) and manufacturing export (MAN).

Equation (2) defines the specification for the estimation of trade costs. It includes a set of reporter, partner, and time-specific fixed effects ( $\delta_i$  and  $\lambda_j$  and  $\theta_t$ ), a vector of geographical characteristics ( $Geo$ ), including the log of distance, and a set of dummies indicating whether the country pairs belong to the EMU, and whether they have a common border, colonial linkages, or a common language. Finally, in order to control for country-specific, time-varying changes in the MRT, we add two measures of remoteness for the trading countries ( $mrt_i$  and  $mrt_j$ ), given by the GPD-weighted distance (Baier and Bergstrand 2009) of a country with all its trading partners.

The expected sign of the variables is not straightforward for all regressors: the economic mass undoubtedly has a positive effect on export and import flows, while the real exchange rate should exert a negative impact. With regard to financial integration, we might expect a positive effect on imports, since, in general, the allocation efficiency effect of the globalisation of financial flows should release the BoP constraint on imports. The effect on exports is not clear-cut, but we might expect, on average, a positive impact because financial capital facilitates the development of outsourcing relations (Timmer et al. 2014, Amador et al. 2015) between firms in different countries, particularly between the EMU and eastern members of the EU, contributing to the increase in total trade. Nevertheless, the effect might be null or even negative if financial flows are not used to improve productivity.

Equation (1) assumes that all elasticities are the same across countries. With this specification, differences within the EMU and between the EMU and third countries are only due to the different dynamics of financial opening and competitiveness. The increase in financial flows in the EMU are instead partly the result of the convergence of interest rates brought about by the elimination of exchange rate fluctuation. In addition, the single currency and the constraints of the Stability and Growth Pact (SGP) have certainly affected the cost competitiveness of member states. These two features imply that elasticities of trade flows to changes in the regressors might be different, and this difference can explain the evolution of trade imbalances between the core and the periphery. The related specification is as follows:

$$EXP_{i,j,t} = \alpha + \beta_1 mass_{i,j,t} + \sum_k d_k mass_{i,j,t} + \beta_2 rer_{i,j,t} + \sum_k d_k rer_{i,j,t} + \beta_3 fo_{i,t} + \sum_{k1} d_{k1} fo_{i,0t} + \beta_4 fo_{j,t} + \sum_{k2} d_{k2} fo_{j,t} + \Omega_{i,j,t} \quad (3)$$

where  $d_k$ ,  $d_{k1}$ , and  $d_{k2}$  are dummies with the following definition:  $k_1$ =Exporter EMUcore, exporter EMUdeficit;  $k_2$ = importer EMUcore, importer EMUperiphery;  $k=k_1$ UK $_2$ .

Finally, in order to assess whether financial integration and competitive divergences in the EMU are, at least in part, responsible for overall reduction of intra-EMU share in total trade, we test whether a structural change in the parameters of independent variables took place with the introduction of the single currency as in the following specification:

$$EXP_{i,j,t} = \alpha + \beta_1 mass_{i,j,t} + \gamma_1 EMU * mass_{i,j,t} + \beta_2 rer_{i,j,t} + \gamma_2 EMU rer_{i,j,t} + \beta_3 fo_{i,t} + \gamma_3 EMU fo_{i,t} + \beta_4 fo_{j,t} + \gamma_4 EMU fo_{j,t} + \Omega_{i,j,t} \quad (4)$$

Equation (4) tests whether there has been a regime shift in all parameters for EMU countries. The reference category includes both non-EMU countries and EMU countries before joining the single currency. While this is not a problem when estimating equation (4) for the period after 1998,

the structural break in 1999 is not considered for non-EMU countries when using data from 1992. In order to separate the EMU-specific break from the common break in 1999, we include a regime shift for non-EMU countries as well:

$$\begin{aligned}
 EXP_{i,j,t} = & \alpha + \beta_1 mass_{i,j,t} + \gamma_1 EMU * mass_{i,j,t} + \delta_1 XEMU * mass_{i,j,t} + \beta_2 rer_{i,j,t} + \gamma_2 EMUrer_{i,j,t} + \delta_2 XEMUrer_{i,j,t} + \\
 & + \beta_3 fo_{i,t} + \gamma_3 EMUfo_{i,t} + \delta_3 XEMUfo_{i,t} + \beta_4 fo_{j,t} + \gamma_4 EMUfo_{j,t} + \delta_4 XEMUfo_{j,t} + \Omega_{i,j,t}
 \end{aligned} \tag{5}$$

where the dummies  $\gamma$  capture the regime shift for EMU countries and the dummies  $\delta$  capture the regime shift for other countries. When using data after 1998, equation (5) collapses to equation (4), as the effect on non-EMU countries becomes the reference category.

All the specifications are estimated with PPML, FE, and RE estimators, but after showing the robustness of the results for equation (1), we report PPML results only because this estimator should be the most reliable. Further, in order to minimize endogeneity problems, each specification is also estimated by introducing all regressors lagged by one period.

In section 4.2, we test for structural changes in equation (1) that occurred with the introduction of the euro and with the global and European crises, and we show estimates for the different sub-periods. The estimation results for equations (3) are presented in section 4.3, while in section 4.5 we report estimates for equations (4) and (5).

#### ***4.2 Estimates with homogeneous coefficients and structural breaks***

The introduction of the euro has been a major structural break, both for members of the area and for other countries for which the EMU represents an external shock that might have changed the elasticities of trade flows to GDP, competitiveness, and financial flows. A similar argument applies to the period after the global financial crisis. With the emergence of the European sovereign debt crisis and the persistent recession fostered by the application of fiscal consolidation policies and structural reforms, the response of trade flows to demand and supply factors, as well as to the availability of financial capital, might have changed.

The presence of significant structural changes implies that estimates over a long time-span might be biased if they do not properly account for these changes. For the purpose of this paper, particularly in order to estimate the group-specific coefficients in the following sections, it is better to estimate a separate specification for each sub-period, provided that long-run tendencies do not affect the results.

