NORGES HANDELSHØYSKOLE
Bergen, Spring 2011

Was the euro a good idea for European trade?

Master Thesis within the main profile of International Business

Thesis advisor: Professor Gregory Corcos
by
Joseba Matanza Medina

Abstract

In this thesis I have studied the effect that the euro has had on European Union trade patterns among its members. The data used in from different 26 EU countries that go from 1993 to 2010. During this period several European countries entered into a common currency union, besides old socialist Eastern European countries did access to the European Union and later on to the euro itself. Using gravity equation theory, I have tried to estimate the size of the effect of the euro, which goes from 8% to 12% in the simplest specification and reaching 26% for the most complex ones. Other concerns affecting the gravity equation have also been addressed in this paper.

Table of contents

1. Introduction

1.1 General notes

Since the end of Second World War European integration has been an essential factor of the European history. It first started as a trade agreement and then turned into a political union. In the end of the 20th century, the monetary integration among most of its members was agreed and completed. Whether it is a culmination of economic integration or a step further into political union is still to be seen.

The Economic and Monetary Union (EMU) is the agreement that include both currently eurozone-countries and those that will be part of it in the future. The introduction of the single currency has had important consequences economically both in Europe and the whole world.

It is very important to put the EMU in perspective, because it has not been a one-time thing but it is part of a gradual European economic integration. This integration has increased the interdependence of the region's countries. Whether to measure the success of this integration in trade flows or price convergence is a point of discussion. The former has been the most used one in monetary union researches as it is easier to gather and it has no comparison problems. Although (O'Rourke, 2002) argues that price convergence is an ultimate effect of trade integration and an irrefutable evidence.

One aspect of a currency union is that in terms of trade it can be seen as factor that reduces trade barriers among its members. For instance the disappearance of exchange rate transaction costs and risks. Though these risks can be hedged at a cost, long-term volatility ones are neither easy nor cheap. In addition, every business has uncertainty on the amount of demand it will get, hedging currency risk on the demand side is everything but perfect. Moreover, these costs get larger the smaller countries are, and Europe is full of them.

According to trade theory, a decrease in trade costs between two countries has two different effects. First, it would increase trade between these two nations. And second it would decrease trade with third countries as goods from them become relatively more expensive compared to those within the monetary union.

Nevertheless, when a monetary union is done there are more things going on apart from trade cost reduction that may also affect trade indirectly. Besides, the EMU is not an ordinary monetary union, but is one between advanced and big countries that has further implications even with countries that have not adopted the euro yet.

1.2 Problem statement

This paper is about how the euro has influenced and affected intra-EU trade, size and direction of the effect. This implies both eurozone-countries and non-eurozone ones. It is not a point of the study to analyze the effect with other major world economies but those inside the EU. The point is to gather similar economies in order to get rid of any omitted variables that might affect economies outside the EU and thus introduce more noise in the results. As the EU was created with trade purposes and it has evolved until the EMU, integration and convergence issue is easier approached with a smaller and more similar sample. It is also easier to dig deeper in country specific characteristics.

When it relates to methodology, the gravity equation for trade will be the one selected, especially the one that has been specifically used in previous monetary union related papers. Hence, this theory will be taken as given, especially (Micco, Stein, & Ordoñez, 2003) specification. Although some new issues will be considered as well.

1.3 Outline summary

Next two sections contain a literature review on overall currency unions first and then on euro specific topics. Section 4 shows up the data and methodology used for my own findings. Section 5 is mainly focused on replicating and updating previous researches. Section 6 is where the real fun is, I mean, where I tried some specification I am concerned about. In section 7 a robustness check is made in addition to other previous models. And finally section 8 contains the conclusions of the thesis.

2. Currency Unions' literature

This section might seem quite long, but I consider it to be a key part related to the econometric model of this thesis, making it easier to be followed up.

2.1 Rose model

The paper by (Rose, 2000) was the first one to analyze the effect of currency unions on trade. Before, the only studies that could somehow estimate this effect where those investigating the border effect. This effect consist on how a national border can reduce trade between two countries, it captures a mixture of different factors that distinguish one country from another, affecting more to small countries (Anderson & van Wincoop, 2001).

The researches by (McCallum, 1995) and (Helliwell, 1998), where they analyze the border effect between Canadian provinces and US states, gather data before and after the North American Free Trade Agreement (NAFTA). We must realize that both countries cannot be more similar, same language, similar culture, legal system and after 1994 the free trade area was created. So it can be said that the only remaining substantial difference is the currency, therefore the fact that Canadians provinces

trade between them an average of 10 to 20 times more than with US states is kind of a proxy of the effect that a currency union might have. (Micco, Stein, & Ordoñez, 2003) Even though currency difference is the most obvious difference, there are more things going on such as historical supply chain links.

Going back to (Rose, 2000), he is the one responsible of a new line of study in international economics according to (Baldwin, 2006). He collected an impressive amount of data concerning 186 nations, colonies and offshore departments from 1970 to 1990. He discarded null and missing values as he uses logarithms to measure the variables. And plotted all in this equation below:

$$\ln(Trade_{odt}) = \alpha_0 + \beta_1 \ln(Y_{ot}Y_{dt}) + \beta_2 \ln(dist_{od}) + \beta_3 CU_{odt} + controls + \varepsilon_{odt}$$

Being *trade* real bilateral trade from origin country *o* to destination *d* at time *t*, *Y* real GDP of the country, *dist* the distance between both nations and *CU* the currency union dummy. In addition, he controls for several other variables like language, religion, former colony status,… The results were surprisingly high, implying that a current union may boost trade a 235% on average ($\beta_3 = 1.21$; $e^{1.21} - 1 = 2.35$) on his favorite regression.

He considers a currency union pair countries that share the same currency with a unite central bank, and not just a fix exchange rate system. The observations containing CU agreements are three different kinds as (Baldwin, 2006) states. First, those called *hub-and-spoke* based on a big nation *hub* like the US, Australia or UK, and their overseas islands and territories *spokes*, which are very small and open economies. Involving a wide variety of products on their trading between the hub and the spoke, but almost negligible trade between spokes as they are tiny and far apart from each other normally. This type is the most abundant one in the CU observations in the regression, raising lots of concerns as we will see.

Second group are two multilateral currency unions among poor and small nations. These two are the West African CFA and the Caribbean Currency Union. Third is mostly omitted from the sample and are those agreements where one nation rules over monetary policy of another which is tiny, like Italy and San Marino, Spain and Andorra or India and Bhutan.

2.2 Critics to Rose

Arguments against the paper have been numerous from the very beginning. And they include a wide variety of aspects of the study, from the econometric methodology used to sample problems and reached conclusions. None of these critics have forgotten the key issue, which has been to open a new study line concerning currency unions. Being the Rose the first one to do so despite all the problems.

Medal mistakes

(Baldwin, 2006) and (Baldwin & Taglioni, 2006) papers summarize and rank three methodological errors committed in the Rose paper, the latter applied to eurozone specific studies. They are supported with large amount of mathematical demonstrations that I will not include in here. They call the medal mistakes as they are ranked from *#1* or gold medal till *#3* or bronze.

Starting at top 3, the bronze medal mistake concerns the method used to deflate and turn into real units the trade flows, which is the explained variable. (Rose, 2000) uses the US consumer price index as trade flows are measured in dollars. Ideally the best deflator would be a world price index, but as long as it is not available Rose uses the US one as the best proxy, it is the biggest open to free trade nation. Since the time series is long enough to be affected by global trends on inflation on other countries, it would induce a bias in the results. Baldwin states that it is somehow solved this bias using time dummies to correct for world trends.

Second mistake or silver medal is related to the fact that trade flows used in (Rose, 2000) are bilateral trade flows, it is the result of averaging all four different trade measures available (exports and imports, both in FOB and CIF[1]). This error that Baldwin finds is linked to the mathematical issue that the logarithm of a mean is not the average of the logarithms separately[2]. This can be a big source of biasness the larger the trade unbalance is between trade partners. Introducing a great systematic error on North-South trade compared to North-North one, thus unbalance partners will see their trade boosted artificially. Even in Germany's trade with EU15 and other OECD countries where the unbalance is supposed to be fairly small, (Baldwin, 2006) finds out that the error is about 15% of real trade figures.

Finally here it comes the big one; the gold medal is for an omitted variables bias. (Baldwin, 2006) strongly criticizes that pooled OLS method leave behind many variables that individually considered are negligible but together they become a big problem. He proposes as the ideal method to use country-pair time-varying fix effects, this would make disappear any other variable in the model though. Thus, these within estimator method will help eliminating any omitted variable trail. No later on study on the topic does not approach the equation this way, moreover is normally the preferred specification by the authors.

When Rose review his work in (Rose & van Wincoop, 2001) and (Glick & Rose, 2001), Baldwin still have concerns about it. The former uses country specific dummies, which drops the Rose effect to 136% from 235% of the original paper. Yet this specification

[1] FOB (Free On Board) and CIF (Cost Insurance and Freight), normally exports are measured in FOB and imports in CIF. So when two countries trade we have export and import data of country A to B and the same data but reported by country B to A exports and imports.

[2] $\ln\left(\frac{X+I}{2}\right) \neq \frac{lnX+lnI}{2}$

might continue suffering from omitted variable and should thus either be time-varying or country-pair specific. The latter is the one used in (Glick & Rose, 2001), where the Rose effect falls larger to 91%. But we will look closer at these papers later.

Reverse causality

Another important issue argued by some authors such as (Persson, 2001) is that adopting a common or other country's currency is not random choice. Countries that are close to each other, share language, former colonies, are part of the same nation, small economies or those that already have large trade relations are the ones more likely to establish a currency union. He shows it in a table where the mean values of several variables in currency unions observations can be compared to those that are not. Therefore currency union dummy would be and endogenous variable in the model giving biased results. He suggests as a possible solution to build a *propensity score* that would represent the likelihood of two countries being part of a currency union.

Table 1. Descriptive statistics

Variable	Non common-currency pairs					Common-currency pairs				
	Obs	Mean	Std.Dev	Min	Max	Obs	Mean	Std.Dev	Min	Max
Output	26 356	34.428	2.679	20.026	43.526	252	28.866	3.964	20.326	37.991
Output/per capita	26 356	16.238	1.366	11.728	20.805	252	15.248	1.641	12.280	19.355
Distance	26 356	8.201	0.793	3.991	9.422	252	6.469	1.387	2.967	9.258
Contiguity	26 356	0.025	0.155	0	1	252	0.111	0.315	0	1
Language	26 356	0.136	0.343	0	1	252	0.806	0.397	0	1
Free trade area	26 356	0.017	0.131	0	1	252	0.298	0.458	0	1
Same country	26 356	0.001	0.034	0	1	252	0.143	0.351	0	1
Same colonizer	26,356	0.081	0.273	0	1	252	0.710	0.455	0	1
Colonial relation	26 356	0.013	0.115	0	1	252	0.028	0.165	0	1
Trade	26 356	9.413	3.307	0.132	19.367	252	8.609	2.996	1.742	16.872

Source: (Persson, 2001)

In his currency unions papers review for the European Central Bank, (Baldwin, 2006) quote several studies that used instrumental variable methodologies to address this problem. Astonishingly, their most conservative results are that the Eurozone formation would more than double world trade. Obviously, the findings are meaningless.

(Devereux & Lane, 2003) discovered just the opposite. Trading partners tend to stabilize bilateral exchange rates to each other, being a monetary union the ultimate step of stabilization. However, I personally think that there is a long shot from fixing exchange rates to common currency. Fix rates break-ups are widely seen historically and there is not much confidence about the length they will last, but it is the fact that a

currency union is almost irreversible what makes businessmen trust that they got rid of long-term exchange rates risk for the foreseeable future and build-up life-long business relationships or investments.

On the other hand, (Tenreyro & Barro, 2003) argue that the decision for many countries to adopt other's currency is because it is stable and there is no mutual economic relation argument behind. Thus they find no clue for endogeneity bias.

An excellent case study against reverse causality was posed by (Frankel, 2008). The African CFA members are a group of sub-Saharan countries that share a common currency which was fixed to the French franc. They were former French colonies, except Equatorial Guinea, are small and poor economies, speak French, close to each other,… they fulfill every condition to be a likely currency union between them and with France. But suddenly in 1999 they became also linked to other countries like Finland, Italy or Ireland which have nothing to do with them. Interestingly he regressed this and found out that the euro boosted bilateral trade between European countries (excluding France) and CFA countries by 76%, where it is obvious that there is no endogeneity.

