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The impact of the European economic integration on communitarian trade and FDIs

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Abstract

The thesis is divided in eight different but interdependent chapters.
The first chapter allows to understand the importance of intra-trade and intra-FDIs in Europe. This introduction also contains the aim of the thesis and the actualization of the topic.
The second chapter is dedicated to the European economic integration. This chapter begins with a strong focus on the terminologies that will be used when referring to economic integration: the reader should concentrate on the definitions and on the realignment between terminologies. The realignment is of huge importance, since the terms used in theory to identify the various steps of the economic integration partly differ from those used by European law to identify the evolution of its own institutions. The second chapter is then dedicated to some brief considerations on trade blocs and regional economic integration, underlying even what "width" and "depth" of integration mean and to the main steps of the European economic integration. In the last part of the second chapter, three sections are respectively dedicated to the history of the common market in Europe, the history of the currency union in Europe and to the description of the process of mergers and acquisitions which characterized Europe from the 80's to the beginning of the new millennium.
The third chapter is dedicated to the existing literature about our topic. This chapter should be useful to understand the limits, the open-issues and so the opportunities for further analysis. The reader can find here the description of the various types of FDIs according to Dunning's taxonomy, the relationship between trade and FDI, which can be seen as substitutes or complements in the existing literature, some issues related to the importance of timing and trade- and FDI- creation and diversion and the presentation of the gravity model approach. The last part of the third chapter is instead dedicated to the impact of the various steps of the European economic integration on trade and FDIs.
The fourth chapter includes the empirical analysis. This part begins with the differences between the gravity model approach, which is analysed in the generic literature review, and the approach that will be used by us, underlying the reasons why not all the typical features of a gravity fit well with our case. Then it proceeds with some considerations on data availability and selection, which is something that must be considered before fixing the model. After the presentation of some interesting anomalies that can be found in the database, the final version of the model is presented. The central part contains many

regressions, which little by little add some improvements to the model. A dedicated section in the last part shows the reasons why the panel approach is the only feasible one when making this type of research.

The fifth chapter includes the analysis of the results both on the new findings of the research and on their compatibility with the already existing literature.

The sixth chapter contains the inferences that can be done on Brexit or theoretical exit from the euro scenarios through the results of the research.

The seventh chapter is dedicated to the limitations of this research and to some further improvements which can be implemented to obtain better results in other future researches.

The eighth chapter contains the conclusion.

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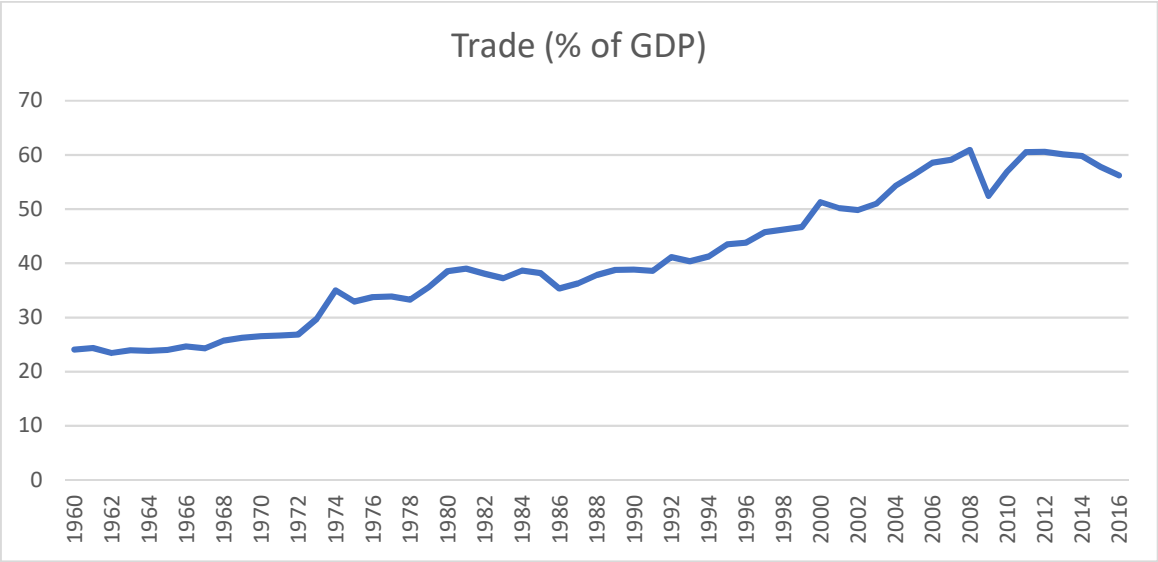
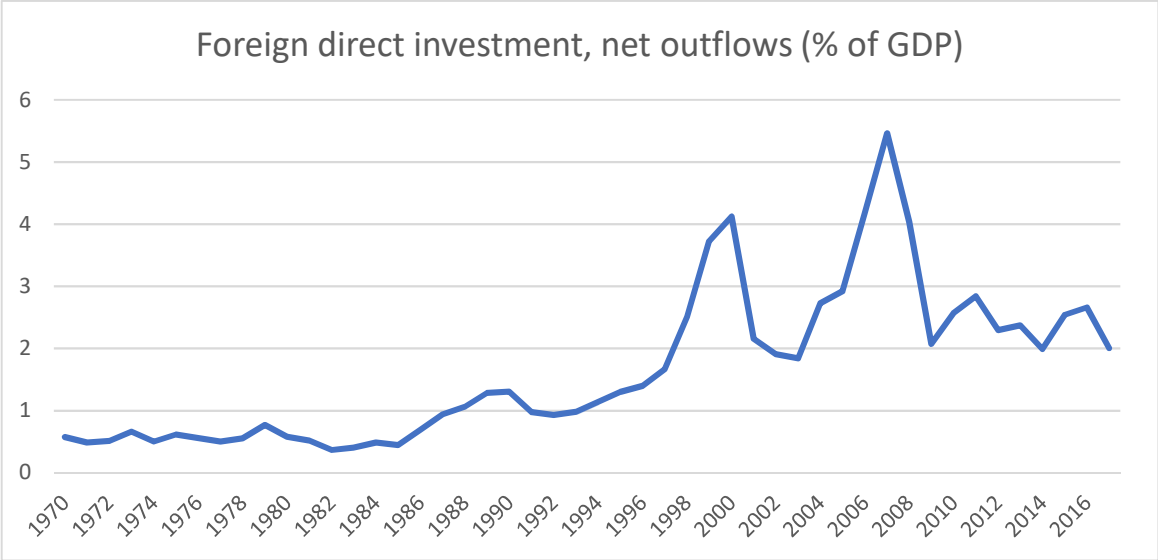
1. Introduction