Table 3 reports the results of estimates with homogenous elasticities and structural breaks in all parameters corresponding to the introduction of the euro (1999) and the global financial crisis (2008). As a robustness check, we report, together with PPML estimates, the results from RE and FE estimators. Most of the specifications indicate that the euro break is significant for all variables, although it does not change the sign of the coefficients. The impact of mass is positive and increases after 1999, while the impact is positive on average but lower after 1999 for both importer's and exporter's financial opening. As for the *rer*, there we observe a reduction of the average impact, stronger when using RE and FE estimators, which is expected due to the elimination of nominal exchange rate variations within the EMU. The break corresponding with the global financial crisis is less significant and only marginally affects the *mass* and *rer*. PPML estimates also report little impact on the two indicators of financial opening, while both RE and FE suggest that their impact might have dropped to zero. The latter result is somewhat expected since, after the crisis, there have been a recomposition from private to public sources, together with a global reduction in financial flows.

Table 4 contains the estimates of equation (1) for the different subperiods. In order to separate the impact of the global financial crisis from that of the European debt crisis, we include a specification for only the 2010-2013 period. The results are consistent with those shown in Table 3. Mass is more significant between 1999 and 2007, with its impact falling after 2008. The *rer* is mainly significant during the 1998-2007 period, while the impact of exporter's financial opening falls over time, becoming insignificant after 2009 in PPML estimates and turning negative in RE and FE estimates. The impact of the importer's *fo* is more stable, but it falls by approximately 25% from 2010 in PPML estimates while turning to zero in the other cases.

**Table 3 - Estimation of the basic specification with double structural breaks, 1992-2013**

	PPML TNE L0	PPML TNE L1	PPML MAN L0	PPML MAN L1	RE TNE L0	RE TNE L1	RE MAN L0	RE MAN L1	FE TNE L0	FE TNE L1	FE MAN L0	FE MAN L1
mass <sub>i,j,t</sub>	0.361*** [0.078]	0.395*** [0.066]	0.374*** [0.081]	0.390*** [0.066]	0.386*** [0.031]	0.583*** [0.030]	0.461*** [0.033]	0.650*** [0.031]	0.386*** [0.031]	0.584*** [0.030]	0.461*** [0.033]	0.651*** [0.031]
mass <sub>i,j,t</sub> *(>1998)	0.095*** [0.023]	0.040** [0.015]	0.098*** [0.023]	0.048** [0.015]	0.107*** [0.013]	0.017** [0.007]	0.101*** [0.014]	0.010 [0.007]	0.107*** [0.013]	0.017** [0.007]	0.102*** [0.014]	0.010 [0.007]
mass <sub>i,j,t</sub> *(>2007)	-0.043*** [0.012]	-0.022** [0.008]	-0.040*** [0.012]	-0.019** [0.008]	0.071*** [0.010]	0.000 [0.005]	0.074*** [0.010]	0.002 [0.006]	0.071*** [0.010]	0.000 [0.005]	0.074*** [0.010]	0.002 [0.006]
rer <sub>i,j,t</sub>	-0.133** [0.052]	-0.100** [0.048]	-0.145** [0.057]	-0.126** [0.051]	-0.079*** [0.022]	-0.074*** [0.020]	-0.082*** [0.024]	-0.082*** [0.021]	-0.079*** [0.022]	-0.074*** [0.020]	-0.082*** [0.024]	-0.082*** [0.021]
rer <sub>i,j,t</sub> *(>1998)	0.015 [0.010]	0.017* [0.009]	0.014 [0.010]	0.016* [0.009]	0.015** [0.005]	0.013** [0.004]	0.020*** [0.005]	0.019*** [0.005]	0.015** [0.005]	0.013** [0.004]	0.020*** [0.005]	0.018*** [0.005]
rer <sub>i,j,t</sub> *(>2007)	-0.010 [0.007]	-0.013* [0.008]	-0.005 [0.007]	-0.008 [0.008]	-0.022*** [0.005]	-0.021*** [0.005]	-0.022*** [0.005]	-0.020*** [0.005]	-0.022*** [0.005]	-0.021*** [0.005]	-0.022*** [0.005]	-0.020*** [0.005]
fo <sub>i,t</sub>	0.490*** [0.094]	0.426*** [0.091]	0.521*** [0.097]	0.467*** [0.092]	0.395*** [0.035]	0.189*** [0.036]	0.369*** [0.037]	0.145*** [0.038]	0.395*** [0.035]	0.188*** [0.036]	0.368*** [0.037]	0.143*** [0.038]
fo <sub>i,t</sub> *(>1998)	-0.175*** [0.023]	-0.149*** [0.021]	-0.186*** [0.024]	-0.166*** [0.022]	-0.152*** [0.013]	-0.076*** [0.009]	-0.155*** [0.014]	-0.075*** [0.010]	-0.152*** [0.013]	-0.076*** [0.009]	-0.156*** [0.014]	-0.075*** [0.010]
fo <sub>i,t</sub> *(>2007)	0.007 [0.015]	-0.030** [0.013]	-0.001 [0.016]	-0.040** [0.013]	-0.117*** [0.010]	-0.079*** [0.007]	-0.122*** [0.010]	-0.088*** [0.008]	-0.116*** [0.010]	-0.079*** [0.007]	-0.122*** [0.010]	-0.088*** [0.008]
fo <sub>j,t</sub>	0.401*** [0.076]	0.362*** [0.070]	0.336*** [0.084]	0.293*** [0.077]	0.291*** [0.036]	0.107** [0.035]	0.267*** [0.038]	0.072** [0.036]	0.290*** [0.036]	0.106** [0.035]	0.267*** [0.038]	0.071** [0.036]
fo <sub>j,t</sub> *(>1998)	-0.114*** [0.023]	-0.079*** [0.021]	-0.118*** [0.023]	-0.085*** [0.022]	-0.112*** [0.014]	-0.021** [0.010]	-0.118*** [0.015]	-0.026** [0.010]	-0.113*** [0.014]	-0.021** [0.010]	-0.118*** [0.015]	-0.026** [0.010]
fo <sub>j,t</sub> *(>2007)	0.006 [0.016]	-0.014 [0.018]	0.002 [0.016]	-0.018 [0.018]	-0.104*** [0.011]	-0.026** [0.009]	-0.109*** [0.012]	-0.033*** [0.009]	-0.103*** [0.011]	-0.026** [0.009]	-0.109*** [0.012]	-0.033*** [0.009]
R <sup>2</sup>					0.751	0.744	0.739	0.73	0.751	0.744	0.739	0.73
N	26280	25524	26280	25524	26145	25482	26145	25482	26145	25482	26145	25482

Standard errors in brackets. \*significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%. TNE=Total exports, excluding energy; MAN=manufacturing export. L0=contemporaneous regressors; L1=lagged regressors.