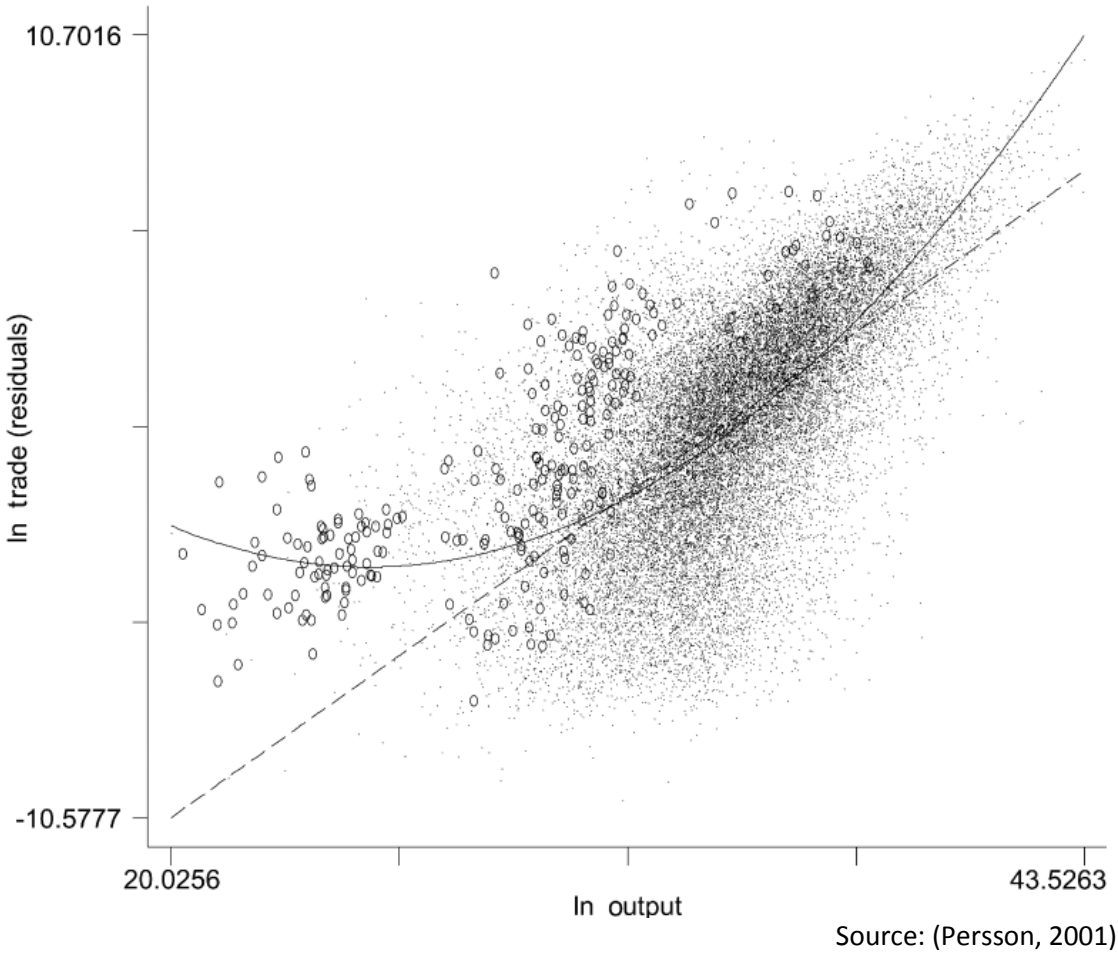
Misspecification problems

Model misspecification was first exposed by (Persson, 2001). He was worried mainly about possible non-linearities within the Rose model. Even in (Rose, 2000) did actually appear a model using the quadratic term for output, he did not put too much importance. Persson per contra focus his attention on it. Adding the output quadratic term to the model the Rose effect falls from 235% to 97%, being the output square coefficient highly significant.

On the graph next page we can observe this relationship between trade flow residuals and GDP. Empty white dots represent currency union observations and the black dots are the rest non-currency union ones. The dashed line shows the estimated linear fit of the regression, while the solid curved line is the quadratic estimation we have been talking about. Most CUs tend to be in the lower part, as we have previously seen they tend to be smaller economies. Interestingly there are lots of them above the dashed line; this mismatch with output would be however captured by the currency union dummy pumping up its effect artificially.

(Baldwin, 2006) adds up that before the articles of (Rose, 2000) and (Persson, 2001), non-linearity was not considered as a problem in gravity equation studies. Now still unknowing the correct form of non-linearity, we know that it exist and should be considered. Especially the more extreme and varying values are used, which is the case with plenty of tiny economic nations.

Another type of model misspecification that (Persson, 2001) takes into account are the crossed relationship between variables. The two suggested are free trade area (FTA) and language, arguing that it should have a positive combined effect as both characteristic makes them more similar to a unite country where there are no significant manmade trade barriers. The second one is colonial history and output with an expected negative conjunct effect. It can be interpreted from the point of view of small overseas nations where after independence, if achieved, trade bonds were already done and remain undestroyed; while this is not as important for bigger countries. For instance all the small islands in the pacific that are or used to be part of France or UK still trade more with them than with big nearer nation around like Australia, US or Japan. There is one condition for this interpretation in order to be correct, that the net effect colony plus colony crossed output is still positive, at least for the lower GDP deciles. Both crossed coefficient signs fell where expected and were highly significant.



Source: (Persson, 2001)

An extra point that (Anderson & van Wincoop, 2001) develops is a model of *multilateral resistance term*, also called *relative prices matter* in (Baldwin, 2006). It refers to the fact that gravity equation model are based on absolute variables to approximate trade barriers, per contra they suggest to build up a relative trade barrier model like classical trade models are based on comparative advantage. Arguing that if

not controlled for it, gravity equations model would underestimate trade flows for pairs like Australia and New Zealand, which they are far apart but much closer compared to other trade partners. It would overestimate others like Germany and the Netherlands, almost picking-out the euro effect, which they have much more trade partners around.

Notwithstanding, most of misspecification issues coming from omission of certain variables or their form can be simply solved using panel data techniques as it was suggested in the gold medal mistake solution.

Sample issues

The sample gathered by (Rose, 2000) was unbalanced (includes missing values) and with many zero values for trade, which had to be discarded in order to use natural logarithms. Previously we highlighted that most of currency union observation are *hub-and-spoke* type, resulting in lot of zero values for *spoke-and-spoke* CUs. Therefore, as (Baldwin, 2006) comments, this leads to an upward bias on the CU coefficient because it does not take into account this zero values. A possible solution that I suggest, I ignore myself if it is econometrically correct to implement, is to allot a zero value on their logarithm to those observation so the regression analysis can take them into account.

Even if we were to assume that the results do not suffer from any of these problems, even if the conclusions reached in (Rose, 2000) were undoubtedly perfect, they could not be extrapolated to the EMU. Several reasons concerning the sample turned them likely to be biased.

First, several authors like (Micco, Stein, & Ordoñez, 2003) and (Berger & Nitsch, 2005) highlight that most currency union are among small, poor and very open economies, or between them and a much bigger country. On the contrary, European countries are much larger and developed; hence Rose results would apply just to those CUs that are similar to those in the sample.

Second, articles written by (Estevadeoral, Frantz, & Taylor, 2002) and (Lopez-Cordova & Meissner, 2002), though being based in pre-Second World War era and the gold standard, could be more comparable since they are based on industrial and developing countries. They found out that the gold standard boosted trade between 34% and 72%.

Finally, if we look deeper into the data we observe that most of currency unions shifts are about countries breaking up their common monetary policy, and not entering into a common currency. Thus the fact that Rose effect is that high is that split-ups are much more trade destroyers than union are boosters. This is addressed by (Glick & Rose, 2001) when analyzing the sensitivity of their model, they conclude that they

cannot reject equality of entry and exit impact of trade (with opposite coefficient sign of course). This concern it is also searched in (Nitsch, 2005) where he finds out that entries and exits are a different issue and the effect in the entry case is heterogeneous (CFA area versus others).

2.3 Updates of Rose model

After the first round of critics arose, Rose, together with other colleagues, approaches these concerns and tries to solve them.

Some months after (Rose, 2000), they published (Rose & van Wincoop, 2001) where the main point was to introduce in the Rose model country fix-effect. This method drops the Rose effect from 297% to 136% with data from 1970 to 1995 for almost 200 countries. Second they also put in place the *multilateral resistance term* that (Anderson & van Wincoop, 2001) developed. With data from 1980 to 1990 for 143 countries they predict the effect of the euro to be about 58% of increasing trade and 11% in welfare.

(Glick & Rose, 2001) expanded the data set, catching 217 countries from 1948 to 1997. In my view this could be dangerous, as they take into account currency unions under colonial empires, thus introducing more break-ups in the regression, some of them with wars involved hereunder. In contrast with other papers, he uses country-pair within estimator methodology which drops the Rose effect from 267% to 91%. They do also separate country exit from entries, as I have already said above, finding it impossible to accept that they have the same effect on trade. In this latter point they introduce the Ireland-UK case study, finding no trade break-up at all the data for this specific case, being an exception and not the rule for other currency split-ups.

2.4 Own concerns

After reading all this articles I got to mind several more concerns that I would like to raise. I have previously discussed how lots of currency unions were between small poor countries and there were more split-ups than new formations. My first point goes in this line too. The so called *hub-and-spoke* currency union might be biased because some of the *spokes* (tiny countries) contain military bases that might increase trade systematically, whilst other where there are no military facilities do not. This can be either through military material, if accounted as trade in the statistics, or by products from homeland that the troops and personnel are used to consume, let's say as a major example the Coca-cola! Examples like this that I found easily are US and Panama, UK and Gibraltar or France and French Polynesia. Yet other countries that are not in a CU do also contain military bases, but these are relatively much larger than these *spokes* and thus the effect on trade is almost negligible.

Another point that should have been controlled for in the (Glick & Rose, 2001) extended paper is the fact that some break-ups happened after a colonial war, like France and Algeria or Portugal and its colonies. Damaging trade even further.

Second the data measurement way, using and averaging FOB and CIF might be an easy way out. I think one of it should be selected based on theory/literature ideally or assumed for convenience, but averaging introduces systematic upward bias for countries far apart, difficult transportation, or political shakiness.

Last but not least none of the studies have compared results between time-invariant country-pair fix effects and time-varying country dummies. It would be interesting to do so as a robustness check of the model.

To sum up this part, Rose first found result of 235% has been dropped to a range of 90% to 140% depending the author and specification used in each case. Remember that this figure cannot be directly turned to the euro as sample characteristic are different, but it remains large and significant to be ignored.

3. Eurozone specific literature

In this section I will review three articles I consider to be important and then just comment some other issues about euroland arisen in other papers.

3.1 Micco, Stein & Ordoñez (2003)

It is one of the first studies analyzing the Rose effect with eurozone countries' figures. For this purpose they gather data from 1992 to 2002[3] in dollar terms of total goods trade (as imports plus exports), using two different samples. First and bigger, 22 developed countries. Second and cozier, the 14 members[4] of European Union (EU) that has the advantage to be a group much homogenous with all of them inside the EU. They use natural logarithms for trade, GDP distance and GDP per capita.

In the debate of choosing nominal or real GDP figures, though preferring the latter, they present the results with both of them. They argue for real ones that *"since large shifts in real exchange rates around the time of the creation of the EMU may cause the results to be sensitive to changes in the definition of this variables",* but as the answer to it is not obvious they include both. Besides, they say that the estimation from nominal output would be an upper bound and the real a lower bound of the euro effect. In the latter estimation they will control for real exchange rates too, one for the exporter and the other for the importer against the dollar.

[3] They warn that 2002 data is the result of annualizing trade data until July 2002. They find it convenience to include given the amount of years since the euro was in action.

[4] Belgium and Luxemburg share the custom system.

Despite their preferred specification for the model is using country-pair fix effects together with year dummies, they do also present the result of the pooled OLS including trade barriers such as distance, landlocked, language, island, area and border. In the developed sample the euro effect goes from 32% in nominal OLS to 4% in real no-FOREX[5] fix-effects. While the EU15 sample the range goes from 37% to 6% for the same specifications respectively.

Thereafter, they alter the specification in order to analyze the euro timing effect. For this purpose they drop the euro and year dummies from the model and they include a time trend for those countries that will adopt the euro in 1999[6]. In this year the effect is positive and significant for both samples. However, the real jump comes in 1998, one year before the EMU was finally settled. Another jump comes in 2001. As possible explanations about why does the effect appear a year earlier they argue that it was not until that year when every doubt of the euro formation was gone[7]. (Frankel, 2008) also support the view that until March 1998 the euro was still in the air. Adding that financial market statistics point to June 1997 as the break-up, implied from the interest swap market, but as financial markets react faster than goods and services one the effect can be lagged to the year after in 1998. (Flam & Nordström, 2003) also suggest that currency hedging is a short term strategy, and then it was easy to hedge exchange rate risk for the remainder months of 1998.

Another question that (Micco, Stein, & Ordoñez, 2003) raise in their paper is the euro triggered any trade diversion from non-eurozone to eurozone countries. They do it introducing to their first model a new dummy (EMU1) that takes value 1 when just one of the countries in the pair belongs to the eurozone, so if there is any trade diversion it should take a negative value the dummy coefficient. Nonetheless, depending on the sample and compared to trade among non-eurozone countries, trade between eurozone and non-eurozone countries increases from 12% in the full sample to not significant from zero in the reduced sample. As possible explanations they suggest that the euro directly reduced the exchange rate risk with other currencies, especially for small countries. Indirectly it is easier and cheaper to hedge those remaining risks. And they argue that the non-significance of the EU subsample is normal due to the small sample variation among non-euro countries.

Then they remake the euro timing model including trade diversion dummy, founding it to be positive and significant in 1998 as well for the extended sample. (Gomes, Graham, Helliwell, Kano, Murray, & Schembri, 2006) comment that the absence of

[5] Exchange rates.

[6] They exclude Greece from the eurozone countries since it entered in 2001.

[7] The 25th of March of 1998 the European Commission and the European Monetary Institute published their convergence reports suggesting that 11 countries should be admitted in the euro. In May the decision was announced during the meeting of the Heads of States in Brussels. And in June the European Central Bank (ECB) was created.

trade diversion may not be relevant due to the fact that it is not controlled for the effect of increased trade with China and Eastern European countries.

Finally they run some robustness checks excluding one euro-member country each time, specific EMU country dummy and by groups of countries[8]. They found out that the euro seem to be more boosting for the Netherlands and Spain, whilst less for Greece, for which alone the estimation turn to be negative and significant. By groups is more beneficial for the core Europe rather than the periphery.

3.2 Berger & Nitsch (2005)

The following article, published some years after (Micco, Stein, & Ordoñez, 2003), comments some of their conclusions and tries to clarify them. They find suspicious about it that within the full sample membership in the EU have just a bit larger effect on trade than EMU membership, especially considering the few years since it was launched. They do not agree either of the reasons behind the arisen of the euro effect in 1998, one year earlier. As last point they raise a question on why do the DM block concentrates most of the euro effect, suggesting that positive effect may take time until countries converge.

They first start reproducing (Micco, Stein, & Ordoñez, 2003)[9], preferring as they do the country-pair fix effect specification, but adding the pooled OLS for completeness. Then they update the data set with their new definition for variables and uses complete 2002 data for trade[10]. In the second update they extend to 2003 trade data. These actualizations increased estimation to about 15% from 5%.

Next step was to extend the time period back to 1948. The results vary from 41% of the full sample to 55% of the European sample. However these figures absorb at least part of the European integration effect on trade and not only the euro effect. To control for it the authors run several regression to capture the trade intensity of EMU members in short periods of time, one for each decade. It comes to prove the positive trend of increasing European trade over time in comparison to non-eurozone members.