This thesis shows how trade and foreign direct investments across communitarian countries behave along with the economic integration of the European Economic Community / European Union itself. The "value added" of the thesis is given by a "holistic" approach: the time-series analysis takes into account all the steps of the economic integration. Another important point of differentiation is the focus of the analysis: what it is important to consider is the value of trade and FDIs which occur within the European Union and across member countries and not between member countries on one side and non-member countries on the other. From now on, we will refer to these intra-communitarian trade and FDIs as intra-trade and intra-FDIs, while we will call FDIs from abroad those investments which come from non-communitarian countries.

The importance of this analysis is determined by the increased incidence of trade and foreign investments on national GDPs, as it is possible to observe in graphs 1.1 and 1.2 (World Bank Data) respectively. It is necessary to provide a model able to explain how these two variables behave and react whenever there is an increase or even a decrease in the level of economic integration of a certain country.



Graph 1.1: The incidence of trade (export + import) on GDP has always increased, keeping a relatively constant growth rate from 1960 until nowadays. It is possible to observe that the peak was reached in 2008, when the percentage was quite equal to 61%. The incidence has more than doubled, since it was 24% in 1960 while it is 56% nowadays.



Graph 1.2: The incidence of foreign direct investment net outflows on GDP has increased a lot, especially starting from the 90s. The incidence has always fluctuated between 0% and 1% from 1970 to 1987, it has surpassed 1% in 1988 and has finally reached its first peak equal to 4% in 2000. After a declining period, a new higher peak was reached in 2007, when the incidence was quite equal to 5.5%, which is still the highest recorded value until nowadays. Since the financial crisis, the incidence has fluctuated between 2% and 3%. If compared to the average value of 0.5% which characterized the 70s and the 80s, the incidence has become 11 times higher in 2007 and is still 5 times higher nowadays.

1.1. Aim of the thesis

The main aim of this thesis is to understand whether it is possible to know the impact of the three steps of the European economic integration on the ratio between intra-trade and intra-FDIs. This is our research question. The ratio is used, since trade and FDI are becoming more and more interdependent economic activities which can be substitutes or complements, as it will be later showed in chapter 3. The importance and the implications of using the ratio as dependent variable will be discussed in chapter 4. After having implemented the regressions, we should be able to determine which of the three steps have a positive impact and which of the three steps have a negative impact. A possible conclusion can be even the impossibility to univocally determine the impact. Beside this primary aim, this thesis wants even to show the difficulties connected to this type of research and tries to better analyse the European economic scenarios through the results of the regressions.

1.2. Importance of focussing on Europe

This section is aimed at understanding why the EEC / EU and not the other trade blocs will be analysed. Focusing this study on the European case is important, since there are no other areas in the World where the economic integration has reached such a high level. The results provided by this study centred on Europe should be much more complete than any study made on other trade blocs. But studying the European case is even a way through which one could better forecast the consequences of the introduction of new steps in the economic integration in other areas of the World.

One of the most important benefits generated by the introduction of the European Single Market has been for example the possibility to reach critical mass for capital-intensive development and innovation projects. Working on a higher scale allows to get more resources and this is the reason why a huge increase in intra-FDIs has occurred after the introduction of the common market in Europe. This issue of reaching critical mass and having scale economies has never been perceived by the U.S., whose trade bloc is just a free trade area. The reason of this different attitude of Europe on one side and the US on the other must be found in the dimension of the markets: while the internal market of the US is already big enough to reach the critical mass in many sectors related to innovation, research and development, European countries are too small for being able to reach the same critical mass. The US alone have in fact more than 62% of the whole population of the European Single Market. Another interesting data is related to the incidence of the biggest economy of NAFTA on one side and of the European Single Market on the other. The American population is in fact 67% of the whole population of countries belonging to the NAFTA, while the most populated country of Europe, which is Germany, has just 15.7% of the whole population of the European Single Market. This means that while NAFTA strictly depends on the US, which are the "*conditio sine qua non*" of the free trade area itself, the European Single Market is polycentric. It is possible to conclude that the most important benefit of the establishment of the common market in Europe has been the possibility to increase the aggregated competitiveness, reaching or even overtaking the US. The main drawback has been instead the introduction of a polycentric institution, made up of heterogenous countries, sometimes structurally in conflict among them.