Summing up, the results indicate that the preference for short sample estimates is validated by the data due to the change in all coefficients without suffering from short sample problems in terms of identification of long-run dynamics. In addition, the results indicate that, after the global financial crisis, competitiveness and export financial opening do not affect the size of trade flows, which are instead mainly influenced by domestic and foreign demand dynamics and availability of the financial capital necessary for purchasing imported goods. This is the first indication that consolidation policies did not affect structural competitiveness and that rebalancing is mainly due to demand dynamics. Finally, PPML estimates appear to be the most reliable because of the higher stability of the estimates over time and because of the counterintuitive results of the post-crisis impact of financial opening.

**Table 4 – Estimates of the basic specification by sub-periods**

	Poisson Pseudo Maximum Likelihood Estimator							
	1992-1998		1999-2008		2008-2013		2010-2013	
	TOT	NE	TOT	NE	TOT	NE	TOT	NE
<i>mass<sub>i,t</sub></i>	-0.091	-0.1	0.412***	0.449***	0.219***	0.213***	0.159**	0.147**
	[0.089]	[0.097]	[0.089]	[0.095]	[0.048]	[0.044]	[0.060]	[0.064]
<i>rer<sub>i,t</sub></i>	0.108	0.094	-0.120*	-0.126*	0.065	0.111	0.008	0.06
	[0.188]	[0.209]	[0.064]	[0.074]	[0.097]	[0.097]	[0.151]	[0.157]
<i>fo<sub>i,t</sub></i>	0.514***	0.555***	0.416***	0.446***	0.123**	0.103**	-0.022	-0.027
	[0.137]	[0.150]	[0.116]	[0.116]	[0.044]	[0.045]	[0.072]	[0.073]
<i>fo<sub>j,t</sub></i>	0.439***	0.387**	0.390***	0.359**	0.402***	0.348***	0.311***	0.295**
	[0.112]	[0.126]	[0.104]	[0.116]	[0.053]	[0.055]	[0.086]	[0.094]
N	4965	4965	12413	12413	8146	8146	5334	5334
Random Effects Estimator								
	1992-1998		1999-2008		2008-2013		2010-2013	
	TOT	NE	TOT	NE	TOT	NE	TOT	NE
<i>mass<sub>i,t</sub></i>	0.149***	0.174**	0.508***	0.570***	0.244***	0.264***	0.355***	0.368***
	[0.045]	[0.053]	[0.038]	[0.040]	[0.042]	[0.044]	[0.055]	[0.054]
<i>rer<sub>i,t</sub></i>	0.013	0.014	-0.098**	-0.099**	0.110*	0.147**	-0.074	-0.022
	[0.019]	[0.019]	[0.032]	[0.033]	[0.060]	[0.065]	[0.075]	[0.080]
<i>fo<sub>i,t</sub></i>	0.151**	0.190**	0.226***	0.196***	-0.158***	-0.216***	-0.324***	-0.345***
	[0.073]	[0.079]	[0.043]	[0.047]	[0.045]	[0.050]	[0.056]	[0.063]
<i>fo<sub>j,t</sub></i>	0.230***	0.202**	0.274***	0.289***	0.294***	0.290***	0.067	0.1
	[0.058]	[0.068]	[0.042]	[0.044]	[0.046]	[0.048]	[0.066]	[0.068]
N	0.304	0.306	0.686	0.657	0.292	0.253	0.216	0.184
R <sup>2</sup>	4940	4940	12396	12396	8146	8146	5334	5334
Fixed Effects Estimator								
	1992-1998		1999-2008		2008-2013		2010-2013	
	TOT	NE	TOT	NE	TOT	NE	TOT	NE
<i>mass<sub>i,t</sub></i>	0.158***	0.187***	0.510***	0.572***	0.244***	0.263***	0.357***	0.364***
	[0.044]	[0.053]	[0.037]	[0.040]	[0.041]	[0.044]	[0.055]	[0.054]
<i>rer<sub>i,t</sub></i>	0.012	0.013	-0.098**	-0.099**	0.108*	0.146**	-0.077	-0.021
	[0.019]	[0.019]	[0.032]	[0.033]	[0.060]	[0.065]	[0.074]	[0.079]
<i>fo<sub>i,t</sub></i>	0.140*	0.175**	0.224***	0.194***	-0.158***	-0.216***	-0.325***	-0.342***
	[0.073]	[0.079]	[0.043]	[0.047]	[0.045]	[0.050]	[0.056]	[0.063]
<i>fo<sub>j,t</sub></i>	0.228***	0.198**	0.271***	0.286***	0.294***	0.289***	0.064	0.103
	[0.058]	[0.068]	[0.042]	[0.044]	[0.046]	[0.047]	[0.066]	[0.068]
N	0.304	0.306	0.686	0.657	0.292	0.253	0.217	0.184
R <sup>2</sup>	4940	4940	12396	12396	8146	8146	5334	5334

Standard errors in brackets. \*significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%. TNE=Total exports, excluding energy; MAN=manufacturing export. L0=contemporaneous regressors; L1=lagged regressors.

### ***4.3 Heterogenous elasticities 1: total trade imbalances***

Estimates of equation (3) are reported in Tables 5 and 6. The specifications differ in the way peripheral countries are defined. Starting with a narrow definition, including only the GIPS, we test different aggregations by adding Slovenia, Italy, and France. As we argued in section 3, the latter shows features of a peripheral country in terms of trade and competitiveness losses, but it must be considered a core country in terms of financial position since it provided financial capital to the rest of the EMU and, similar to Germany, acts as an intermediary for financial flows from outside the EMU (European Commission 2012, Hobza and Zeugner 2014). In all specifications except for the last one (columns 9-12 in Table 6), we include France in the group of core countries and then test whether its shift to the group of peripheral countries substantially alters the results.