Finally, after controlling for exchange rate volatility they construct an integration index. This index tries to capture the fact that European integration has been an ongoing process with year of rapid integrations with other époques of standstill. It is calculated as an average from three measures one in each period[11], in the end of each

[8] The groups are the less developed ones (Portugal, Spain, Ireland and Greece), European 1956 (Benelux, Germany, France and Italy), Nordics (Sweden, Denmark, Norway, Iceland and Finland) and Deustche Mark (DM) block (Germany, Denmark, Netherlands, Belgium, France and Austria).

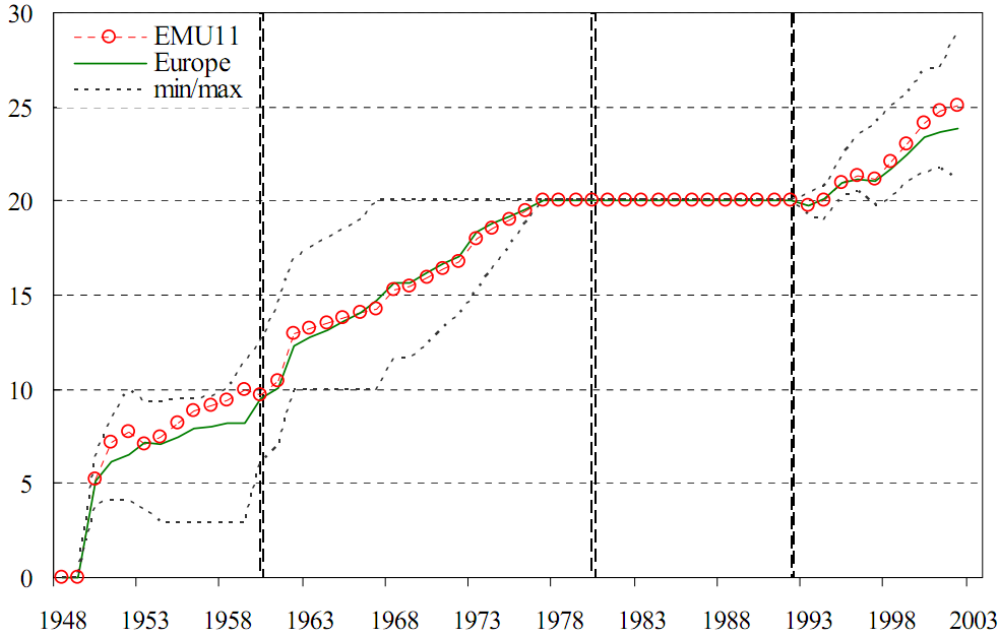
[9] The only change in the remake was to drop two insignificant variables (land area and EU trend).

[10] Remember that (Micco, Stein, & Ordoñez, 2003) annualized 2002 from the first semester of data that they had available.

[11] Periods are 1948-60, 1961-92 and 1993-2003.

period the index takes the maximum value of the measure if not reached before. First it's the share of products free from quantitative restrictions, second the average tariff index and last the Internal Market Index[12].

The graph below shows the evolution of this index. We can observe the standstill period in European integration between 1980 and 1992. Besides it distinguishes between eurozone member states and those outside the euro. When the index, scaled down from a 30 points maximum to 10, is added to the gravity equation, it is positive and significant but it does not really affect euro dummy coefficient value to much. It goes down from 34% to 32% in the full sample and from 48% to 45% in the reduced sample. As a last attempt to reduce the coefficient they induce a time trend for euro countries, this captures every dummy effect becoming insignificant. Concluding that the euro is a step further in European integration rather than a one-time trade gain.



Source: (Berger & Nitsch, 2005)

3.3 Frankel (2008)

In this paper, he first reproduces (Micco, Stein, & Ordoñez, 2003) euro timing research and effectively he confirms that the euro effect first arise in 1998, as I have already mentioned before. Then he enlarges the sample with four extra years till 2006. Interestingly, he discovered that the positive effect is an upward trend which stops during 2005 and 2006.

Next step he performs is to enlarge the sample including other CUs different from the euro and to reach back until using data from 1948. This part is quite confusing, to

[12] An index build up by the European Commission to track integration policies of each member state. It consists in 12 different indicators.

many countries and years mixed with a various of different specification and results. He discovered that country size reduces the effect of the currency union on trade, but that the whole sample including small countries arise lot of noise in the model and a mix of results. The problems increase when he expanded the sample to the 1948-2006 period.

He does also try to control for lagged effect of currency unions on trade. He shows that effect seems to be important during first years and then it is reduced over time until it is gone in 10 years time. Anyway, to focus, most specifications (similar sample ones) point the effect of the euro in trade to be from 10% to 25%, in line with other authors.

3.4 Other euro-specific points and problems

In (Baldwin, 2006) is said that (Flam & Nordström, 2003) is the best paper up-to-date ever. He specially highlights the fact that it does not commit any medal mistake and it uses direction specific trade flow instead of averaging of summing exports and imports. They found the Rose effect to be 15% and 8% in the reduced sample. When distinguishing the trade diversion effect between exports and imports they found that the euro seems to boost Eurozone imports but it is insignificant for exports.

Some authors suggest a more complex way to approach the euro timing. Actually is (Bun & Klaassen, 2002) who address the problem with dynamic panel data techniques getting 4% of short-term effect and 40% in the long-run. However, (Gomes, Graham, Helliwell, Kano, Murray, & Schembri, 2006) are worried that lagged variables in the gravity equation may not fit the theory of the model. Adding that its significance could be spurious due to increasing trade in intermediate good around these years, remembering us that GDP is measured in value added units whilst trade is done in absolute value.

On spurious results does also focus (Baldwin, 2006). Making him suspicious about it the speed that the euro effect shows up and the absence of trade diversion. He presents as possible hypotheses for it the VAT[13] frauds on exports[14], euro depreciation the years after introduced and the implementation of Internal Market measures.

(Gomes, Graham, Helliwell, Kano, Murray, & Schembri, 2006) push concerns on endogeneity problems. They saw three groups within the EU with different commitments to it, the core always committed because their closeness which give them the larger gains for integration; the periphery that want to reach core-Europe's life standards; and non-eurozone members which neither will benefit from integration as much as the core nor to approximate their life-standards since they already have them. (Barr, Breedon, & Miles, 2003) use output and price co-movements to explain

[13] Value Added Tax.

[14] It has been a growing gap between reported exports and imports for intra-EU trade since the tax authorities are the ones responsible to gather the data instead of the customs authorities.

eurozone membership through instrumental variable techniques, getting 21% increase on the euro effect coefficient.

Another issue with minimum effect, if country-pair fix effect are used, is the so called *Rotterdam effect*. Through this port in the Netherlands, and also through Antwerp (Belgium), enter many of European imports from outside Europe. The problem arises because in 1993 happened the change in the export/import accounting method. Before this year, imports were accounted as that in the final country of destination, while now a substantial amount is recorded as imports from the rest of the world to Netherlands or Belgium and from them as exports to the final destination state. These concerns have been tried to be solved by (Gomes, Graham, Helliwell, Kano, Murray, & Schembri, 2006).

Finally, there are other sort of papers that instead of using country-level data they try to solve the question looking at sector-level figures. Examples of it are (Flam & Nordström, 2003) and (Baldwin, Skudelny, & Taglioni, 2005). I found an article by (Fontagne, Mayer, & Ottaviano, 2009) that approaches it with firm-level data. Yet I did not look further into them as my paper is based in country-level data.

Therefore to sum this section, studies focused on the euro specifically found in general the Rose effect to be from about 5% to 35% depending on the model specification and the econometric methodology used.

4. Data and methodology

4.1 Data

In total I used 18 years, from 1993 to 2010 for 26 different countries[15]. Two samples will be developed, the full one and the reduced one using EU-15 countries. All these makes 10,752 observations for the full sample and 3,264 for the reduced one. A description of each variable follows this paragraph.

Trade data has been taken from Eurostat database. It represents trade flows in euros[16] from 1993 to 2010, which was the year when the trade records were started to be reported by the tax authorities instead by the customs ones. The classification system used is the Standard International Trade Classification (SITC). The data is double reported by country of origin and destination. As long as exports tend to be overstated due to the VAT fraud, import destination data source is the one been used[17]. Missing values will be dropped from the sample[18]; they are most concentrated in 1993 and

[15] Belgium and Luxemburg are considered as one.

[16] At current exchange rates, yearly average. Before euro is reported in ECUs.

[17] Some missing values that were reported by export origin nation were introduces to fill that gap. There are a total of 1002 from 11,700 observations.

[18] There are a total of 948 from 11,700 observations.

1994, and till 1998 for Eastern countries[19]. This might produce an upward biased in the results that we must be aware of. It has been then deflated with the euro HICP[20] and then transformed into natural logarithms.

GDP data is taken from Eurostat at market price in current euros from 1993 to 2010. Data for Czech Republic, Ireland, Greece, Cyprus, Malta, Poland, Portugal and Romania for years 1993 and 1994 is missing, so it was taken from United Nations Statistical Division database at market prices in current US dollar and converted into current euros with the USD-EUR average quotation for each year in the Eurostat database. It has been then deflated with the euro HICP and then transformed into natural logarithms.

GDP per capita was obtained with the real GDP figure as described in previous paragraph and dividing between average population data from Eurostat, for year 2010 population on the 1st of January was used as the average population figures were missing. I believe average figures to be more realistic if dramatic population changes happened during the period.

Real Exchange Rates (RER) for each country against the euro are taken from the Eurostat, which label them as *Real Effective Exchange Rate (deflator: consumer price indices - 16 trading partners - Euro Area)*. Base year 1999. Data for years 1993 and 2010 is missing, so when using this variable these years will be dropped from the sample.

Free Trade Agreement (FTA) variable is a dummy that takes value 1 when both countries in the pair have signed a FTA. If both members are inside EU it will take value 0 as there is a specific variable for it. It covers several agreements between initially non-EU countries and EU (called Europe Agreement, EA), and both non-EU like Central European FTA (CEFTA), Baltic FTA (BAFTA), European Economic Area (EEA) or agreements between European FTA (EFTA) and other countries. All these agreements disappeared when they entered in the EU. See Appendix for more detailed data. Wikipedia and the web of the EFTA[21] has been the source for this part.

European Union (EU) dummy takes value 1 when both parties are within the EU and 0 otherwise. EMU have three types, EMU2 if both are within the EMU, EMU1 if one is and one not, EMU12[22] if just the destination country is and EMU21 if the origin nation is. See Appendix for more detailed data.

[19] 936 out of 948 missing values concern at least one country outside EU-15. There are distributed 210 missing values in 1993 and 1994 (each year), and 132 each year from 1995 to 1998 included.

[20] Labeled as Harmonized Index of Consumer Prices (HICP) in Eurostat, available from 1996. For previous years the German Consumer Price Index was used from OECD database.

[21] www.efta.int

[22] It is labeled 1 for non-euro countries and 2 for euro ones. First digit is origin and second digit destination country. EMU22 is simplified to EMU2.

EU Trend is a trend variable that measures the amount of years each country-pair has been within the EU for each year, starting in 1993. For instance, Portugal-UK in 2010 they have been 18 years, from 1993 to 2010; while Sweden-Cyprus in 2005 they have been 2 years from 2004 to 2005. EMU Trend behaves similarly, but when both are inside EMU, and zero if not. EMU-year dummies are a group of year dummies that takes value 1 for that year if the country-pair started in the euro in 1999; it does the same as EMU2-year in (Micco, Stein, & Ordoñez, 2003).

Distance variable is gathered from CEPII. It measures the distance between each pair of countries demographic center. This center is an arithmetic weighted average of country's main cities. (Berger & Nitsch, 2005) specifically state that their distance variable is between geographical centers, and (Micco, Stein, & Ordoñez, 2003) do not specify on it, but most sure that they do also. However, I believe distance between demographic centers[23] reflect a more realistic picture between two countries rather than distance between geographical centers. For example imagine a country pair like Finland and Estonia, they are near each other but Finland's geographic center is much upper north than were population and economic activity is located, thus trade between them would be underestimated by the model. On the contrary, France and Portugal trade would be systematically overestimated because France's economic activity and population is more concentrated in the north. It has been used in natural logarithms.

Language pairs are Austria-Germany, Belgium-Netherlands, Belgium-France, UK-Ireland-Cyprus-Malta, Cyprus-Greece, Denmark-Sweden (due to understandability), Sweden-Finland (substantial Swedish mother tongue community), Estonia-Latvia-Lithuania (substantial Russian mother tongue community), Hungary-Slovakia (substantial Hungarian mother tongue community) and Hungary-Romania (substantial Hungarian mother tongue community). Border is a dummy if they share a common border, islands takes 1 if one country is an island or 2 if both. Landlocked takes 1 if one country is landlocked or 2 if both. Transited is a dummy that takes value 1 if one country was a former socialist-communist country and 2 if both Wikipedia and Google Maps has been the source.

Brent Crude Oil prices measure the yearly average quotation in current euros at constant price. Brent prices were taken from EIA[24], converted into current euros with average USD-EUR quotation from Eurostat and deflated with the HICP. Then revalued at 100 points for 1993 and converted into natural logarithms.

A descriptive statistics table can be found in the Appendix. Also some correlation table and chart for GDP real growth.

[23] As a proxy for economic centers. Population is more concentrated were economic activity is located.
[24] US Energy Information Administration.

4.2 Methodology

The analysis will be based in the gravity equation. It extrapolates to the economy of trade the physic equation that states that the gravity between two objects is equal to the gravitational constant times both objects' mass divided by the distance between them. It was firstly developed by (Linnemmann, 1966) and it has been widely extended, tested and used for other researches like this thesis.

The main specification is a similar one that the one that (Micco, Stein, & Ordoñez, 2003) develop. I will use real figures for GDP and GDP per capita, drop country area, and add transitional for the full sample.

$$lnTrade_{odt} = \alpha_0 + \beta_1 GDP_{ot} + \beta_2 GDP_{dt} + \beta_3 ycap_{ot} + \beta_4 ycap_{dt} + \beta_5 FTA_{odt} + \beta_6 EU_{odt} + \beta_7 EUtrend_{odt} + controls + \delta_1 EMU2_{odt} + \gamma_t + \varepsilon_{odt}$$

Where α_0 is the intercept, *GDP* is each country GDP for origin *o* or destination *d* nation[25], *ycap* is country's GDP per capita, control variables include language, distance, border,… and last γ represent year dummies. The key parameter is then δ. Later real exchange rates will be also included.