This comparison between NAFTA on one side and the European Single Market on the other shows that the European case is more complex, since its economic integration has reached a

further step. This could generate many new intra-FDIs driven by new investment opportunities. The introduction of new steps, however, creates the basis for new conflicts which may lead member countries to leave the common institutions. This represents another reason why the topic is extremely actual.

1.3. Actualization of the topic

The exit of a member country from European institutions is a process as difficult and time-consuming as the entrance of a new member is [1]. Another common point between a country willing to enter and a country willing to exit is related to the effects of the new "status": they are not easily reversible in the short period, while the problem for the long run is represented by their low predictability. This implies that the research is even important for economic agents operating both in the communitarian market or in a country willing to enter the EU. Whenever there is an increase/decrease in the depth (step of the economic integration) or in the width (number of integrated countries), the composition of the GDP of member countries changes, creating an economic scenario in which there are both many threats and opportunities. This issue is even very actual for the exit of the UK from the EU, to which journals have given the name of Brexit. After the decision, which was taken by referendum on the 23rd of June 2016, to leave the EU, there is now a huge debate on how to leave. Different ways of leaving (hard Brexit and soft Brexit) can in fact imply very different economic scenarios for the future of the UK. The changes in the relative importance of trade and investments will be determined by the way in which Brexit will occur. It is interesting to observe that Brexit will be the first case of country leaving the EU, implying a decrease in width, but if a soft Brexit will be implemented, this would be even very similar to a decrease in depth. According to a taxonomy of ways of Brexit published by Chris Giles and Alex Barker [2] in the Financial Times, it is in fact possible to distinguish among:

- No new bilateral agreement
- Bilateral agreement on free trade
- Participation of the UK to the custom union
- Participation of the UK to the single market

[1] For a better explanation of this theme, see James Rothwell and Robert Midgley, *What is article 50? The only explanation you need to read*, The Telegraph, July 25th, 2018

[2] Chris Giles and Alex Barker, *Hard or soft Brexit? The six scenarios for Britain*, The Financial Times, June 23rd, 2017

Where the fist alternative is pure hard Brexit, which would imply that the UK and the EU being part of two different trade blocs, while the last one is pure soft Brexit, which would imply for the UK to be out *de jure* but to be in *de facto*. The interesting aspect is that the two "extreme" ways of exiting can have a similar impact on the ratio trade/investments. Hard Brexit would probably depress both variables while Soft Brexit would probability keep them unchanged. In between alternatives would have instead a positive impact on this ratio, since they would try to keep trade flows at the same level while cross-investments would be penalized.

2. European economic integration

This chapter is dedicated to the analysis of the process through which European countries integrated themselves in a superior institution.

The first part (section 2.1) is dedicated to the realignment between the generic terms (i.e. not explicitly focused on Europe) referred to the various steps of the economic integration and the specific terms which are explicitly used when referring to the European economic integration. In both cases, the various steps are presented as "standing alone" elements. The reader can find the definitions of the generic terms in the appendix to this chapter.

The central part (sections 2.2 and 2.3) is dedicated to the description of the economic integration in general (i.e. not explicitly focused on Europe) as a process and to the concepts of width and depth of integration.

The last part (sections from 2.4 to 2.8) is instead centred on Europe: the chronological events of the European integration are reported before the presentation of the history of the common market and of the currency union. The last section before the appendix focuses on mergers and acquisition, which were one of the main implications of the common market.

2.1. Realignment between terminologies

A serious issue that can arise when doing researches on this topic is related to the terminologies. The generic terms used to define the various steps of the economic integration are different from those strictly related to the European integration. It is necessary to realign the terms, to better understand the "ingredients" of the analysis and to proceed.

Before making the realignment for the free trade area and the custom union, it is necessary to underline that, for the purpose of our thesis, the distinction between them is not so relevant: the only difference is in fact related to the existence of a common external tariff in the case of custom union, which denies the possibility of arbitrage for extra-communitarian countries when serving one of the member countries through export. In other words, the presence of a common external tariff does not significantly affect the level of intra-trade: the predicted effect is a decrease in intra-trade due to the impossibility for extra-communitarian countries to trade with member countries through triangulation, but this decrease should be negligible, if compared to the whole amount of trade between couples of communitarian

countries. This is the reason why when we will talk about free trade area, we will refer both to the free trade area and the custom union, without any distinction.

The free trade area was introduced in 1958, when the European Economic Community became effective but was completed in 1968, when the custom union was introduced. This implies that the generic term "free trade area" can be declined as EEC in the European case, while the generic term "custom union" can be declined as EEC / CU.