Starting with the core-GIPS dichotomy (columns 1-4 in Table 5), we found no major differences with respect to the impact of economic mass, which is only slightly lower than the baseline impact for the EMU core. The real exchange rate, although negative, seem to be insignificant for extra-EMU countries over the 1998-2007 period, in line with previous estimates. Its impact increases and turns significant for core countries exports and GIPS imports. The positive impact on core countries imports when added to the baseline coefficient is not statistically different from zero. As for financial opening, while the average positive effect is confirmed for both imports and exports, we find a higher impact on the exports of core countries and a lower impact on the exports of the periphery, though the effect is still significantly positive in the latter. On the import side, core countries show a higher than average elasticity with respect to financial flows while the impact on the import of the periphery is not different from the average.

The results are robust to the inclusion of both Slovenia and Italy in the group of peripheral countries, while the core-periphery dichotomy seems weakened when France is included in the periphery, in terms of financial opening in particular. This confirms the role of France as a surplus country in terms of its net international investment position (Holba and Zeugner 2014) in spite of its deteriorating trade performance.

In summary, the results indicate that trade elasticities to economic mass, competitiveness, and financial opening are substantially different in the EMU and contributed to the widening of trade imbalances. The performance of core countries is mainly explained by the higher impact of competitiveness on exports, while the impact of financial opening points to similar increases in both imports and exports. In the periphery, the loss of competitiveness stimulated import growth, and



financial integration seems to have contributed to this process by raising imports more than exports, as shown by the difference between the importer and exporter coefficients.

**Table 5 – PPML estimates of the EMU effects for core and peripheral countries**

	GIPS				GIPS+Slovenia			
	1992-2008		1999-2008		1992-2008		1999-2008	
	TOT NE	MAN	TOT NE	MAN	TOT NE	MAN	TOT NE	MAN
$mass_{i,t}$	0.506*** [0.088]	0.546*** [0.091]	0.557*** [0.083]	0.607*** [0.089]	0.497*** [0.087]	0.534*** [0.091]	0.555*** [0.083]	0.605*** [0.089]
$mass_{i,t},EAC_i$	-0.086*** [0.020]	-0.081*** [0.020]	-0.068*** [0.020]	-0.064** [0.020]	-0.086*** [0.020]	-0.081*** [0.020]	-0.069*** [0.020]	-0.064** [0.020]
$mass_{i,t},EAD_i$	-0.084 [0.053]	-0.084 [0.054]	-0.073 [0.054]	-0.074 [0.055]	-0.087* [0.051]	-0.088* [0.051]	-0.074 [0.052]	-0.076 [0.052]
$mass_{i,t},EAC_i$	-0.064** [0.024]	-0.045* [0.026]	-0.058** [0.024]	-0.037 [0.027]	-0.064** [0.024]	-0.045* [0.026]	-0.058** [0.024]	-0.037 [0.027]
$mass_{i,t},EAD_i$	-0.049 [0.041]	-0.047 [0.046]	-0.035 [0.039]	-0.03 [0.045]	-0.051 [0.039]	-0.048 [0.045]	-0.038 [0.038]	-0.032 [0.043]
$reer_{i,t}$	-0.021 [0.057]	-0.021 [0.062]	-0.114* [0.066]	-0.107 [0.076]	-0.022 [0.057]	-0.024 [0.063]	-0.114* [0.066]	-0.107 [0.076]
$reer_{i,t},EAC_i$	-0.054** [0.025]	-0.095*** [0.027]	-0.093*** [0.024]	-0.128*** [0.026]	-0.054** [0.025]	-0.095*** [0.027]	-0.093*** [0.024]	-0.128*** [0.026]
$reer_{i,t},EAD_i$	0.126** [0.051]	0.094 [0.061]	0.090* [0.053]	0.062 [0.063]	0.122** [0.049]	0.09 [0.057]	0.086* [0.050]	0.057 [0.060]
$reer_{i,t},EAC_i$	0.054** [0.022]	0.062** [0.021]	0.089*** [0.023]	0.093*** [0.023]	0.054** [0.022]	0.061** [0.021]	0.089*** [0.023]	0.093*** [0.023]
$reer_{i,t},EAD_i$	-0.087** [0.033]	-0.084** [0.032]	-0.061* [0.035]	-0.061* [0.034]	-0.085** [0.032]	-0.083** [0.031]	-0.060* [0.034]	-0.061* [0.033]
$fo_{i,t}$	0.376*** [0.107]	0.396*** [0.107]	0.403*** [0.113]	0.425*** [0.116]	0.394*** [0.109]	0.417*** [0.109]	0.404*** [0.114]	0.426*** [0.117]
$fo_{i,t},EAC_i$	0.017 [0.042]	0.019 [0.043]	0.208*** [0.059]	0.209*** [0.062]	0.008 [0.042]	0.007 [0.044]	0.208*** [0.059]	0.208*** [0.062]
$fo_{i,t},EAD_i$	-0.177** [0.065]	-0.180** [0.069]	-0.180** [0.079]	-0.191** [0.087]	-0.189** [0.063]	-0.196** [0.066]	-0.172** [0.078]	-0.182** [0.085]
$fo_{i,t}$	0.381*** [0.107]	0.323** [0.118]	0.356*** [0.100]	0.317** [0.113]	0.389*** [0.107]	0.333** [0.118]	0.358*** [0.100]	0.318** [0.113]
$fo_{i,t},EAC_i$	-0.056 [0.049]	-0.047 [0.052]	0.197** [0.063]	0.200** [0.067]	-0.06 [0.049]	-0.052 [0.052]	0.196** [0.064]	0.199** [0.068]
$fo_{i,t},EAD_i$	-0.137** [0.057]	-0.120* [0.062]	-0.102 [0.075]	-0.097 [0.081]	-0.132** [0.056]	-0.117* [0.061]	-0.098 [0.073]	-0.092 [0.079]
N	17378	17378	12413	12413	17378	17378	12413	12413

Standard errors in brackets. \*significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%. GIPS=Greece, Ireland, Portugal, Spain. Standard errors in brackets. TNE=Total exports, excluding energy; MAN=manufacturing export. All specifications use lagged regressors.