However, my preferred specification as other authors is the one that include country-pair fix effects. They will be direction specific. I have tried to take into account as much as possible learnt in the literature, especially the one concerned to the medal mistakes including direction specific flows, time dummies and fix-effects.

5. Results

This section will have first some replications with my data of previous models that have been tried by some authors.

5.1 MSO[26] (2003) replication

First thing to be done with the data is to replicate MSO specification for EU-15 subsample and compare the results. For this purpose I transform *trade* variable to reflect bilateral trade flow, instead of direction specific flow[27]. *GDP* and *GDP per capita* variables have been multiplied[28].

In spite of trying to replicate the first model as comparable as possible, some differences still are present. My regression has one year less of data, from 1993 to 2002 versus 1992 to 2002. I do not include area variable as it is not significant, while I do include island one, which I do not know why but it is not present on MSO.

[25] I am going to give more freedom to the model by calculating GDP and GDP per capita parameters separately instead of jointly.

[26] (Micco, Stein, & Ordoñez, 2003) hereafter MSO.

[27] It is the average of absolute figures of imports and exports and then transformed to logarithms.

[28] $ln(GDP_o \cdot GDP_d) = lnGDP_o + lnGDP_d$

Then there are some differences in measuring *GDP* and *trade* variables as well. MSO *real GDP* is calculated increasing the first year figure by the real growth rate reported on the IMF. Whereas *trade* is an average between booth country reporters data of both their imports and exports. Another issue is on distance, which MSO does not specifically explain how it is obtained.

After this clarification the table hereunder reports the results. We can see that there is some variation in some coefficients, especially in output per capita one which is positive in MSO and negative in my replication in the pooled OLS specification. It can be due to my reduced sample or the way GDP is computed. Theory tells us that richer countries trade more due to trade in intermediate inputs and intra-industry trade.

Comparative with Micco, Stein & Ordoñez (2003) results

lnTrade	**MSO (2003)**, 1992-2002		**Replication**, 1993-2002	
lnGDP	0.775***	2.979***	0.787***	3.072**
	(0.014)	(0.552)	(0.0281)	(0.931)
lnYcap	0.201***	-2.357***	-0.268**	-2.716**
	(0.037)	(0.595)	(0.0954)	(0.952)
EU	-0.029	0.030	-0.151*	0.0272
	(0.24)	(0.035)	(0.0595)	(0.0329)
EU Trend	-0.047	0.017	-0.151**	0.00971
	(0.084)	(0.072)	(0.0557)	(0.00715)
FTA	-0.026	-0.014	-0.144*	0.0188
	(0.132)	(0.026)	(0.0563)	(0.0206)
lnDistance	-0.760***		-1.252***	
	(0.037)		(0.103)	
Language	0.779***		0.387*	
	(0.108)		(0.179)	
Border	0.413***		0.0638	
	(0.063)		(0.109)	
Area	-0.019			
	(0.015)			
Island			0.0194	
			(0.0649)	
Landlocked	-0.012		-0.785***	
	(0.057)		(0.124)	
EMU2	0.191***	0.059***	0.0984***	0.0796**
	(0.048)	(0.014)	(0.0266)	(0.0241)
Year dummies	Yes	Yes	Yes	Yes
Country-pair dummies	No	Yes	No	Yes
N	1001	1001	904	904
Robust standard errors in parentheses				
# $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$				

When comparing EMU2 results it is rapid highlighted that OLS MSO's coefficient is much larger than the replication one, while that difference is much lower in the fix-

effects specification. Therefore this divergence is caused by some time-invariant variable. Area and island are both non-significant. Others are objectively measured, but it is distance the one where there might be differences in measuring it. As it is specified in the Data section, there might be a difference that is we analyze it deeply it seems to be not random as far as I am concerned. The three non-euro countries in the EU-15[29] has a demographic center more in the south and nearer to Europe's economic core[30], while for the other EU countries it is more random (biggest differences are in France, Italy and Finland which demographic centers are closer too and the other way round happens with Austria and Greece).

Another issue is that the replication coefficient is more stable when introducing the fix-effects specification, but once again it can be due to all the reasons mentioned above. Nonetheless, what does it really matter is that all EMU2 coefficients are positive and significant on a range of 6% to 20%, and in line with other studies.

5.2 Full sample and EU-15 expanded until 2010

In the following two tables we can see two main specifications for both sample, full and EU-15. First is the pooled OLS and then the within estimator model. Besides in the full sample in it a middle step without *transition* variable, which is negative and significant as these economies needed to adapt their productive structures to market driven economy. Everything is also done for the extended period of time until 2010.

First thing that was suspicious is why the full EMU2 coefficient does fall from OLS to FE[31], in contrast to what other authors found and that what happens in the EU-15 subsample. So that is why I introduced this middle step without *transition*, yet EMU2 coefficient does not change but so does others like output and per capita ones (still not statistically significant change). This is logical since transition economies are on average smaller and poorer economies than the others. Economically thinking these new EU members must have some common unknown feature that makes EMU2 coefficient be biased because of an omitted variable unlike it happens in the developed countries sample.

Another interesting point is the negative coefficient for the *EU Trend*, stable throughout all full sample specifications. It means that the EU membership benefits are diluted over time, disappearing in 5 years time. But as long as this is a result of intra-EU trade we must be precautious to extract a conclusion. Therefore I would say it is the result of a greater Europe integration and trade liberalization that happened before the new members entered the EU. Maybe due to the fact that the business

[29] UK, Denmark and Sweden.

[30] Large part of the European economic activity is in the area around Benelux, northeastern France and West Germany.

[31] Fix-effects.

world new they were going to get in establishing thus business relationship before their formal membership came true.

Focus in our main objective again, the effect of the euro goes in the full sample from 8% to 11% in boosting trade among its members. It quite stable and in line with other studies up-to-date.

Full sample

lnTrade		1993-2002			1993-2010	
lnGDPo	0.926***	0.938***	-1.940*	0.923***	0.941***	0.308
	(0.0239)	(0.0244)	(0.874)	(0.0223)	(0.0230)	(0.476)
lnGDPd	0.818***	0.830***	-1.713#	0.817***	0.836***	-0.414
	(0.0259)	(0.0270)	(0.882)	(0.0231)	(0.0247)	(0.388)
lnYcapo	-0.0393	0.0212	2.578**	-0.0841	-0.0543	0.432
	(0.0782)	(0.0609)	(0.864)	(0.0592)	(0.0544)	(0.462)
lnYcapd	0.0504	0.111*	2.599**	0.0585	0.0882	1.250***
	(0.0656)	(0.0493)	(0.840)	(0.0545)	(0.0494)	(0.374)
EU	0.0875*	0.112**	-0.00740	0.168***	0.168***	0.149***
	(0.0394)	(0.0389)	(0.0364)	(0.0368)	(0.0368)	(0.0378)
EU Trend	-0.0290***	-0.0243***	-0.0272**	-0.0373***	-0.0320***	-0.0374***
	(0.00782)	(0.00703)	(0.00836)	(0.00583)	(0.00487)	(0.00657)
FTA	0.152***	0.152***	0.0752*	0.130***	0.126***	0.114***
	(0.0359)	(0.0356)	(0.0317)	(0.0337)	(0.0340)	(0.0331)
lnDistance	-1.601***	-1.524***		-1.589***	-1.516***	
	(0.0776)	(0.0683)		(0.0685)	(0.0624)	
Language	0.905***	0.936***		0.969***	1.000***	
	(0.159)	(0.154)		(0.155)	(0.148)	
Border	-0.0933	-0.0438		-0.0575	-0.00799	
	(0.117)	(0.114)		(0.110)	(0.105)	
Island	-0.160*	-0.0921		-0.186**	-0.105	
	(0.0681)	(0.0675)		(0.0649)	(0.0640)	
Landlocked	-0.141*	-0.181**		-0.0932	-0.136*	
	(0.0651)	(0.0629)		(0.0594)	(0.0568)	
Transition	-0.274*			-0.249**		
	(0.132)			(0.0893)		
EMU2	0.0938***	0.0927***	0.103***	0.0816**	0.0801**	0.104***
	(0.0218)	(0.0223)	(0.0222)	(0.0275)	(0.0276)	(0.0277)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country-pair dummies	No	No	Yes	No	No	Yes
N	5552	5552	5552	10752	10752	10752
Robust standard errors in parentheses						
# $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$						

Next we now compare it to the EU-15 subsample, between really similar countries. Here we might ignore *EU*, *EU Trend* and *FTA* since their variation is almost gone. Still is worthy to comment that there was something going on in 1993 in the trade between

non-EU countries at that time[32] and the others. Both *EU* and *FTA* dummies are negative and significant, but I totally ignore what can be the reason for that. *Distance* change when expanding the sample to 2010 is significant, hence something happened that made far long countries to decrease its trade, one possible explanation might be that transporting cost increased at that period, especially oil prices a major commodity. Again EMU2 coefficient is positive and significant on a similar range from 9% to 12%.

EU-15 subsample

lnTrade	1993-2002		1993-2010	
lnGDPo	0.765***	2.817**	0.751***	1.154*
	(0.0349)	(1.037)	(0.0365)	(0.495)
lnGDPd	0.863***	2.851**	0.824***	0.0924
	(0.0391)	(1.006)	(0.0388)	(0.493)
lnYcapo	-0.274*	-2.542*	-0.419***	-0.933
	(0.113)	(1.053)	(0.114)	(0.503)
lnYcapd	-0.293***	-2.354*	-0.368***	0.488
	(0.0858)	(1.065)	(0.0824)	(0.526)
EU	-0.208***	0.00731	-0.218***	0.0101
	(0.0592)	(0.0304)	(0.0615)	(0.0353)
EU Trend	-0.190***	0.0101#	-0.224***	0.00741#
	(0.0556)	(0.00550)	(0.0561)	(0.00377)
FTA	-0.196***	0.00600	-0.225***	0.00608
	(0.0577)	(0.0184)	(0.0579)	(0.0180)
lnDistance	-1.323***		-1.476***	
	(0.102)		(0.109)	
Language	0.385*		0.316#	
	(0.160)		(0.166)	
Border	0.0356		0.0273	
	(0.117)		(0.116)	
Island	0.00455		-0.0442	
	(0.0783)		(0.0809)	
Landlocked	-0.803***		-0.833***	
	(0.114)		(0.120)	
EMU2	0.103***	0.0868***	0.115***	0.114***
	(0.0222)	(0.0219)	(0.0282)	(0.0284)
Year dummies	Yes	Yes	Yes	Yes
Country-pair dummies	No	Yes	No	Yes
N	1808	1808	3264	3264
Robust standard errors in parentheses				
# $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$				

[32] Sweden, Finland and Austria.

5.3 Real exchange rates

There is not much to comment here. Theory tells us that real exchange rates (RER) do affect trade since when they change they make one country products relatively more expensive those other ones'. In MSO we saw that they were significant, (Baldwin, 2006) per contra does not like them pretty much. So as a normal check I include them know and see how does the picture change.

As we can observe they are mainly insignificant and unstable, maybe due to different computing methods for output figures or maybe due to that their effect is tiny is the short-run. Nowadays there is a wide variety of products and vertical international specialization, this links change slowly over time and cannot change every time exchange rates trend changes. Besides consumer products controlled by multinationals have a price policy that does not reflect perfectly exchange rates movements.

So I have decided not to give more importance to it and exclude RER from next specification. You can see the result in the Appendix.

5.4 Analyzing trade diversion

As MSO did, I include EMU1 in the model, it switches on when there is in the pair a country inside the euro and the other is not. Similarly to MSO he found that the effect is positive, boosting trade about 13%, so that there is no trade diversion. Theory tells us that when we lower trade barriers between two countries those countries tend to trade relatively more with them reducing trade with other partners. Thus, if the euro lowers barriers we should see this coefficient be negative instead as it is positive.

However, seeing the result it is arguable that within Europe there plenty of small countries, whose currencies are difficult to trade with others. With the euro in place now, trade between small countries like Portugal and Latvia is easier and cheaper as one country in the pair owns a strong currency. This could explain the positive coefficient found in the full sample and the not significant coefficient in the EU-15 subsample as the non-euro ones are not that small. Other plausible explanation for the latter finding rest in the econometrics, there little variation for the control group[33] and especially EMU2 and EMU1 suffer from multicollinearity. It can be seen in the standard error for those coefficient with the one without EMU1, it rises for EMU2 from about 0.022-0.028 to 0.038-0.063, almost doubling depending the specification. This increase is the reason why EMU2 coefficient is insignificant for the EU-15 period 1993-2010.

[33] Trade between non-euro countries.

Trade diversion effect (EMU1)

	Full sample			EU-15 subsample		
lnTrade	1993-2002		1993-2010	1993-2002		1993-2010
lnGDPo	0.921***	-1.986*	0.227	0.764***	2.792**	1.155*
	(0.0238)	(0.873)	(0.470)	(0.0349)	(1.036)	(0.495)
lnGDPd	0.814***	-1.760*	-0.496	0.863***	2.826**	0.0928
	(0.0257)	(0.873)	(0.381)	(0.0390)	(1.004)	(0.494)
lnYcapo	-0.0310	2.628**	0.496	-0.272*	-2.515*	-0.933#
	(0.0781)	(0.864)	(0.456)	(0.113)	(1.052)	(0.504)
lnYcapd	0.0586	2.649**	1.315***	-0.291***	-2.327*	0.487
	(0.0653)	(0.831)	(0.368)	(0.0857)	(1.063)	(0.526)
EU	0.0954*	-0.00479	0.142***	-0.207***	0.00475	0.0103
	(0.0393)	(0.0363)	(0.0373)	(0.0592)	(0.0302)	(0.0355)
EU Trend	-0.031***	-0.029***	-0.040***	-0.190***	0.0073	0.0077
	(0.0079)	(0.0084)	(0.0067)	(0.0556)	(0.0065)	(0.0051)
FTA	0.150***	0.0737*	0.110***	-0.196***	0.00314	0.00635
	(0.0360)	(0.0317)	(0.0327)	(0.0577)	(0.0188)	(0.0185)
lnDistance	-1.609***			-1.322***		
	(0.0771)			(0.102)		
Language	0.909***			0.386*		
	(0.159)			(0.160)		
Border	-0.0888			0.0366		
	(0.117)			(0.117)		
Island	-0.139*			0.00517		
	(0.0691)			(0.0782)		
Landlocked	-0.147*			-0.804***		
	(0.0651)			(0.114)		
Transition	-0.227#					
	(0.132)					
EMU2	0.196***	0.211***	0.234***	0.137***	0.112**	0.109
	(0.0382)	(0.0397)	(0.0420)	(0.0391)	(0.0378)	(0.0634)
EMU1	0.119**	0.125**	0.141***	0.0384	0.0279	-0.00498
	(0.0368)	(0.0387)	(0.0370)	(0.0399)	(0.0380)	(0.0652)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country-pair dummies	No	Yes	Yes	No	Yes	Yes
N	5552	5552	10752	1808	1808	3264

Robust standard errors in parentheses

# $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

More in depth look, we see when splitting the control group from at least one non-EMU country to both must be non-EMU, the euro effect or EMU2 rises till 22%. Hence not only euro increases trade within members comparing to a non-members but the difference is even more dramatic comparing to trade between non-euro countries. The EMU1 coefficient is about the same size in the MSO full sample (12%) that includes other world major economies and in my full sample that include other European countries (13%).