The realignments between the common market and the European Single Market and between the common currency and the eurozone require a deeper analysis and so two dedicated sections (2.5 and 2.6) will be later presented in this chapter. It is however possible to anticipate here that the generic term "common market" or "single market" becomes European Single Market, while the generic term "currency union" or "monetary union" becomes Eurozone, euro area or European Monetary Union (EMU). The differences between Eurozone and EMU will be discussed in the dedicated section.

Table 2.1 shows a synthesis of the realignment, which will be kept in the whole research.

It also contains the name of the regressors that will be later used in the econometric model, which are associated to the various steps of the economic integration.

Table 2.1

Generic terms	**"European" terms**	**regressor**
free trade area	EEC	FTA FTA_dummy
custom union	EEC - CU	
common market single market	European Single Market	ESM ESM_dummy
currency union monetary union	Eurozone / euro area EMU	EMU EMU_dummy
common currency	Euro	

2.2. Trade bloc and regional economic integration

A trade bloc is a generic term, which refers to all the agreements among countries, whose aim is to favour trade and to promote the free circulation of workers, people and capital. This implies that free trade area, custom union, common market and currency union are all typologies of trade bloc. In most cases, these typologies are even chronological steps. Whenever countries decide to integrate, in fact, they must sacrifice part of their sovereignty on certain policies and give the legislation on these policies to the trade bloc, both in a structured way (when an organization is created) or in an intergovernmental way. The free trade area is generally the first step, which implies the integration of trade policies, while the currency union is generally seen as the last step before the full integration, since the monetary policy becomes common. This "way of seeing" regional economic integration as a sequence of predetermined steps is generally correct for the purpose of our thesis, but there are some cases in which some exception occurs: Norway, Island, Switzerland and Liechtenstein belong for example to the common market without being part of the custom union.

The econometric model that will be later used to answer the research question will consider the free trade area / custom union, the common market and the currency union as three independent trade blocs and not as unique trade bloc which evolves over time, reaching different steps of integration. Regressor FTA_dummy will signal whether two countries belong to the free trade area (EEC), regressor ESM_dummy will signal whether two countries belong to the single market (European Single Market), while EMU_dummy will signal whether two countries belong to the currency union (Eurozone). It is better to opt for this alternative even because of the disalignment between increase in the level of integration among countries and increase in the number of integrated countries, which is particularly true for the recent years, as the next dedicated section will explain.

2.3. Width and depth of European economic integration

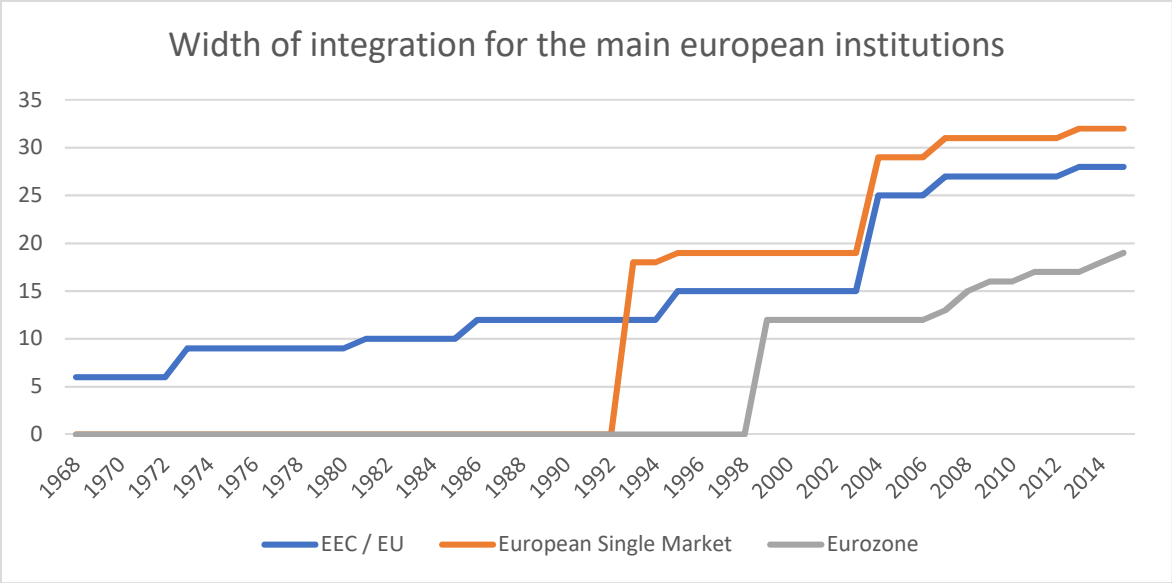
The regression analysis must be performed through panel data. This is due to the willingness of not losing important pieces of information. If a common-size analysis were performed, there would be not the possibility to "catch" the dynamicity of economic integration: we would just obtain that more economically integrated countries will have higher amount of trade and FDI flow but without knowing trends. If a time-series analysis were instead

performed, there would be not the possibility to have a clear and holistic view of Europe, limiting the analysis to the bilateral relations of a couple of countries.