**Table 6 – PPML estimates of EMU effects for the deficit countries: alternative definitions**

	GIPS+Italy				GIPS+Italy+Slovenia				GIPS+Italy+France			
	1992-2008		1999-2008		1992-2008		1999-2008		1992-2008		1999-2008	
	TOT NE	MAN	TOT NE	MAN	TOT NE	MAN	TOT NE	MAN	TOT NE	MAN	TOT NE	MAN
$mass_{i,t}$	0.506*** [0.088]	0.546*** [0.091]	0.557*** [0.083]	0.607*** [0.089]	0.496*** [0.087]	0.533*** [0.090]	0.580*** [0.083]	0.631*** [0.089]	0.507*** [0.088]	0.543*** [0.090]	0.579*** [0.082]	0.629*** [0.088]
$mass_{i,t}EAC_i$	-0.086*** [0.020]	-0.081*** [0.020]	-0.068*** [0.020]	-0.064** [0.020]	-0.095*** [0.021]	-0.090*** [0.020]	-0.076*** [0.020]	-0.072*** [0.020]	-0.107*** [0.022]	-0.103*** [0.022]	-0.086*** [0.023]	-0.083*** [0.023]
$mass_{i,t}EAD_i$	-0.084 [0.053]	-0.084 [0.054]	-0.073 [0.054]	-0.074 [0.055]	-0.083** [0.032]	-0.087** [0.032]	-0.072** [0.031]	-0.076** [0.031]	-0.077** [0.024]	-0.078** [0.024]	-0.067** [0.024]	-0.069** [0.024]
$mass_{i,t}EAC_i$	-0.064** [0.024]	-0.045* [0.026]	-0.058** [0.024]	-0.037 [0.027]	-0.076** [0.024]	-0.057** [0.026]	-0.069** [0.024]	-0.048* [0.026]	-0.087** [0.027]	-0.072** [0.029]	-0.078** [0.028]	-0.061** [0.031]
$mass_{i,t}EAD_i$	-0.049 [0.041]	-0.047 [0.046]	-0.035 [0.039]	-0.03 [0.045]	-0.086** [0.033]	-0.083** [0.036]	-0.072** [0.029]	-0.068** [0.032]	-0.072** [0.026]	-0.059** [0.029]	-0.062** [0.024]	-0.051* [0.026]
$reer_{i,t}$	-0.021 [0.057]	-0.021 [0.062]	-0.114* [0.066]	-0.107 [0.076]	-0.019 [0.055]	-0.018 [0.060]	-0.110 [0.067]	-0.100 [0.078]	-0.015 [0.054]	-0.015 [0.059]	-0.103 [0.068]	-0.092 [0.078]
$reer_{i,t}EAC_i$	-0.054** [0.025]	-0.095*** [0.027]	-0.093*** [0.024]	-0.128*** [0.026]	-0.054** [0.027]	-0.100*** [0.029]	-0.093*** [0.027]	-0.133*** [0.029]	-0.058** [0.028]	-0.102*** [0.030]	-0.094*** [0.028]	-0.134*** [0.030]
$reer_{i,t}EAD_i$	0.126** [0.051]	0.094 [0.061]	0.090* [0.053]	0.062 [0.063]	0.053 [0.034]	0.011 [0.038]	0.025 [0.034]	-0.012 [0.038]	0.023 [0.030]	-0.02 [0.033]	-0.006 [0.031]	-0.044 [0.033]
$reer_{i,t}EAC_i$	0.054** [0.022]	0.062** [0.021]	0.089*** [0.023]	0.093*** [0.023]	0.044** [0.021]	0.052** [0.021]	0.079*** [0.023]	0.083*** [0.023]	0.065** [0.022]	0.075*** [0.021]	0.098*** [0.025]	0.104*** [0.025]
$reer_{i,t}EAD_i$	-0.087** [0.033]	-0.084** [0.032]	-0.061* [0.035]	-0.061* [0.034]	-0.103*** [0.026]	-0.096*** [0.025]	-0.070** [0.029]	-0.066** [0.028]	-0.080** [0.024]	-0.073** [0.023]	-0.049* [0.026]	-0.045* [0.026]
$fo_{i,t}$	0.376*** [0.107]	0.396*** [0.107]	0.403*** [0.113]	0.425*** [0.116]	0.389*** [0.106]	0.412*** [0.105]	0.353** [0.110]	0.369** [0.113]	0.376*** [0.106]	0.400*** [0.105]	0.348** [0.109]	0.365** [0.112]
$fo_{i,t}EAC_i$	0.017 [0.042]	0.019 [0.043]	0.208*** [0.059]	0.209*** [0.062]	0.008 [0.046]	0.001 [0.048]	0.224*** [0.063]	0.226*** [0.067]	0.048 [0.047]	0.040 [0.048]	0.306*** [0.062]	0.308*** [0.066]
$fo_{i,t}EAD_i$	-0.177** [0.065]	-0.180** [0.069]	-0.180** [0.079]	-0.191** [0.087]	-0.139** [0.051]	-0.154** [0.052]	-0.081 [0.067]	-0.08 [0.074]	-0.126** [0.045]	-0.136** [0.046]	-0.063 [0.060]	-0.063 [0.066]
$fo_{i,t}$	0.381*** [0.107]	0.323** [0.118]	0.356*** [0.100]	0.317** [0.113]	0.380*** [0.105]	0.319** [0.116]	0.313** [0.097]	0.272** [0.110]	0.374*** [0.105]	0.315** [0.116]	0.304** [0.096]	0.262** [0.108]
$fo_{i,t}EAC_i$	-0.056 [0.049]	-0.047 [0.052]	0.197** [0.063]	0.200** [0.067]	-0.043 [0.053]	-0.033 [0.056]	0.226*** [0.066]	0.230** [0.070]	-0.038 [0.055]	-0.029 [0.059]	0.254*** [0.069]	0.254*** [0.075]
$fo_{i,t}EAD_i$	-0.137** [0.057]	-0.120* [0.062]	-0.102 [0.075]	-0.097 [0.081]	-0.052 [0.048]	-0.023 [0.052]	0.015 [0.070]	0.022 [0.075]	-0.05 [0.046]	-0.028 [0.048]	0.054 [0.061]	0.062 [0.064]
$dist_{i,j}$	-0.815*** [0.032]	-0.848*** [0.032]	-0.834*** [0.030]	-0.868*** [0.031]	-0.802*** [0.032]	-0.838*** [0.034]	-0.826*** [0.031]	-0.862*** [0.032]	-0.801*** [0.032]	-0.836*** [0.033]	-0.825*** [0.031]	-0.861*** [0.032]
$EMU$	0.131** [0.064]	0.103 [0.067]	0.317*** [0.087]	0.266** [0.090]	0.109 [0.069]	0.088 [0.070]	0.289** [0.091]	0.249** [0.094]	0.112 [0.069]	0.091 [0.071]	0.282** [0.094]	0.243** [0.097]
N	17378	17378	12413	12413	17378	17378	12413	12413	17378	17378	12413	12413

Standard errors in brackets. \*significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%. GIPS=Greece, Ireland, Portugal, Spain. TNE=Total exports, excluding energy; MAN=manufacturing export. All specifications use lagged regressors.