Another way to approach this problem is to use our direction specific data to distinguish Euroarea exports from imports. So it was also done by (Flam & Nordström, 2003). I found that EMU12 and EMU21 are not significantly different from each other, as you can see in the next table in columns 1, 5 and 6.

Direction specific trade diversion (1993-2010)

lnTrade	Full sample				EU-15	
lnGDPo	0.920***	0.339	0.517	0.493	0.749***	1.126*
	(0.0222)	(0.469)	(0.463)	(0.472)	(0.0363)	(0.502)
lnGDPd	0.813***	-0.606	-0.410	-0.400	0.826***	0.122
	(0.0235)	(0.384)	(0.371)	(0.379)	(0.0387)	(0.492)
lnYcapo	-0.0912	0.373	0.181	0.206	-0.418***	-0.904
	(0.0585)	(0.457)	(0.450)	(0.460)	(0.114)	(0.511)
lnYcapd	0.0566	1.437***	1.225***	1.214***	-0.369***	0.458
	(0.0551)	(0.372)	(0.358)	(0.366)	(0.0819)	(0.525)
EU	0.164***	0.142***	0.140***	0.140***	-0.218***	0.0103
	(0.0364)	(0.0374)	(0.0375)	(0.0376)	(0.0615)	(0.0355)
EU Trend	-0.0391***	-0.0399***	-0.0329***	-0.0332***	-0.224***	0.00768
	(0.00592)	(0.00664)	(0.00712)	(0.00651)	(0.0564)	(0.00506)
FTA	0.127***	0.110***	0.0973**	0.0976**	-0.225***	0.00635
	(0.0335)	(0.0327)	(0.0331)	(0.0328)	(0.0582)	(0.0184)
lnDistance	-1.608***				-1.475***	
	(0.0693)				(0.109)	
Language	0.975***				0.316	
	(0.156)				(0.167)	
Border	-0.0611				0.0271	
	(0.110)				(0.116)	
Island	-0.168*				-0.0443	
	(0.0660)				(0.0809)	
Landlocked	-0.0981				-0.833***	
	(0.0597)				(0.120)	
Transition	-0.231**					
	(0.0891)					
EMU2	0.191***	0.234***	0.155**	0.161***	0.111	0.109
	(0.0421)	(0.0422)	(0.0483)	(0.0301)	(0.0617)	(0.0629)
Tran*EMU21			0.171**	0.126***		
			(0.0551)	(0.0331)		
EMU21	0.116**	0.0991*	-0.0561		0.0185	0.0148
	(0.0400)	(0.0408)	(0.0658)		(0.0659)	(0.0677)
Tran*EMU12			0.150*	0.188***		
			(0.0617)	(0.0391)		
EMU12	0.126**	0.183***	0.0411		-0.0266	-0.0247
	(0.0437)	(0.0468)	(0.0741)		(0.0674)	(0.0694)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country-pair dummies	No	Yes	Yes	Yes	No	Yes
N	10752	10752	10752	10752	3264	3264
Robust standard errors in parentheses						
* p < 0.05, ** p < 0.01, *** p < 0.001						

However, when fix-effects are applied into the full sample there is a change that does not happen in the reduced subsample. It is that now both coefficients are different and go in line with (Flam & Nordström, 2003) that concluded that the euro seemed to turn the euro nations as a greater importers (20% versus 10% for euro exports). Still is suspicious why this does not appear in the EU-15 sample. When thinking for reasons that could explain it globalization came first with the vertical specialization networks. At this time multinational presence in Eastern Europe grew and these factories were to export many of their products as inputs to Western European companies or as final products, this could explain this direction specific difference.

Afterward I crossed EMU12 and EMU21 dummies with transition one, so if my thinking was sound these coefficient should take strong value and make disappear the non-crossed coefficient ones. That can be seen in column 3 and 4, the latter excludes the non-crossed dummies since they are insignificant. Despite their difference (20% versus 13% for euro exports) they are not statistically significant. Another conclusion that can be reached is that there is no trade diversion arising from the euro, rather the opposite for some group of countries.

5.5 Timing the euro

Last comparison is the euro timing effect. This specification was developed by MSO in order to observe if the euro effect appears when it should in 1999. He found as you might already have read that it appeared a year earlier. Each EMU-year variable is a dummy that takes one for that specific year if both countries are entering the euro in 1999.

Under my data I found also that it appears in 1998 in the full sample. Then it grows further in 1999 being more or less stable around 20% and decreasing when the financial crisis hit strongly international trade in 2009 and caused deeper problems in the euro-area, the so called sovereignty debt crisis.

Notwithstanding, the same conclusions cannot be reached from the reduced sample. On it, the euro effect first appears in 1996, too early to be caused by the euro. It is true that it has a jump in 1998 and another in 2001, but still is suspicious that the effect arose that early. It could be that states within the euro were already integrating in a faster speed than those outside before the euro. For instance adapting single market directives faster or than the single market had a lagged effect that benefited more core Europe countries. The reason why this does not appear in the full sample might be linked to the fact that around those years trade with Eastern Europe increased sharply due to vertical specialization production networks. Anyway, this would also mean that the EMU2 previous coefficients might suffer from an endogeneity problem as many authors warned, or if there is something else behind, it could be caused a spurious result.

Fortunately, within the full sample there are five more countries entering the euro on a later date than 1999, so this could also lead us to wrong conclusion. It might also be a proof that the euro is nothing but a continuation of Europe's economic integration and not especial happening, being a non-random event.

If we leave aside the fact that the effect arise in 1996, we see that after 2001 the coefficient also reaches a stable figure at 21%, though slightly higher the last years when more countries entered the area. Comparing this to the conclusion reached just before when the coefficient decreased the last year, I wonder if this it could not be due to that the new euro members[34] are not taken into account in here. Since the euro might have jumped their trade that is now in the control group. In contrast, this does not happened in the EU-15 subsample.

Timing: period 1993-2010

lnTrade	Full	EU-15		Full	EU-15
lnGDP$_o$	0.413	0.803	**EMU-1999**	0.211***	0.146***
	(0.480)	(0.472)		(0.0490)	(0.0341)
lnGDP$_d$	-0.307	-0.258	**EMU-2000**	0.205***	0.158***
	(0.382)	(0.491)		(0.0515)	(0.0390)
lnYcap$_o$	0.325	-0.496	**EMU-2001**	0.171***	0.191***
	(0.468)	(0.481)		(0.0513)	(0.0380)
lnYcap$_d$	1.141**	0.924	**EMU-2002**	0.208***	0.208***
	(0.370)	(0.520)		(0.0549)	(0.0439)
EU	0.147***	-0.00136	**EMU-2003**	0.193***	0.186***
	(0.0363)	(0.0350)		(0.0547)	(0.0431)
EU Trend	-0.0422***	0.00432	**EMU-2004**	0.179**	0.215***
	(0.00662)	(0.00400)		(0.0558)	(0.0444)
FTA	0.122***	0.00126	**EMU-2005**	0.203***	0.214***
	(0.0340)	(0.0180)		(0.0548)	(0.0460)
EMU-1994	-0.0335	0.0179	**EMU-2006**	0.194***	0.209***
	(0.0320)	(0.0160)		(0.0564)	(0.0464)
EMU-1995	-0.0586	0.0204	**EMU-2007**	0.195***	0.223***
	(0.0412)	(0.0233)		(0.0573)	(0.0482)
EMU-1996	0.00421	0.0527*	**EMU-2008**	0.199***	0.228***
	(0.0408)	(0.0251)		(0.0565)	(0.0463)
EMU-1997	0.0535	0.0897**	**EMU-2009**	0.165**	0.232***
	(0.0417)	(0.0273)		(0.0589)	(0.0475)
EMU-1998	0.133**	0.136***	**EMU-2010**	0.133*	0.252***
	(0.0460)	(0.0325)		(0.0618)	(0.0509)
Year dummies	Yes	Yes		Yes	Yes
Country-pair dummies	Yes	Yes		Yes	Yes
N	10752	3264		10752	3264
Robust standard errors in parentheses					
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$					

[34] Slovenia entered in 2007, Malta and Cyprus in 2008 and Slovakia in 2009.

6. Plug and play

Once a previous model done before by some authors have been replicated for the sake of comparison, the joy starts. In this section I will put in place some of the concerns I thought about and try to go further and get something new out of it.

6.1 Non-linearities

First non-linearity to be addressed is the square terms, as (Persson, 2001) highlighted. In the following table it can be seen the results for the full sample. The first column show the combined result of introducing in the square term for GDP, output per capita and distance. Second column drops distance, and the third one just account for this square term.

One benefit of having direction specific trade flow is that origin and destination coefficient can be divided for country characteristic. And so behaves GDP and output per capita being significant for destination only, in line with macroeconomic theory that export depend just on destinations economic power. Distance's square term per contra is insignificant, that is why is dropped later in fourth and fifth column.

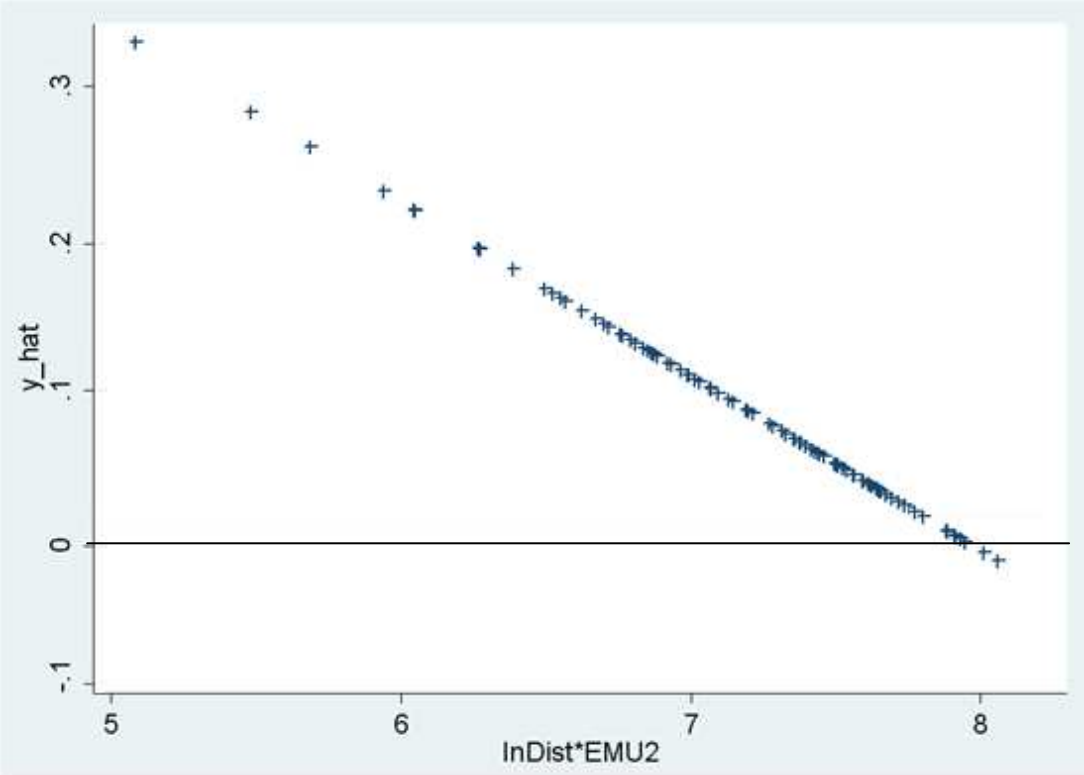
What cares in here is the euro effect, which is stable at 9% controlling for square non-linearities. Another interesting point relies upon EU dummy which grow in importance, though this increase is not statistically significant. It seems intuitive that entering the single market supposes a larger decrease in trade barriers than entering the single currency. It goes from 17% to 23%.

The last two columns include distance crossed with EMU2 dummy, being the last column the fix-effects specification that I prefer. The intuition is that as we have review is that (Micco, Stein, & Ordoñez, 2003) found that Portugal and Greece peripheral countries where the least benefited from the euro, while the Deutsche Mark (DM) block where the most, which are much closer to each other. One reason for introducing the euro was that it would make possible of local supply networks in areas nearby the border like Benelux-France-Germany area. Therefore, this area might be the most benefited from the introduction of the common currency. On the other hand, MSO also argue that the DM block saw the largest increases in trade because they were already more integrated than others and that the euro might take time, so a positive result might be spurious in this case.