Using panel data, however, implies some issues that would be not a problem if a common-size or time-series analysis were performed. The dataset would in fact contain information on the bilateral trade and FDI flows of couples of countries and would signal the "degree of economic integration" between the two countries. This dataset has a strong dynamicity on two directions: on one side, the number of countries involved has increased a lot since the Treaty of Rome, passing from six to twenty-eight members, while on the other side, the level of economic integration has increased, passing from a free trade area to a currency union. A serious issue is represented by the correlation of these two dimensions: if new member countries were obliged to adopt the same level of economic integration of old members in the past, this is not true anymore, after the creation of the Eurozone. Among the ten countries involved in the so-called first eastern enlargement which occurred in 2004, just seven have later adopted the common currency, but this has occurred at a low pace, since the last country adopted Euro in 2015. Even some countries who entered the common institutions before the creation of the Eurozone (Sweden, Denmark and the U.K) have not adopted the common currency yet.

This means that in the recent history of European institution, there has been a disalignment between depth of integration (number of common institutions) and width of integration (number of countries belonging to an institution). It is necessary to keep in mind this distinction when using the econometric model.

Graph 2.1 allows to understand in a visual way, the issue related to the increased depth and width and the disalignment between these two dimensions.



Graph 2.1: While it is mandatory for EU members to be even part of the European Single Market, the adoption of the common currency was an option for some countries, so that it is possible to observe a non-perfect correlation between the number of EU members (blue line) and the number of countries having euro as currency (grey line). There is instead a perfect correlation between number of EU members (blue line) and number of countries who belong to the common market (orange line), where the gap is due to the four countries out of the EU but part of the European Single Market.

2.4. Main steps of the European integration [3]

The following list contains the main events related to the European economic integration in a chronological order:

- 1 January 1952: The European Coal and Steel Community (ECSC) becomes effective.
- 25 March 1957: The Treaty of Rome is signed to create the European Economic Community (EEC). The aim is the creation of both a custom union and a common market: the four freedoms of movement are mentioned in the Treaty, but a specific focus is given to the movement of goods.
- 1 January 1958: The EEC becomes effective.
- 1 July 1968: The custom union is completed, the free trade area is consolidated.

[3] source: R. Baldwin and C. Wyplosz, 2015 (5th edition), The Economics of European Integration, McGraw-Hill Higher Education

- *1 January 1973: First enlargement*
- 1979: The European Court of Justice establishes the mutual recognition principle.
- *1 January 1981: Second enlargement*
- *1 January 1986: Third enlargement*
- 17 February 1986: The Single European Act (SEA) is signed. The aim is the completion of the common market, through the establishment of the European Single Market.
- 1 July 1987: The SEA becomes effective
- 1 July 1990: EMU stage 1
- 7 February 1992: The Treaty of Maastricht is signed for the creation of the EU and of the European Single Market. Restrictions on movements capital are now strongly forbidden (just few exceptions are allowed).
- 2 May 1992: The EEA agreement is signed: the single market now involves three non-communitarian countries (Iceland, Norway and Liechtenstein). It is de facto extended even to Switzerland, through bilateral agreements.
- 1 January 1993: The European Single Market becomes effective.
- 1 November 1993: The EU becomes effective after a difficult ratification process in Denmark.
- 1 January 1994: The EEA becomes effective. EMU stage 2
- *1 January 1995: Fourth enlargement*
- 1 January 1999: EMU stage 3: Euro becomes a currency
- 1 May 1999: Amsterdam Treaty, which was signed in 1997
- 1 January 2002: Euro notes and coins circulate
- 1 February 2003: Nice Treaty, which was signed in in 2000
- *1 May 2004: Eastern enlargement*
- *1 January 2007: Second eastern enlargement*
- October 2009: Lisbon treaty, which was signed in 2007 and after difficult ratification in Ireland
- 2011: The Single Market Act (SMA) is launched to further deepen the single market through removal of remaining barriers.

The events written it italics are related to the enlargements of the EEC / EU. Besides them, starting from 2002, many enlargements, even if not reported, also involved the Eurozone. As it is possible to see, enlargements alternate with deeper forms of integration and this shows the huge disalignment between the two dimensions "width" and "depth".

2.5. History of the common market in Europe [4]

This section is aimed at clarifying the main issues related to the common market in Europe. Two important aspects must be considered:

- The common market in Europe is something which was already discussed at the beginning of the European economic integration. A lot of attention was paid toward common trade policies while few importance was given to policies related to the free movement of capital, so that in 1968, the ECC is an already completed free trade area and custom union while the common market is far from being completed.
- A second wave of integration started in 1986, when the Single European Act (SEA) was signed. The European Single Market as it is known today, however, came into force only in 1993.

Keeping in mind these two aspects, it is now possible to go deeper in the analysis of the evolution of the common market in Europe.

The European Single Market is based on the four freedoms, which were already mentioned in the Treaty of Rome (1957). Despite of this, there was enough effort just toward the freedom of movement of goods in the first years, while the other three freedoms were not much considered at the beginning. This is the reason why, starting from 1968, it is possible to talk about an incomplete European Single Market, which is in practise based only on the free movement of goods. But such an incomplete single market cannot be defined a common market, since it is exactly a free trade area / custom union. This is an important point for the analysis: the 1968 cannot be considered the first year of existence of the common market, while it can be considered the year in which the free trade area becomes a custom union.