#### 4.4 Heterogenous elasticities 2: intra-EMU imbalances and trade shares

The analysis in the previous section provided useful evidence on the determinants of total (intra and extra-EMU) trade imbalances on the evolution of intra-EMU trade share. The estimation of the euro effect as specified in equations (4) and (5) provides some clarity on this issue. The results (Tables 7 and 8) confirm, on average, the outcomes of Table 3. The creation of the monetary union brought about a regime shift for its member countries. The shift is significant only for the two financial opening indicators whose coefficients is substantially reduced when trade involves two EMU countries. This means that financial opening had a lower than average effect on the euro area, implying a reduction of intra-EMU share in total trade. This dynamic continued after the global financial crisis (columns 5-8) when the effect of financial opening is, in general, insignificant, but turns negative for intra-EMU trade.

**Table 7 – PPML estimates of EMU effects on trade shares.**

	1992-2008	1992-2008	1999-2008	1999-2008	2008-2013	2008-2013	2010-2013	2010-2013
$mass_{i,t}$	0.533*** [0.085]	0.491*** [0.094]	0.412*** [0.089]	0.287** [0.098]	0.219*** [0.048]	0.203*** [0.048]	0.159** [0.061]	0.107* [0.064]
$EMU*mass_{i,t}$		0.051 [0.052]		0.073 [0.057]		0.125* [0.065]		0.091 [0.068]
$rer_{i,t}$	-0.029 [0.058]	-0.028 [0.060]	-0.120* [0.064]	-0.118* [0.068]	0.065 [0.097]	0.056 [0.098]	0.008 [0.151]	-0.008 [0.154]
$EMU*rer_{i,t}$		0.050 [0.190]		-0.022 [0.198]		0.196 [0.221]		0.163 [0.239]
$fo_{i,t}$	0.317** [0.100]	0.338** [0.104]	0.418*** [0.116]	0.511*** [0.120]	0.124** [0.044]	0.133** [0.044]	-0.022 [0.072]	0.010 [0.074]
$EMU*fo_{i,t}$		-0.131** [0.055]		-0.178** [0.063]		-0.123* [0.070]		-0.205** [0.075]
$fo_{i,t}$	0.303** [0.099]	0.322** [0.103]	0.392*** [0.104]	0.482*** [0.107]	0.403*** [0.053]	0.409*** [0.053]	0.310*** [0.086]	0.330*** [0.088]
$EMU*fo_{i,t}$		-0.136** [0.049]		-0.185*** [0.056]		-0.093 [0.065]		-0.162** [0.070]
N	17378	17378	12413	12413	8146	8146	5334	5334

Standard errors in brackets. \*significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%. The dependent variable is total exports, excluding energy.

As indicated in Table 8, the structural break after 1999 is significant for the two financial opening indicators, both for EMU and non-EMU countries. The effect is stronger for EMU countries, confirming the significance of euro membership with respect to the relation between financial integration and trade. Nevertheless, although statistically significant, the difference for non-EMU countries is substantially reduced, ranging between -0.07 and -0.13. There seems to also be some differences in terms of mass and real exchange rate, but the net effect (the sum of the average and group-specific coefficients) does not point to significant differences between the two groups.

**Table 8 – PPML estimates of EMU effects on trade shares, specification (5)**

	1992-2008	1992-2008	1992-2013	1992-2013
$mass_{i,t}$	0.533*** [0.085]	0.388*** [0.081]	0.477*** [0.065]	0.407*** [0.069]
$XEMU*mass_{i,t}$		0.046** [0.014]		0.029* [0.015]
$EMU*mass_{i,t}$		0.100* [0.051]		0.055 [0.052]
$rer_{i,t}$	-0.029 [0.058]	-0.095** [0.047]	-0.048 [0.052]	-0.105** [0.048]
$XEMU*rer_{i,t}$		0.019** [0.009]		0.010 [0.011]
$EMU*rer_{i,t}$		0.066 [0.189]		0.115 [0.167]
$fo_{i,t}$	0.317** [0.100]	0.455*** [0.101]	0.301** [0.097]	0.423*** [0.093]
$XEMU*fo_{i,t}$		-0.142*** [0.019]		-0.160*** [0.023]
$EMU*fo_{i,t}$		-0.248*** [0.055]		-0.231*** [0.052]
$fo_{i,t}$	0.303** [0.099]	0.345*** [0.089]	0.316*** [0.077]	0.359*** [0.075]
$XEMU*fo_{i,t}$		-0.073*** [0.019]		-0.080*** [0.024]
$EMU*fo_{i,t}$		-0.209*** [0.049]		-0.148** [0.049]
N	17378	17378	25524	25524

Standard errors in brackets. \*significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%. The dependent variable is total exports, excluding energy.

#### 4.5 A deeper look at post-crisis rebalancing

In section 4.2, we found evidence suggesting that rebalancing after the global financial crisis was mainly driven by the evolution of domestic and external demand components, rather than a rebalancing in competitiveness, as shown by the evolution of the ULC. Estimates for the latest period are, in any event, not so reliable due to multiple shocks on world and European economies since 2008. In particular, we aim to eliminate the effect of the global financial crisis in order to focus only on the European sovereign debt crisis and the policy response of European institutions. This is done by limiting estimates in equation (3) to the post-crisis period. Since the evolution of financial opening is less interesting for the rebalancing analysis, we did not include these variables in the estimates.