Non-linearities within the full sample

lnTrade	1993-2010				
lnGDPo	-0.00949	0.00614	0.926***	0.0497	-0.663
	(0.566)	(0.565)	(0.0226)	(0.560)	-1.071
lnGDPo^2	0.0180	0.0176		0.0168	0.0232
	(0.0110)	(0.0110)		(0.0109)	(0.0152)
lnGDPd	-2.118***	-2.102***	0.821***	-2.043***	-3.966***
	(0.535)	(0.533)	(0.0233)	(0.528)	(0.860)
lnGDPd^2	0.0583***	0.0579***		0.0567***	0.0834***
	(0.0104)	(0.0104)		(0.0103)	(0.0150)
lnYcapo	0.0933	0.0959	-0.0867	0.0377	0.650
	(0.484)	(0.484)	(0.0591)	(0.481)	(0.608)
lnYcapo^2	-0.00626	-0.00623		-0.00270	-0.0217
	(0.0267)	(0.0267)		(0.0265)	(0.0336)
lnYcapd	2.545***	2.548***	0.0560	2.497***	2.800***
	(0.449)	(0.450)	(0.0546)	(0.447)	(0.545)
lnYcapd^2	-0.139***	-0.139***		-0.136***	-0.116***
	(0.0249)	(0.0249)		(0.0248)	(0.0342)
EU	0.221***	0.221***	0.168***	0.220***	0.220***
	(0.0359)	(0.0359)	(0.0368)	(0.0359)	(0.0383)
EU Trend	-0.032***	-0.032***	-0.037***	-0.032***	-0.037***
	(0.0068)	(0.0068)	(0.0058)	(0.0068)	(0.0072)
FTA	0.155***	0.155***	0.130***	0.154***	0.158***
	(0.0323)	(0.0323)	(0.0337)	(0.0323)	(0.0321)
lnDistance	-3.001*	-1.585***	-2.480	-1.570***	
	-1.268	(0.0676)	-1.284	(0.0682)	
lnDistance^2	0.100		0.0631		
	(0.0893)		(0.0901)		
Language	0.956***	0.995***	0.944***	0.995***	
	(0.141)	(0.144)	(0.151)	(0.147)	
Border	-0.200	-0.119	-0.109	-0.125	
	(0.125)	(0.112)	(0.123)	(0.114)	
Island	-0.300***	-0.300***	-0.186**	-0.296***	
	(0.0696)	(0.0696)	(0.0648)	(0.0693)	
Landlocked	-0.0265	-0.0243	-0.0952	-0.0239	
	(0.0612)	(0.0615)	(0.0594)	(0.0617)	
Transition	-0.228*	-0.234**	-0.246**	-0.223*	
	(0.0886)	(0.0890)	(0.0890)	(0.0892)	
lnDist*EMU2				-0.0977**	-0.105***
				(0.0308)	(0.0306)
EMU2	0.0914***	0.0916***	0.0814**	0.796***	0.864***
	(0.0273)	(0.0273)	(0.0275)	(0.218)	(0.217)
Year dummies	Yes	Yes	Yes	Yes	Yes
Country-pair dummies	No	No	No	No	Yes
N	10752	10752	10752	10752	10752
Robust standard errors in parentheses					
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$					

With the results on hand the intuition seems right. The net effect of the euro is positive for the mean value of distance, 10%; but it goes down the more far apart are the countries. The next graph shows the net effect for euro countries, net effect on the vertical axis and distance in the horizontal axis. Most of the observations are concentrated around 0 and 0.15, being the closest pair Netherlands-Belgium at the top and below zero are pairs that contain either Portugal, Greece, Finland or Cyprus.



Another non-linearity that I have tries but not included here, as it has been insignificant in various ways I have tried, is the one crossing EMU2 with GDP. It seems logical that the euro benefit more small nations than big ones due to the exchange rate risk I have mentioned several times. However, there is no relevant result for it.

Next, the same has been done but in the reduced sample for EU-15 countries. In this time though the square term of distance is significant but it is not the one of outputs. Interestingly in this case the euro effect rise from the linear specification figure of 12% to 15%. So somehow poorer, smaller and further countries are less benefited from the single currency just in the reduced sample, it seems then that the periphery-core due is once again highlighted.

When tested this affirmation deeper, crossing euro dummy with distance the result are less dramatic than in the full sample for far apart old-euro countries like Greece, Finland and Portugal. Being the net effect for the mean distance of 13% on average, but 3% for the further couple of Portugal and Finland. Still, the reasoning is not that

the more damages trade if they are far apart, but it benefits relatively more close countries than further ones.

Non-linearities in EU-15 subsample

lnTrade			1993-2010		
lnGDPo	1.393	1.373	0.728***	0.725***	1.038*
	-1.250	-1.250	(0.0350)	(0.0347)	(0.473)
lnGDPo^2	-0.0122	-0.0114			
	(0.0232)	(0.0232)			
lnGDPd	0.335	0.243	0.803***	0.799***	-0.0233
	-1.091	-1.089	(0.0375)	(0.0376)	(0.479)
lnGDPd^2	0.00876	0.0109			
	(0.0203)	(0.0203)			
lnYcapo	-6.546**	-6.557**	-0.396***	-0.343**	-0.751
	-2.448	-2.441	(0.113)	(0.120)	(0.478)
lnYcapo^2	0.306*	0.306*			
	(0.123)	(0.123)			
lnYcapd	-2.233	-2.223	-0.352***	-0.299***	0.669
	-1.835	-1.834	(0.0806)	(0.0831)	(0.511)
lnYcapd^2	0.0947	0.0937			
	(0.0912)	(0.0912)			
EU	-0.241***	-0.248***	-0.210***	-0.189**	0.019
	(0.0630)	(0.0649)	(0.0600)	(0.0601)	(0.0349)
EU Trend	-0.225***	-0.233***	-0.215***	-0.206***	0.0056
	(0.053)	(0.056)	(0.053)	(0.053)	(0.004)
FTA	-0.225***	-0.233***	-0.216***	-0.209***	0.00239
	(0.0557)	(0.0580)	(0.0556)	(0.0556)	(0.0181)
lnDistance	3.864***	-1.492***	3.779***	3.864***	
	-1.064	(0.108)	-1.032	-1.009	
lnDistance^2	-0.383***		-0.375***	-0.377***	
	(0.0790)		(0.0768)	(0.0753)	
Language	0.561***	0.307	0.566***	0.575***	
	(0.152)	(0.172)	(0.148)	(0.145)	
Border	0.0923	0.0220	0.0958	0.101	
	(0.107)	(0.118)	(0.105)	(0.104)	
Island	-0.0724	-0.0396	-0.0782	-0.0789	
	(0.0853)	(0.0881)	(0.0785)	(0.0782)	
Landlocked	-0.939***	-0.840***	-0.929***	-0.928***	
	(0.118)	(0.123)	(0.116)	(0.115)	
lnDist*EMU2				-0.0906**	-0.0913**
				(0.0341)	(0.0332)
EMU2	0.140***	0.139***	0.116***	0.766**	0.771**
	(0.0294)	(0.0294)	(0.0282)	(0.247)	(0.239)
Year dummies	Yes	Yes	Yes	Yes	Yes
Country-pair dummies	No	No	No	No	Yes
N	3264	3264	3264	3264	3264
Robust standard errors in parentheses					
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$					

I thus conclude in line with (Persson, 2001) that never before were non-linearities to be a problem in the gravity model analysis. But in line with the robust results there should not be omitted or at least not controlled for in every research, especially in those where countries do differ widely from each other (resulting in a higher sampling variation). In the following models though, I will not include them so results are easier comparable to previous literature and model, and in order not to build up the study in complexity.

6.2 Trade diversion in transition economies

This as commented in section 5.4, I am analyzing if the trade diversion, which benefited trade in pairs EMU1 type[35], has something to do with the fact that most of those cases concern new EU members. Therefore I include in column 1 a dummy which takes one when both conditions are fulfilled, transition economy and EMU1. There we see that this trade diversion effect is just significant for transition economies, not the rest. In case the reader is thinking about that they are not just transition economies but the new EU member, I must say that in this case the coefficient is reduced almost a third, dominated by transition economies' positive impact[36].

Fourth column includes a non-linearity, distance crossed with EMU2 and EMU1. Just the former is significant and included in following specifications. Fifth and sixth columns include transition crossed with EMU1, drop EMU1 alone, and include distance with EMU2. The last column if the fix-effects specification.

In this case there is a movement up for euro and distance effect, meaning that when EMU1 relationship is included the less beneficial effect of euro on far away trade partners grow. The crossed relationship between transition and EMU1 now stay at about 17% on boosting trade on average.

This result I think that support the idea I commented before that vertical specialization networks with Eastern Europe may have an important effect, as Malta and Cyprus do not benefit from it. Besides this could lead to wrong conclusion causing spurious results in the coefficient as both event happened around the same time. I remind it is an idea that I came up with, I did not check when this globalization patterns started to go to Eastern Europe, but as far as I know there are around late 90s and beginning of XIX century.

[35] One country in the pair is within the euro and the other is not.
[36] The result of EMU1 crossed with Malta and Cyprus is highly negative.

Transition crossed with EMU1

lnTrade	1993-2010					
lnGDPo	0.920***	0.933***	0.933***	0.918***	0.920***	0.508
	(0.0225)	(0.0223)	(0.0222)	(0.0223)	(0.0224)	(0.468)
lnGDPd	0.814***	0.827***	0.827***	0.814***	0.815***	-0.219
	(0.0231)	(0.0227)	(0.0227)	(0.0229)	(0.0230)	(0.376)
lnYcapo	-0.119*	-0.310***	-0.309***	-0.0869	-0.112	0.211
	(0.0579)	(0.0604)	(0.0604)	(0.0593)	(0.0585)	(0.454)
lnYcapd	0.0251	-0.164**	-0.163**	0.0528	0.0295	1.033**
	(0.0529)	(0.0544)	(0.0544)	(0.0544)	(0.0531)	(0.363)
EU	0.157***	0.0672	0.0685	0.165***	0.157***	0.140***
	(0.0366)	(0.0404)	(0.0410)	(0.0361)	(0.0365)	(0.0375)
EU Trend	-0.031***	-0.014	-0.013	-0.039***	-0.032***	-0.033***
	(0.0066)	(0.0077)	(0.0072)	(0.0058)	(0.0058)	(0.0065)
FTA	0.109**	0.0783*	0.0775*	0.127***	0.110***	0.0964**
	(0.0335)	(0.0335)	(0.0332)	(0.0333)	(0.0331)	(0.0328)
lnDistance	-1.618***	-1.662***	-1.660***	-1.622***	-1.602***	
	(0.0688)	(0.0699)	(0.0695)	(0.0763)	(0.0691)	
Language	0.980***	0.972***	0.972***	0.960***	0.982***	
	(0.157)	(0.155)	(0.155)	(0.159)	(0.160)	
Border	-0.0763	-0.147	-0.147	-0.0768	-0.0870	
	(0.110)	(0.108)	(0.108)	(0.111)	(0.112)	
Island	-0.152*	-0.145*	-0.146*	-0.164*	-0.148*	
	(0.0657)	(0.0662)	(0.0660)	(0.0658)	(0.0658)	
Landlocked	-0.0901	-0.0389	-0.0383	-0.0925	-0.0893	
	(0.0596)	(0.0602)	(0.0601)	(0.0598)	(0.0600)	
Transition	-0.301***	-0.904***	-0.904***	-0.229*	-0.276**	
	(0.0856)	(0.123)	(0.123)	(0.0898)	(0.0877)	
Tran. Trend		0.0368***	0.0363***			
		(0.00567)	(0.00594)			
lnDist*EMU2				-0.0978**	-0.129***	-0.125***
				(0.0341)	(0.0321)	(0.0307)
EMU2	0.110*	0.147**	0.124***	0.896***	1.068***	1.061***
	(0.0499)	(0.0472)	(0.0292)	(0.241)	(0.228)	(0.217)
Trans*EMU1	0.183***	0.0783#	0.0975***		0.161***	0.161***
	(0.0471)	(0.0413)	(0.0259)		(0.0273)	(0.0277)
lnDist*EMU1				0.0652		
				(0.0398)		
EMU1	-0.0444	0.0326		-0.350		
	(0.0615)	(0.0563)		(0.279)		
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country-pair dummies	No	No	No	No	No	Yes
N	10752	10752	10752	10752	10752	10752

Robust standard errors in parentheses

# $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Another specification tried is to check is a time trend for transition economies and the rest comparable to the first column (Columns 2 and 3). So that the transition economies were much really worse in the beginning but improving and closing the gap with the Western. This trend takes a positive and significant value. While the transiton-EMU1 dummy is still positive (8%) and significant at 10% level[37]. If EMU1 is dropped because it is insignificant, the transition-EMU1 rises to 10% and is highly significant again. Thus there is a mixed effect that goes against previous conclusions.

6.4 Super transition economies and vertical production networks

I have commented in several parts of this thesis the idea that around the same time the euro took place, Eastern Europe countries started to receive direct investments from Western Europe. Some of these investments could be aimed as vertical FDI in order to take advantage of cheaper factor prices and its closer placement to core Europe.

Until now I have not distinguished different countries in Eastern Europe that might have received relatively larger amounts of FDI. In the Appendix it can be seen a chart which show the share of foreign-controlled affiliates in manufacturing for some European countries. Considering turnover share in foreign owned firm hands, Slovakia, Czech Republic, Poland, Estonia and Hungary have a large presence of foreign investment involved in manufacturing. This can be a proxy to select the countries which are more involved in this vertical production networks. Therefore I made a new group for these countries called *super transition*, a dummy that takes value one when one country in the pair is one of these countries.

As we can observe in the results, when this dummy is crossed with EMU1 it is positive and highly significant. Whilst EMU1 crossed with transition lose its significance in the model. Super transition EMU1 coefficient still maintain its significance when a super transition trend is included in the model, this trend will account for the fact that FDI is accumulated over years increasing trade every year for those nations. This suggests that the euro may have boosted those vertical investments and thus increasing trade between super transition and euro countries. As a result vertical production network hypothesis between Western and Eastern Europe takes a step forward, it should be deeper analyzed though.

[37] T-test is 5.8% likelihood.