As it is explained by Bernitz and Kjellgren (2014) [5], other twenty years were necessary to fully liberalize capital movement. The article 67 of the Treaty of Rome, which fixes the rule

[4] sources E. Dahlberg, *Economic Effects of the European Single Market Review of the empirical literature*, Kommerskollegium, National Board of Trade, 2015

[5] Bernitz, U. and A. Kjellgren, *Europarättens grunder, Edition 5:1*, Norstedts Juridik, Stockholm, 2014

for the cross-border capital mobility, was in fact not very clear and too ambiguous. It sentenced that the capital mobility had to be liberalized at least to make the common market work in a proper way. From this definition, it is even possible to observe that the free movement of capital was seen as something which had to support the free movement of goods and so as something of secondary importance. Beside this lack of direct communitarian support, the liberalization of capital mobility could proceed very slowly even because of the behaviour of national governments, who adopted some measures to avoid this freedom and to protect their capitals. This situation persisted many years with little improvements and even some worsening. The "turning" year was the 1985, when the "Completing the Internal Market" paper was presented by the European Commission president Jacques Delors. The aim of this paper was to complete (or better to create) the European Single Market thanks to the removal of many barriers of different nature, which were already-existing or were even created after 1968. This new relaunched phase of freedoms liberalization was called "Single Market Programme". The "Single European Act" (SEA) was signed in 1986. The new communitarian rules had to be adopted by all member countries in no more than six years (i.e. within 12/31/1992).

When we will talk about common market referred to the European case, we will refer to the second wave of integration. This is justified by the fact that the first wave was negligible if compared to the second one. If we considered the first wave, we would have even the problem related to the overlapping of the Free trade area and the common market.

2.6. History of the currency union in Europe [6]

Even if the currency union in Europe is something relatively new, since Eurozone was launched in 1999, the project of having a single monetary policy together with the harmonization of fiscal policies is old and started in the 70s. The European Commission established that "greater co-ordination of economic policies and monetary cooperation" was needed already in 1969. After that, a group of experts led by the financial minister of Luxemburg Werner established some principles to let currencies narrow their fluctuations in 1971, but this plan failed, because of the collapse of the Bretton Woods System and the increase in the oil prices in 1973.

[6] Source: https://ec.europa.eu/info/about-european-commission/euro/history-euro/history-euro_en

The project was relaunched through the European Monetary System (EMS), which was launched in 1979: according to the new exchange rate mechanism (ERM), currencies could fluctuate around a weighted average of EMS currencies, called European Currency Unit (ECU). The following step is represented by the Delors Report: Jacque Delors, the president of the European Commission, together with the central bank governors of countries involved put the basis for completing the EMU as it is known today in 1989. The stages of the EMU are the following:

- Stage 1: 1990 - 1993
    - Abolishment of exchange controls to allow full free capital mobility
    - Introduction of convergence criteria
- Stage 2: 1994 - 1998
    - Adoption of stability and growth pact
    - Creation of the European Central Bank (ECB)
- Stage 3: from 1999
    - Implementation and adoption

When we will talk about currency union in Europe, we will refer to the last stage of the EMU and so we will consider the introduction of the common currency as way of payment. Even in this case, however, there is a problem related to the exact time in which this currency union begins. The 1999 is in fact the year in which the euro becomes a virtual currency, and the exchange rates across national currencies are kept constant, while the 2002 is the year in which euro coins and banknotes start to circulate.

2.7. The integration as a sequence of steps

The deep analysis of the history gives an important result. The ECC / EU cannot be seen as a single institution which evolves over times. It is in fact better to consider the European economic integration as the addition of non-mutual exclusive steps. This means that when the European Single Market comes into force, it does not substitute the European Economic Community - Custom Union, but these two institutions “live” side by side.

Another issue is related to the starting year of the various steps of the integration. As it will be later discussed in the literature review, the introduction of a new step is something gradual and so it is not easy to fix the first year for the econometric model. The free trade area is in fact introduced in 1958 but it is completed only in 1968, with the introduction of the custom

union, while the common market is launched in 1986 through the SEA but it comes into force in 1993, with the European Single Market. The common currency is instead virtually introduced in 1999 but physical coins and banknotes start to circulate in 2002. A good approach could be considering transitional phases.

2.8. Mergers and acquisitions in Europe

The European Single Market and the European Monetary Union could facilitate mergers and acquisitions across European companies. As it is argued by M. Vancea [7], it is possible to subdivide the huge period of M&As in Europe in three different waves. They were respectively experienced in the late '80s (first wave), in the '90s (second wave) and in the 2003-2007 period (third wave). According to the logic of our econometric model, the first two waves must be correlated with common market while the last wave is mainly determined by the common currency, since the effects of the European Single Market are supposed to have finished.