The results (Table 9) indicate that the effect of economic mass is significant for the whole sample but slightly lower for the EMU periphery. On the other hand, the real exchange rate is

significant for the exports of core countries and for the imports of the periphery. These results suggest that, from the point of view of peripheral countries, rebalancing in competitiveness only had the effect of reducing imports, while core countries still relate their export performance to cost competitiveness. These results suggest that competitiveness changes do not explain the improvement in export performance of the periphery, especially when import reduction caused by deteriorating domestic demand is added for both prices and quantities.

**Table 9 – PPML estimates of the EMU effects for core and peripheral countries, 2008-2013**

	GIPS+Slovenia				GIPS+Italy+Slovenia			
	2008-2013		2010-2013		2008-2013		2010-2013	
	TNE	MAN	TNE	MAN	TNE	MAN	TNE	MAN
$mass_{i,i,t}$	0.410*** [0.043]	0.367*** [0.034]	0.221*** [0.060]	0.195** [0.061]	0.414*** [0.042]	0.373*** [0.034]	0.224*** [0.054]	0.202*** [0.056]
$mass_{i,i,t}EAC_i$	-0.037* [0.020]	-0.019 [0.021]	-0.034* [0.021]	-0.013 [0.022]	-0.041** [0.020]	-0.02 [0.021]	-0.038* [0.021]	-0.014 [0.022]
$mass_{i,i,t}EAD_i$	-0.058** [0.019]	-0.039** [0.020]	-0.062** [0.020]	-0.039* [0.021]	-0.061* [0.032]	-0.052* [0.031]	-0.063* [0.032]	-0.051 [0.031]
$mass_{i,i,t}EAC_j$	-0.042 [0.027]	-0.028 [0.027]	-0.041 [0.028]	-0.029 [0.027]	-0.050* [0.027]	-0.037 [0.026]	-0.050* [0.029]	-0.038 [0.027]
$mass_{i,i,t}EAD_j$	-0.059* [0.034]	-0.064** [0.032]	-0.064* [0.035]	-0.070** [0.032]	-0.072** [0.030]	-0.075** [0.027]	-0.073** [0.031]	-0.076** [0.028]
$reer_{i,i,t}$	0.004 [0.095]	0.071 [0.090]	-0.08 [0.147]	-0.007 [0.149]	0.012 [0.095]	0.082 [0.089]	-0.069 [0.145]	0.01 [0.146]
$reer_{i,i,t}EAC_i$	-0.103*** [0.023]	-0.144*** [0.023]	-0.104*** [0.024]	-0.147*** [0.024]	-0.104*** [0.025]	-0.152*** [0.025]	-0.105*** [0.026]	-0.155*** [0.026]
$reer_{i,i,t}EAD_i$	0.100** [0.040]	0.07 [0.044]	0.102** [0.040]	0.07 [0.044]	0.029 [0.035]	-0.013 [0.036]	0.031 [0.036]	-0.015 [0.036]
$reer_{i,i,t}EAC_j$	0.078** [0.024]	0.065** [0.023]	0.077** [0.025]	0.061** [0.024]	0.066** [0.026]	0.051** [0.024]	0.066** [0.027]	0.046* [0.025]
$reer_{i,i,t}EAD_j$	-0.097** [0.035]	-0.107** [0.033]	-0.096** [0.036]	-0.110*** [0.033]	-0.087** [0.031]	-0.099*** [0.029]	-0.084** [0.032]	-0.101*** [0.030]
N	9054	9054	5934	5934	9054	9054	5934	5934

Standard errors in brackets. \*significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%. GIPS=Greece, Ireland, Portugal, Spain. TNE=Total exports, excluding energy; MAN=manufacturing export. All specifications use lagged regressors.

The last issue is related to monetary policy. Nominal exchange rate dynamics between 2010 and 2013 partially counterbalanced the effects of competitiveness changes through ULCs. Because of the monetary policy of the central bank, which reduced the size of its balance sheet, the nominal exchange rate appreciated between 2011 and 2013. This might imply that the effect of competitiveness on external trade in the last period is mainly due to nominal exchange rate dynamics. In order to assess this assumption, we re-run the previous estimates and separate the nominal exchange rate and relative ULC dynamics. As reflected in Table 10, most of the real exchange rate's impact is due to the movement of the nominal exchange rate, which explains the effect on export for EMU core countries and partly explains the periphery's import reduction. For

the latter, relative ULC dynamics is significant in explaining reduction, but there is once again no effect on export, confirming the conclusion that rebalancing is mainly due to the recession-induced fall in GDP.

**Table 10 – PPML estimates of the EMU effects for core and peripheral countries, 2008-2013: real exchange rate decomposition.**