Super transition economies
(Poland, Czech Rep., Slovakia, Estonia and Hungary)

lnTrade	1993-2010					
lnGDPo	0.913***	0.915***	0.914***	0.928***	0.913***	0.290
	(0.0228)	(0.0224)	(0.0225)	(0.0221)	(0.0225)	(0.468)
lnGDPd	0.807***	0.809***	0.809***	0.822***	0.807***	-0.431
	(0.0233)	(0.0230)	(0.0230)	(0.0225)	(0.0229)	(0.372)
lnYcapo	-0.101	-0.102	-0.0912	-0.284***	-0.126*	0.436
	(0.0569)	(0.0568)	(0.0580)	(0.0586)	(0.0577)	(0.454)
lnYcapd	0.0435	0.0429	0.0537	-0.138*	0.0191	1.252***
	(0.0527)	(0.0527)	(0.0536)	(0.0538)	(0.0538)	(0.359)
EU	0.157***	0.157***	0.159***	0.0720	0.130***	0.139***
	(0.0369)	(0.0368)	(0.0367)	(0.0405)	(0.0380)	(0.0377)
EU Trend	-0.032***	-0.031***	-0.034***	-0.015*	-0.033***	-0.034***
	(0.00658)	(0.00657)	(0.00581)	(0.00769)	(0.00580)	(0.00646)
FTA	0.127***	0.127***	0.134***	0.0951**	0.140***	0.119***
	(0.0333)	(0.0333)	(0.0332)	(0.0333)	(0.0333)	(0.0326)
lnDistance	-1.621***	-1.618***	-1.614***	-1.660***	-1.629***	
	(0.0681)	(0.0679)	(0.0674)	(0.0688)	(0.0670)	
Language	0.970***	0.974***	0.971***	0.967***	0.954***	
	(0.154)	(0.155)	(0.155)	(0.153)	(0.152)	
Border	-0.0628	-0.0695	-0.0642	-0.137	-0.0595	
	(0.109)	(0.110)	(0.110)	(0.107)	(0.108)	
Island	-0.164*	-0.159*	-0.166*	-0.151*	-0.191**	
	(0.0659)	(0.0653)	(0.0650)	(0.0656)	(0.0647)	
Landlocked	-0.168*	-0.135*	-0.144*	-0.0806	-0.211***	
	(0.0735)	(0.0598)	(0.0599)	(0.0600)	(0.0626)	
Transition	-0.307**	-0.276**	-0.255**	-0.848***	-0.403***	
	(0.0948)	(0.0847)	(0.0874)	(0.121)	(0.0915)	
Super tran.	0.0789					
	(0.0927)					
Tran. Trend				0.0347***		
				(0.00564)		
Super tran. Trend					0.0220***	
					(0.00457)	
EMU2	0.122*	0.122*	0.137***	0.155**	0.135***	0.161***
	(0.0502)	(0.0502)	(0.0289)	(0.0479)	(0.0280)	(0.0291)
Trans*EMU1	0.0681	0.0665		-0.0165		
	(0.0521)	(0.0520)		(0.0481)		
SupTrans*EMU1	0.240***	0.243***	0.280***	0.210***	0.150***	0.287***
	(0.0518)	(0.0508)	(0.0385)	(0.0502)	(0.0372)	(0.0402)
EMU1	-0.0360	-0.0360		0.0354		
	(0.0616)	(0.0616)		(0.0566)		
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country-pair dummies	No	No	No	No	No	Yes
N	10752	10752	10752	10752	10752	10752
Robust standard errors in parentheses						
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$						

6.5 EMU trend

One argument MSO raised as a plausible explanation of way the Deutsche Mark block countries did show a greater benefit from the euro is that they were already trading their currencies in fix rates long before the euro and thus they were more integrated. So he argued that the euro might not be a one-time effect but it can get time.

So as they are currently several countries that entered in other years different from 1999 an EMU trend variable might be interesting to see in play. Nonetheless, this variable is highly insignificant in both OLS and within estimator specifications. This can be due to either that the euro has a one-time effect on trade or that there is not enough variation in the sample for countries that adopted the sample later.

I do not include the results, I just wanted to comment that though the idea made sense, it turned out to be wrong.

6.6 Oil prices

When I first saw MSO euro timing results and then (Frankel, 2008) extended sample ones it came to my mind that the euro increased trade strongly during the first years but after 2001-2002 it turned stable. Hence, it might something else going on around that time. Some authors commented that there could be an effect related to the sharp fall in the euro-dollar quotation, but the quotation has change in different manners along time. Besides the effect it is already accounted in the year dummies, because there is no big reason to think that the euro-dollar does affect systematically more some European countries than others.

But there is one other thing that has a great role in trade, and this is the transportation costs. This is also accounted somehow within the year dummies, but in contrast it does affect in a different way each country. Those whose trade partners are far away will see their cost rise stepper than others. And well, which is the main driver for transportation costs? The oil prices. As a result next specification will include Brent oil prices crossed with distance.

The result below shows almost the same EMU2 coefficients, and it does support the new specification. First, second, fifth and sixth column reflect the new crossed variable Brent oil prices with distance. As this variable is time varying it does get value under fix-effects specification. There is a difference once again between the full and the reduced samples, being nearly insignificant in the full OLS specification and no significant at all under within estimator. Totally opposite looks EU-15, where it is highly significant. So it can be again be a result of transition interaction. The reasoning behind can be that the price gap with Eastern Europe in much higher than with other Western economies and despite a transportation cost increase Eastern European products are

still far cheaper. In Western Europe whereas companies might change their supply patterns accordingly, either switching to closer country suppliers or to national ones.

Within the EU-15 subsample a 10% increase in oil prices would decrease trade about 8% on average for the mean country distance, going on a range from 6% to 9.5% in the minimum and maximum distance values respectively. Quite a large magnitude to be ignored given especially the high oil price volatilities.

Oil prices and distance

	Full sample		EU-15	
lnGDPo	0.926***	0.399	0.751***	1.067*
	(0.0222)	(0.485)	(0.0366)	(0.488)
lnGDPd	0.822***	-0.323	0.822***	0.00539
	(0.0228)	(0.401)	(0.0391)	(0.474)
lnYcapo	-0.0851	0.347	-0.348**	-0.759
	(0.0585)	(0.471)	(0.119)	(0.492)
lnYcapd	0.0534	1.164**	-0.290***	0.661
	(0.0538)	(0.387)	(0.0840)	(0.503)
EU	0.167***	0.150***	-0.189**	0.0936*
	(0.0371)	(0.0379)	(0.0615)	(0.0368)
EU Trend	-0.0387***	-0.0383***	-0.210***	0.0769***
	(0.00569)	(0.00659)	(0.0559)	(0.0133)
FTA	0.129***	0.114***	-0.224***	0.0627**
	(0.0339)	(0.0331)	(0.0573)	(0.0211)
lnBrent*Dist	-0.0688*	-0.0330	-0.116***	-0.115***
	(0.0307)	(0.0315)	(0.0282)	(0.0278)
lnDistance	-1.242***		-0.858***	
	(0.182)		(0.185)	
Language	0.970***		0.321	
	(0.154)		(0.166)	
Border	-0.0621		0.0473	
	(0.109)		(0.116)	
Island	-0.181**		-0.0507	
	(0.0649)		(0.0805)	
Landlocked	-0.0940		-0.824***	
	(0.0592)		(0.119)	
Transition	-0.252**			
	(0.0883)			
EMU2	0.0858**	0.103***	0.123***	0.124***
	(0.0271)	(0.0276)	(0.0283)	(0.0287)
Year dummies	Yes	Yes	Yes	Yes
Country-pair dummies	No	Yes	No	Yes
N	10752	10752	3264	3264
Robust standard errors in parentheses				
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$				

7. Sensitivity analysis

7.1 Excluding groups of countries

Next table shows how does the EMU2 coefficient varies when several countries are excluded at the same time from the sample. I made for different exclusion groups, Less Developed Periphery (LDP – Portugal, Ireland, Greece, Spain, Cyprus and Malta), Core (France, Italy, Germany, Belgium-Luxemburg and the Netherlands), DM Block (Germany, the Netherlands, Belgium-Luxemburg, Austria France and Denmark) and North Periphery (Sweden, Finland, Denmark and UK). Eastern Europe has not been excluded as a group because it has been already analyzed separately with transition dummies and the EU15 subsample.

First thing to highlight is that the coefficient does not vary sharply, so it does the t-test. More especially when *Core* Europe is excluded, where the EMU2 is just significant on a 10% level of confidence.

Surprisingly I did find as well the fact that the coefficient rises when *DM Block* countries are excluded. It is just the opposite of what MSO found. A reasonable explanation is that all this groups of countries lead by Germany performed poorly during the 2000s compared to Sothern Europe especially. Those years are not reflected in MSO and hence might have change the euro effect. In this same line lays the fact that the coefficient falls when *LDP* is excluded from the regression, showing that this countries had a different behavior. Anyway these differences are not statistically significant one from each other. Another point is that when North periphery is excluded, mostly non-euro but within EU-15 countries, the euro effect takes its lowest record. Meaning that euro has been beneficial and an advantage compared to those developed European countries that had not adopted it.

7.2 Excluding years

Next table shows the robustness check using just a couple of years of trade data before the euro and after the euro. The election of the years has been because of some years after the single market took place and then 5 and 10 after that. It is also done separately for the full sample and the EU-15 subsample. There can be seen some differences but it is quite stable and the differences are insignificant from each other.

8. Conclusion

All along this thesis several figures of the euro effect could have been found, concerning both previous literature and my own findings. Related euro literature on currency unions found the Rose effect to be between 5% and 35% depending on the data and authors specifications, while my own research on the extended data available at the moment and the inclusion of Eastern Europe on it gives a narrower range

between 8% to 12% in the simplest specification; and reaching 26% for the most complex ones. The latter figure appears when we account for possible trade diversion[38] and when we separate East and West Europe.

In this thesis I have tried first to replicate as similarly as possible with my own data previous papers, especially (Micco, Stein, & Ordoñez, 2003). I found several differences in the results with it that can be caused by several reasons, yet the key findings on EMU2 and EMU1 coefficients are really close.

Moreover, I have tried as well to develop some extra specifications that I considered important and that it made a lot of sense. The relation between euro effect and distance was quite remarkable as the net effect was negative for far away countries or the negative interaction of oil prices and distance on trade. Non-linearities never have been fully accounted for on empirical researches about gravity equations, at sight of my results they should be taken more seriously in advance.

Being quite new the inclusion of trade data of Eastern EU members, it has arisen some extra concerns that it would be a good idea to develop further. There is no doubt that FDI investments shape trade patterns in different forms, above all in Eastern Europe. This is mixed with the introduction of the euro that seemed to have boosted even more those investment-trade relationships by an amount of about 20% to 30% depending on specific countries, being at the top range those nations who have a larger multinational presence in their economies.

Nonetheless, some problems have also arisen during the data gathering. Missing values on trade data during the first years and concentrated on Eastern states or the early appearance of the euro effect when trying to time it. A wide variety of other interferences should not be forgotten. The deeper EU integration going on these years, two economic crises and the amazing increase of world trade in the 2000s due to China can be some other things going on that could affect the results in an unknown way. Besides, the euro has not only affected trade but also world financing, monetary policy, investments and some other areas all of them interrelated with each other.

Ending up the conclusion, the common currency has had a significant positive effect which is at least about 8% of higher trade between European countries. This figure should be taken in mind especially for those countries that are still doubting of a positive effect the euro might have if adopted by their own countries. In addition and concerning nowadays happenings, it should be also considered by those lawmakers and experts that suggest/think that some country within the euro should leave it and return back to their old currency.

[38] Go to section 5.4 for extra clarification.

9. Appendix

FTA situation after 1992 (ended when got into EU)

EU-12 (EMU year)	Belgium-Luxemburg (1999), Germany (1999), Denmark, Spain (1999), France (1999), UK, Greece(2001), Ireland (1999), Italy (1999), Netherlands and Portugal (1999)							
	EU	EMU	EA	EAA	EFTA	EFTA-Other	CEFTA	BAFTA
Austria	1995	1999		1994	1960			
Bulgaria	2007		1995			1994	1999	
Cyprus	2004	2008	1973					
Czech Rep.	2004		1995			1992	1992	
Estonia	2004	2011	1998			1997		1994
Finland	1995	1999		1994	1986			
Hungary	2004		1994			1993	1992	
Lithuania	2004		1998			1997		1994
Latvia	2004		1998			1996		1994
Malta	2004	2008	1971					
Poland	2004		1994			1994	1992	
Romania	2007		1995			1993	1997	
Sweden	1995			1994	1960			
Slovenia	2004	2007	1999			1998	1996	
Slovakia	2004	2009	1995			1992	1992	

Descriptive Statistics (full sample)

	N	Min	Max	Mean	Std. Deviation
lnTrade	10752	9.420	25.300	19.531	2.487
lnGDPo	10752	21.338	28.477	25.580	1.734
lnGDPd	10752	21.338	28.477	25.580	1.734
lnYCAPo	10752	6.654	10.637	9.539	0.837
lnYCAPd	10752	6.654	10.637	9.539	0.837
RERo	10752	0.000	199.920	93.981	34.807
RERd	10752	0.000	199.920	93.981	34.807
lnBrentDist	10752	9.315	14.024	12.205	0.729
lnDist	10752	5.081	8.237	7.165	0.573
EU	10752	0.000	1.000	0.569	0.495
FTA	10752	0.000	1.000	0.304	0.460
Language	10752	0.000	1.000	0.048	0.213
Border	10752	0.000	1.000	0.095	0.294
Island	10752	0.000	2.000	0.308	0.501
Landlocked	10752	0.000	2.000	0.289	0.487
Transition	10752	0.000	2.000	0.703	0.640
EMU2	10752	0.000	1.000	0.139	0.346
EMU1	10752	0.000	1.000	0.369	0.483
EMU12	10752	0.000	1.000	0.184	0.388
EMU21	10752	0.000	1.000	0.184	0.388

Descriptive Statistics (EU-15 sample)

	N	Min	Max	Mean	Std. Deviation
lnTrade	3264	16.308	25.300	21.704	1.650
lnGDPo	3264	24.721	28.477	26.734	1.025
lnGDPd	3264	24.721	28.477	26.734	1.025
lnYCAPo	3264	9.215	10.637	10.110	0.313
lnYCAPd	3264	9.215	10.637	10.110	0.313
RERo	3264	0.000	111.460	88.564	31.503
RERd	3264	0.000	111.460	88.564	31.503
lnBrentDist	3264	9.315	13.913	12.114	0.744
lnDist	3264	5.081	8.127	7.121	0.560
EU	3264	0.000	1.000	0.960	0.197
FTA	3264	0.000	1.000	0.020	0.141
Language	3264	0.000	1.000	0.065	0.246
Border	3264	0.000	1.000	0.153	0.360
Island	3264	0.000	2.000	0.287	0.476
Landlocked	3264	0.000	1.000	0.141	0.348
EMU2	3264	0.000	1.000	0.392	0.488
EMU1	3264	0.000	1.000	0.251	0.434
EMU12	3264	0.000	1.000	0.126	0.331
EMU21	3264	0.000	1.000	0.126	0.331