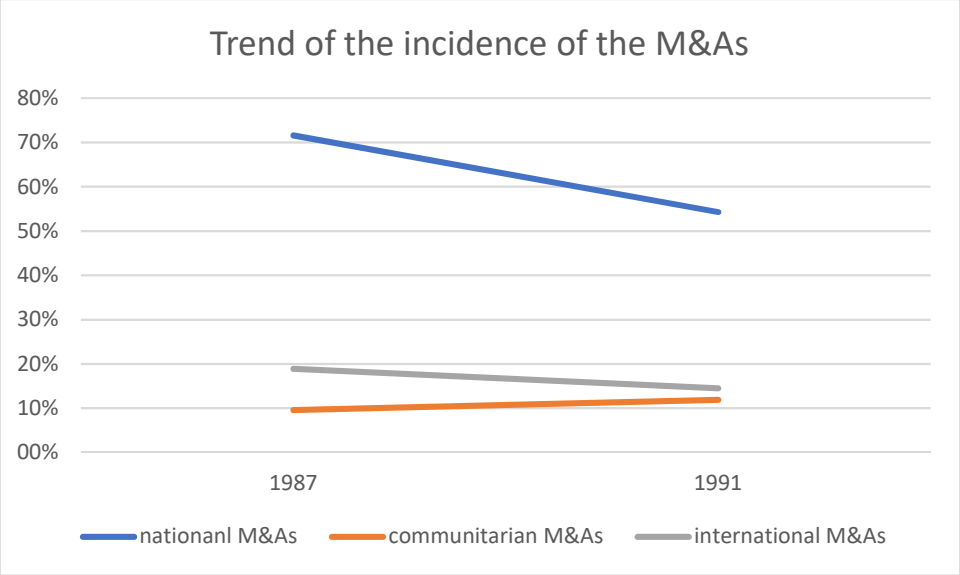
Liberalizations, privatizations and even deregulations played a significant role in all these waves in the increase of investment flows both across European countries and between the EU and the USA. The new competitive environment could in fact even promote investments from countries not belonging to the European Single Market. Mergers and acquisitions across countries belonging to the common market, however, were involved in a "virtuous circle" in which many transactions occurred to better compete in a more competitive market, where more competitive firms were exactly those already merged or involved in an acquisition.

The first wave was experienced in the 1987-1991 period. By counting the number of transactions involving mergers or acquisitions, it is possible to observe that the national ones (i.e. those involving two companies belonging to the same country) passed from 71.6% in 1987 to 54.3% in 1991. The communitarian ones (i.e. those involving two companies belonging to two different countries, but which are both part of the ESM) passed instead from 9.6% to 11.9%. All the other transactions (the international ones) passed from 18.9% to 14.5%. The only M&As whose relative importance in percentage terms increased are the communitarian ones and this implies that the first wave had a significant impact on internal

[7] M. Vancea, *Mergers and acquisitions waves from the European Union perspective,* Department of Economics, Faculty of Economic Sciences, University of Oradea, Oradea, Romania, 2013

mergers and acquisitions while investments from abroad were not so important in this phase. In 1991, a period of crisis and recession started, and this had negative effects on the propension to invest of economic agents in Europe.

Graph 2.2 allows to better understand the trend of the three types of M&As according to the geography of investor and investee countries.



Graph. 2.2: The incidence of national M&As on the total has decreased in the four years period considered. Despite of this, they remain the type of M&As having the highest incidence on the total. In the same period, even the incidence of international M&As has decreased., whose The relative incidence on the total of communitarian M&As has instead increased between 1987 and 1991.

The second wave started as the unfavourable economic situation ended in 1993. This period was characterized by a further increase in the relative importance of communitarian transactions, even if national transactions were still the most common in the E.U. (home bias effect). Together with the previous mentioned processes of liberalization, privatization and deregulation, there were other causes which determined this trend of increase in communitarian transactions: globalization, technological innovation and increased importance in the financial markets. Even in this case, a phase of economic recession, which started in 2001, was the cause of the end of the wave.

The third wave began in 2003. The new increase in cross-border mergers and acquisitions was determined by a new favourable economic situation in which new positive factors were

low interest rates and the presence of the common currency in twelve out of nineteen countries of the European Single Market. The share of cross-border operations involving countries which adopted the common currency increased, passing from 34% in 1999 to 42% in 2004. The Euro could favour M&As by eliminating currency risk and so returns variability. The financial crisis, which started in 2007, cause the end of this third wave. This was due to the credit crunch, which did not allow to keep the same intensity in the investment activities anymore.

The high number of mergers and acquisitions that was verified among communitarian countries in these three waves suggests us that the impact of the common market and the currency union is positive on the amount of intra-FDIs. It is important to underline here that, for the purpose of our thesis, the first and the second waves can be considered together. This is even justified by the relatively short period which passed between the end of the first wave (1991) and the beginning of the second wave (1993). The first wave is due to the "preliminary" introductions of some typical elements of a common market, while the second wave is due to the creation of the common market as an institution: the European Single Market was in fact established in 1993. In other words, first and second wave of M&As in Europe chronologically coincide with first and second wave of the common market creation, that we have seen in section 2.5. This further confirms that the first year of the common market in Europe cannot coincide with the introduction of the European Single Market in 1993 but should be anticipated of some years, to consider even the first wave.

2.9. Appendix to chapter 2

The following definitions are useful to have a clear idea of the various steps of the economic integration.

Free trade area (FTA): [8]

Grouping of countries within which tariffs and non-tariff trade barriers between the members are generally abolished but with no common trade policy toward non-members.

[8] http://stats.oecd.org/glossary/detail.asp?ID=3128

Custom union (CU): [9]

Arrangements among countries in which the parties do two things:

- agree to allow free trade on products within the customs union.
- agree to a common external tariff with respect to imports from the rest of the world.