	GIPS+Slovenia				GIPS+Italy+Slovenia			
	2008-2013		2010-2013		2008-2013		2010-2013	
	TNE	MAN	TNE	MAN	TNE	MAN	TNE	MAN
$mass_{i,i,t}$	0.410*** [0.045]	0.365*** [0.036]	0.213*** [0.062]	0.181** [0.064]	0.419*** [0.045]	0.372*** [0.035]	0.217*** [0.055]	0.189** [0.058]
$mass_{i,i,t}EAC_i$	-0.036* [0.020]	-0.02 [0.020]	-0.034* [0.020]	-0.015 [0.021]	-0.042** [0.020]	-0.024 [0.020]	-0.040* [0.020]	-0.018 [0.021]
$mass_{i,i,t}EAD_i$	-0.057** [0.019]	-0.040** [0.018]	-0.061** [0.019]	-0.041** [0.019]	-0.053* [0.031]	-0.046 [0.030]	-0.056* [0.031]	-0.047 [0.030]
$mass_{i,i,t}EAC_j$	-0.046* [0.028]	-0.039 [0.026]	-0.046 [0.029]	-0.04 [0.027]	-0.053* [0.028]	-0.046* [0.026]	-0.053* [0.030]	-0.047* [0.027]
$mass_{i,i,t}EAD_j$	-0.045 [0.032]	-0.049 [0.031]	-0.050 [0.034]	-0.056* [0.031]	-0.057* [0.029]	-0.062** [0.027]	-0.059* [0.031]	-0.065** [0.028]
$exr_{i,i,t}$	0.111 [0.100]	0.181* [0.095]	0.103 [0.155]	0.238 [0.153]	0.116 [0.101]	0.190** [0.095]	0.106 [0.154]	0.249* [0.151]
$exr_{i,i,t}EAC_i$	-0.104*** [0.023]	-0.142*** [0.022]	-0.104*** [0.023]	-0.145*** [0.023]	-0.103*** [0.025]	-0.149*** [0.024]	-0.104*** [0.026]	-0.151*** [0.025]
$exr_{i,i,t}EAD_i$	0.082* [0.045]	0.054 [0.049]	0.085* [0.046]	0.057 [0.049]	0.014 [0.034]	-0.024 [0.035]	0.016 [0.035]	-0.023 [0.036]
$exr_{i,i,t}EAC_j$	0.072** [0.025]	0.058** [0.023]	0.071** [0.026]	0.054** [0.024]	0.059** [0.026]	0.046* [0.024]	0.060** [0.027]	0.041* [0.025]
$exr_{i,i,t}EAD_j$	-0.062* [0.034]	-0.080** [0.033]	-0.061* [0.034]	-0.085** [0.033]	-0.058** [0.029]	-0.080** [0.028]	-0.056* [0.031]	-0.084** [0.029]
$ulc_{i,i,t}$	-0.092 [0.106]	-0.031 [0.109]	-0.104 [0.158]	-0.048 [0.165]	-0.077 [0.106]	-0.012 [0.108]	-0.087 [0.155]	-0.025 [0.161]
$ulc_{i,i,t}EAC_i$	-0.088 [0.130]	-0.198 [0.148]	-0.099 [0.130]	-0.22 [0.149]	-0.086 [0.134]	-0.225 [0.148]	-0.091 [0.135]	-0.244 [0.150]
$ulc_{i,i,t}EAD_i$	0.293 [0.293]	0.212 [0.297]	0.263 [0.276]	0.161 [0.285]	0.233 [0.171]	0.102 [0.169]	0.21 [0.167]	0.063 [0.164]
$ulc_{i,i,t}EAC_j$	0.206 [0.181]	0.29 [0.182]	0.185 [0.182]	0.276 [0.181]	0.13 [0.187]	0.23 [0.186]	0.114 [0.190]	0.22 [0.186]
$ulc_{i,i,t}EAD_j$	-0.470** [0.199]	-0.346* [0.183]	-0.435** [0.200]	-0.29 [0.180]	-0.483** [0.192]	-0.302* [0.181]	-0.446** [0.195]	-0.251 [0.180]
N	9054	9054	5934	5934	9054	9054	5934	5934

Standard errors in brackets. \*significant at 10% l; \*\*significant at 5%; \*\*\*significant at 1%. TNE=Total exports, excluding energy; MAN=manufacturing export. All specification use lagged regressors.

## 5. Conclusions and policy recommendations

The evolution of trade flow among the original members of the European Monetary union has been characterized by the rise and fall of imbalances in trade and current account balances on the one hand, and a continuous reduction in the share of intra-EMU trade with respect to total trade

on the other. While the rise in trade imbalances and the subsequent reduction have been widely investigated because of the connection to the area's prospects for recovery, the reduction of intra-EMU trade shares has received little attention.

In this paper, we argue that the reduction of intra-EMU shares is a by-product of the development of imbalances and is consequently influenced by the same factors determining first the divergence, and then the rebalancing of net trade positions. With this view, we use a bilateral trade model to simultaneously investigate the effects of competitiveness and financial integration on imports and exports. This approach allows us to provide a better picture of the way these variables have affected the evolution of imbalances, both before and after the global financial crisis, while assessing whether they also influenced the share of intra-EMU trade.

Our results indicate that the relation between trade and financial opening changed with the introduction of the euro, both for EMU and non-EMU countries, confirming the usefulness of the gravity model as a means to estimate economic relations within a short time span. In terms of imbalances, the improved performance of core countries is mainly explained by the higher impact of competitiveness on exports, while the impact of financial opening points to similar increases in both imports and exports. In the periphery, the loss of competitiveness stimulated import growth, and financial integration seems to have contributed to this process by raising imports more than exports.

We further find that the reduction of intra-EMU trade share is due to the lower impact of financial integration on both imports and exports, with competitiveness only playing a role in terms of relative differences in real exchange rate since elasticities do not change after the introduction of the euro.

Finally, we provide some early evidence on causes of the recent rebalance in trade and current account positions. We find that most of the variation in imports and exports is due to economic mass, which combines domestic and international demand. The real exchange rate, while playing its usual role for the export performance of core countries, reduced imports of the periphery. These effects are mainly driven by nominal exchange rate and hence the asymmetric effects of monetary policy. Changes in relative ULC contributed, in any event, to the periphery's fall in imports. All in all, these effects suggest that rebalancing of net trade is not driven by improvements in structural competitiveness of the periphery, but rather by a recession in terms of both price (deflation) and quantity.

Our findings have important policy implications. The reduction of intra-EMU trade is a serious issue since one of the expected outcomes of the monetary union is to bring about an increase in trade and financial flows as a result of the increase in the size of the single market and the

decrease in trade dependency on third countries. However, the EMU is increasingly behaving as an export-led economy, particularly in more recent years, due to increasing external surplus recorded by the German economy. This growth model, typical of emerging countries, is not sustainable in the long-run because of the structural features of countries in the area and because it does not match the evolution of trade and current account dynamics in the rest of the world.

As for trade imbalances, our results beg criticism toward the responses of European institutions to the problem of structural differences in trade and competitiveness. So far, the consolidation policies imposed on peripheral countries had the effect of reducing imbalances mainly through the compression of domestic demand, as implied by negative GDP growth. Improvement of unit labour costs in the periphery appears to be a by-product of negative growth, with little effect on structural competitiveness. The obvious implication is that imbalances will rise again once GDP growth stably returns to positive values.

In order to stimulate intra-area trade and structurally rebalance the competitive positions of core and peripheral countries, measures aimed at improving the competitiveness of the internal market should be implemented, and more resources should be devoted, at a European level, to carry out structural reforms.



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## Appendix

**Table A1 Data sources**

Variable description	Source
Trade flows	UNCOMTRADE accessed through WITS
GDP at current and constant prices	Eurostat, OECD, Fred Federal Reserve
Financial opening=Net foreign assets+net foreign liabilities	Lane and milesi Ferretti (2007), IMF-IFS
ULC=labour compensation/GDP	Eurostat, OECD, Fred Federal Reserve
Exchange rates	IMF-International financial Statistics