Correlation of real GDP growth (period 1996-2010)

	Germany	France	UK	US	Japan
Belgium	0.861	0.887	0.853	0.853	0.747
Bulgaria	0.362	0.440	0.332	0.096	0.203
Czech Republic	0.573	0.422	0.526	0.313	0.756
Denmark	0.863	0.882	0.917	0.922	0.813
Germany	1.000	0.831	0.777	0.708	0.772
Estonia	0.659	0.732	0.866	0.719	0.757
Ireland	0.551	0.821	0.893	0.863	0.496
Greece	0.241	0.528	0.660	0.411	0.252
Spain	0.679	0.906	0.943	0.801	0.544
France	0.831	1.000	0.916	0.872	0.610
Italy	0.885	0.926	0.934	0.831	0.796
Cyprus	0.699	0.851	0.751	0.576	0.405
Latvia	0.687	0.767	0.887	0.692	0.745
Lithuania	0.609	0.620	0.810	0.569	0.679
Luxembourg	0.779	0.935	0.814	0.809	0.535
Hungary	0.671	0.852	0.914	0.788	0.589
Malta	0.652	0.486	0.417	0.474	0.572
Netherlands	0.858	0.874	0.845	0.829	0.600
Austria	0.894	0.875	0.846	0.783	0.676
Poland	0.533	0.410	0.442	0.518	0.439
Portugal	0.668	0.816	0.760	0.823	0.389
Romania	0.338	0.236	0.377	0.045	0.478
Slovenia	0.799	0.797	0.882	0.714	0.707
Slovakia	0.584	0.369	0.540	0.321	0.643
Finland	0.887	0.903	0.947	0.871	0.775
Sweden	0.877	0.890	0.862	0.861	0.783
United Kingdom	0.777	0.916	1.000	0.896	0.724
Iceland	0.532	0.750	0.800	0.687	0.500
Norway	0.486	0.610	0.732	0.741	0.574
Switzerland	0.884	0.766	0.624	0.556	0.644
Croatia	0.458	0.473	0.728	0.496	0.649
Macedonia	0.341	0.231	0.196	0.242	0.218
Turkey	0.438	0.343	0.459	0.522	0.719
United States	0.708	0.872	0.896	1.000	0.650
Japan	0.772	0.610	0.724	0.650	1.000

Real Exchange Rates

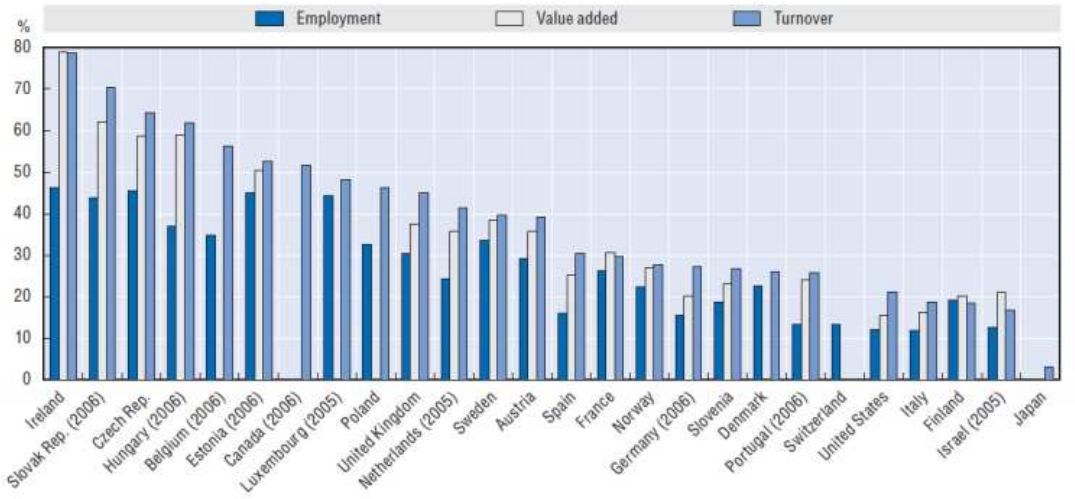
	Full sample		EU-15 subsample	
lnTrade	1994-2002	1994-2009	1994-2002	1994-2009
lnGDPo	0.931***	0.920***	0.755***	0.743***
	(0.0241)	(0.0228)	(0.0356)	(0.0364)
lnGDPd	0.838***	0.825***	0.858***	0.829***
	(0.0261)	(0.0234)	(0.0384)	(0.0383)
lnYcapo	0.00753	-0.155*	0.0961	-0.302
	(0.0720)	(0.0694)	(0.157)	(0.156)
lnYcapd	-0.0200	-0.0992	-0.195	-0.328**
	(0.0730)	(0.0648)	(0.121)	(0.115)
RERo	-0.00154	0.00108	-0.0117***	-0.00390
	(0.00140)	(0.00107)	(0.00196)	(0.00212)
RERd	-0.000342	0.00255**	-0.00308	-0.00147
	(0.00143)	(0.000836)	(0.00195)	(0.00182)
EU	0.0906	0.160***	-0.0202	-0.000696
	(0.0516)	(0.0392)	(0.0271)	(0.0314)
EU Trend	-0.0408***	-0.0337***	-0.138*	-0.203***
	(0.00845)	(0.00585)	(0.0561)	(0.0595)
FTA	0.0570	0.0980**	%	%
	(0.0384)	(0.0341)		
lnDistance	-1.581***	-1.624***	-1.190***	-1.421***
	(0.0782)	(0.0712)	(0.105)	(0.112)
Language	0.919***	0.945***	0.393*	0.318
	(0.162)	(0.155)	(0.165)	(0.167)
Border	-0.0812	-0.0896	0.115	0.0547
	(0.119)	(0.109)	(0.126)	(0.119)
Island	-0.159*	-0.200**	-0.0316	-0.0555
	(0.0678)	(0.0642)	(0.0755)	(0.0799)
Landlocked	-0.110	-0.0764	-0.763***	-0.820***
	(0.0645)	(0.0598)	(0.112)	(0.120)
Transition	-0.271*	-0.439***		
	(0.132)	(0.108)		
EMU2	0.0870***	0.0746**	0.0697***	0.110***
	(0.0211)	(0.0262)	(0.0203)	(0.0261)
Year dummies	Yes	Yes	Yes	Yes
Country-pair dummies	No	Yes	No	Yes
N	5112	9662	1632	2906

Robust standard errors in parentheses

# $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

% omitted due to collinearity

Share of foreign-controlled affiliates in manufacturing employment, turnover and value added, 2007.



Source: OECD Economic Globalisation Indicators 2010

StatLink http://dx.doi.org/10.1787/844073623604

Excluding groups of countries

	Full	LDP	Core	DM Block	North per.
lnGDPo	0.308	0.262	0.655	0.451	0.188
	(0.476)	(0.913)	(0.570)	(0.572)	(0.553)
lnGDPd	-0.414	1.032	-0.111	-0.0727	-0.328
	(0.388)	(0.752)	(0.522)	(0.522)	(0.438)
lnYcapo	0.432	0.342	0.141	0.346	0.519
	(0.462)	(0.868)	(0.541)	(0.540)	(0.536)
lnYcapd	1.250***	-0.248	0.947	0.953	1.269**
	(0.374)	(0.715)	(0.498)	(0.496)	(0.423)
EU	0.149***	0.0574	0.172***	0.173***	0.156***
	(0.0378)	(0.0315)	(0.0465)	(0.0475)	(0.0456)
EU Trend	-0.0374***	-0.0442***	-0.0536***	-0.0574***	-0.0341***
	(0.00657)	(0.00726)	(0.00884)	(0.00900)	(0.00884)
FTA	0.114***	-0.0384	0.170***	0.181***	0.137***
	(0.0331)	(0.0302)	(0.0421)	(0.0440)	(0.0395)
EMU2	0.104***	0.0865**	0.0904#	0.113*	0.0834*
	(0.0277)	(0.0300)	(0.0464)	(0.0460)	(0.0404)
Year dummies	Yes	Yes	Yes	Yes	Yes
Country-pair dummies	Yes	Yes	Yes	Yes	Yes
N	10752	6168	6612	5948	7476
Robust standard errors in parentheses					
# $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$					

Excluding years (5 and 10 years later)

	Full sample			EU15 subsample		
	All years	1996-97 vs. 2001-02	1996-97 vs. 2006-07	All years	1996-97 vs. 2001-02	1996-97 vs. 2006-07
lnGDPo	0.308	-1.531	0.0931	1.154*	4.198***	2.011**
	(0.476)	(0.883)	(0.629)	(0.495)	-1.251	(0.723)
lnGDPd	-0.414	-1.060	-0.861	0.0924	3.796**	1.302
	(0.388)	(0.900)	(0.502)	(0.493)	-1.284	(0.691)
lnYcapo	0.432	2.268*	0.447	-0.933	-4.165**	-2.109*
	(0.462)	(0.900)	(0.645)	(0.503)	-1.298	(0.832)
lnYcapd	1.250***	1.696	1.472**	0.488	-3.456*	-1.009
	(0.374)	(0.880)	(0.503)	(0.526)	-1.362	(0.792)
EU	0.149***	%	0.0632	0.0101	%	%
	(0.0378)		(0.0518)	(0.0353)		
EU Trend	-0.0374***	-0.0500***	-0.0329**	0.00741#	-0.00250	0.0148**
	(0.00657)	(0.00928)	(0.0116)	(0.00377)	(0.00631)	(0.00503)
FTA	0.114***	-0.0725	-0.185**	0.00608	%	%
	(0.0331)	(0.0546)	(0.0596)	(0.0180)		
EMU2	0.104***	0.124***	0.135***	0.114***	0.0826**	0.115**
	(0.0277)	(0.0308)	(0.0371)	(0.0284)	(0.0301)	(0.0379)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country-pair dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	10752	2336	2336	3264	728	728

Robust standard errors in parentheses

# $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

% omitted due to collinearity

10. References

Anderson, J., & van Wincoop, E. (2001). *Gravity with gravitas: a solution to the border puzzle.* NBER Working Paper 8079, American Economic Review.

Baldwin, R. (2006). *The euro's trade effects.* European Central Bank: Working Papers Series 594.

Baldwin, R., & Taglioni, D. (2006). *Gravity for dummies and dummies for gravity equations.* National Bureau of Economic Reasearch, USA: Working Paper 12516.

Baldwin, R., Skudelny, F., & Taglioni, D. (2005). *Trade effects of the euro - evidence from sectoral data.* European Central Bank: Working Paper Series 446.

Barr, D., Breedon, F., & Miles, D. (2003). Life on the outside. *Economic Policy* , 573-613.

Berger, H., & Nitsch, V. (2005). Zooming out: the trade effect of the euro in historical perspective. *Working Paper 1435.* CESifo Conference.

Bun, M. J., & Klaassen, F. J. (2002). *Has the euro increased trade?* Tinbergen Instute Discussion Paper: TI 108/2.

Chinese University of Hong Kong, T. (s.f.). *International Economics*. Recuperado el 2nd de May de 2011, de http://intl.econ.cuhk.edu.hk/rta/index.php?did=24#link_60

Devereux, M. B., & Lane, P. R. (2003). Understanding bilateral exchange rate volatility. *Journal of Internationa Economics 60* , 109-132.

Estevadeoral, A., Frantz, B., & Taylor, A. (2002). *The rise and fall of world trade, 1870-1939.* Quaterly Journal of Economics.

Flam, H., & Nordström, H. (2003). *Trade volume effects of the euro: aggregate and sector estimates.* Institute for International Economic Studies, Stockholm University: Seminar Paper 746.

Fontagne, L., Mayer, T., & Ottaviano, G. (2009). *Of markets, products and prices: the effect of the euro on European firms.* European Firms in a Global Economy: Bruegel Blueprint 8.

Frankel, J. A. (2008). *The estimated effects of the euro on trade: why are they below historical effects of monetary unions among smaller countries?* National Bureau of Economic Research, US: Working Paper 14542.

Glick, R., & Rose, A. K. (2001). Does a currency union affect trade? The time series evidence. *European Economic Review* , 46-6, 1125-1151.

Gomes, T., Graham, C., Helliwell, J., Kano, T., Murray, J., & Schembri, L. (2006). *The euro and trade: is there a positive effect?* Bank of Canada.

Helliwell, J. F. (1998). How much do national borders matter? Washington DC, United States: Brooking Institution Press.

Linnemmann, H. (1966). *An econometric study of international trade flows.* Amsterdam: North-Holland.

Lopez-Cordova, E., & Meissner, C. (2002). *Exchange rate regimes and international trade: evidence from the classical gold era.* American Economic Review.

McCallum, J. (1995). National boders matter: Canada-US regional trade partterns. *American Economic Review 85* , 615-623.

Micco, A., Stein, E., & Ordoñez, G. (2003). *The currency union effect on trade:early evidence from EMU.* Inter-American Development Bank: Working Paper 490.

Nitsch, V. (2005). Currency union entries and trade. *Globalization of Capital Markets and Monetary Policy* , Palgrave Macmillan.

O'Rourke, K. H. (2002). *Europe and the causes of globalization, 1790 to 2000.* Trinity College Dublin, Department of Economics: CEG Working Papers 20021.

Persson, T. (2001). Currency unions and trade: how large is the treatment effect? *Economic Policy 33* , 335-48.

Rose, A. K. (2000). One money, one market: estimating the effect of common currencies on trade. *30* (7-46).

Rose, A. K., & van Wincoop, E. (2001). National money as barrier to trade: the real case for monetary union. *American Economic Review* , 91-2, 386-390.

Tenreyro, S., & Barro, R. J. (2003). *Economic effects of currency unions.* NBER Working Paper 9435.