Common market: [10]

Customs union with provisions to liberalise movement of regional production facts (people and capital).

Economic union: [11]

An economic union is a common market with provisions for the harmonisation of certain economic policies, particularly macroeconomic and regulatory. The European Union is an example of an economic union.

Currency union: [12]

Agreement among members of that union (countries or other jurisdictions) to share a common currency, and a single monetary and foreign exchange policy.

[9] http://stats.oecd.org/glossary/detail.asp?ID=3130
[10] http://stats.oecd.org/glossary/detail.asp?ID=3129
[11] http://stats.oecd.org/glossary/detail.asp?ID=3131
[12] https://www.imf.org/external/np/sta/bop/pdf/cuteg1.pdf

3. Existing literature on trade and FDIs

The focus of this thesis is Europe. This means that a huge contribution is generated by all those papers which already investigate the effects of the European economic integration on intra-communitarian trade and FDI. These are the papers which will be analysed with high priority. There are some cases in which, however, the already existing literature does not directly investigate Europe. In these cases, the most generic (i.e. not focused on a specific region of the World) papers would be reported as second-best. In any case the literature review includes even papers focused on other trade blocs of the World. This will be particularly true when the effects of a free trade area will be analysed. In this case, for example, huge attention will be paid to the papers analysing the effects of NAFTA on Canada, Mexico and the U.S. The choice of considering papers whose focus is on other trade blocs can be strange but is supported by a specific reason. The free trade area in Europe (European Economic Community) was in fact created between 1957 and 1968 and was then "incorporated" in the European Single Market, while NAFTA agreement was signed in 1992 and started in 1994. So, the recent papers which analyse the effects of a free trade area on member countries do not consider Europe (the result would be something of low value added and too much related to the past) and so prefer to consider other trade blocs and NAFTA is the most important existing free trade area which is not a common market at the same time. The problem related to this approach is the time-consuming added work which must be done to extrapolate a theoretical framework from focused paper and then decline the framework on Europe, considering its peculiarities. This is the reason why the use of papers focused on other trade blocs is limited to few cases, one of which is represented by the previously mentioned case of NAFTA.

The existing literature on trade and FDIs constitutes a long chapter which is subdivided in six different sections.

Section 3.1 shows a famous taxonomy which classifies the various types of FDI in the literature: according to Dunning, there are in fact four types of investments: resource-seeking (even called vertical FDIs), market-seeking (even called horizontal FDIs), efficiency-seeking and asset-seeking.

Section 3.2 is about the relationship between trade and FDIs in the literature. This section is subdivided in two subsections, since trade and FDIs are analysed as substitutes or complements, but they are also alternative decisions on how to serve foreign markets.

Many researchers have in fact analysed the relationship between FDI and trade, trying to understand if they are substitutes or complements. They used many datasets, which were different both for the number of countries involved and the number of years considered. The conclusion is different and depends a lot on these two dimensions, but the result mainly depends on the typology of FDI in dunning taxonomy.

Many other researchers have analysed the same issue but through a different approach: FDI and trade can in fact be even considered decisions of economic agents on how to serve a foreign market. Most decisions depend on some important drivers.

Section 3.3 is related to some important issues on trade and FDIs which must be considered when building the econometric model. These issues are the time, which is treated in subsection 3.3.1 and the processes of trade- and FDI-creation and trade- and FDI-diversion and the unequal benefits, which are treated in subsection 3.3.2.

Some common results of existing papers about this topic are in fact related to the importance of the time in building the econometric model: causes and effects can be in fact gradual or verified in unexpected moments.

Trade creation, trade diversion, FDI creation and FDI diversion have been instead debated a lot but are not part of our focus, which is related to intra-communitarian trad and FDI, while creation and diversion refer to the relationship with "outer" countries.

Section 3.4 is useful to understand the boundaries of our analysis.

Section 3.5 describes the gravity model approach, which is the common tool used in the papers which try to investigate how trade and FDI depend on various regressors. The dependent variable (trade or FDI) is expressed as a function of the GDP and the distance of the two countries between which trade (or even FDI, but with lower sensitivity) flows occurs and of some dummy variables related to the membership of countries to the trading bloc.

Section 3.6 is related to the impact of the European economic integration on trade and FDI. This section is subdivided in three subsections: each of them is centred on a specific step (free trade area, common market and currency union) of the integration process. Many papers belonging to different authors will be analysed in this section. The structure the authors give to their work strongly depends on the dataset used, which even in this case can

cover few or more countries and years. It is important to underline that the last three sections are not pure literature review but may also include considerations not explicitly stated by any author, but which try to come out with a conclusion mixing the previous results.

3.1. Types of FDI according to Dunning's taxonomy

The most famous taxonomy on FDI typologies was suggested by Dunning in 1993 [13]:

- Resource-seeking: the investment is done to get resources (raw materials, WIP) which are not available in the home country or which maximize the value for money of purchases (higher quality at the same price or lower cost at the same quality). Even investments made with the purpose of getting benefits from law cost of labour belong to this category.
- Market-seeking: the investment is done to sell the product even in the foreign market through foreign production facilities.
- Efficiency-seeking: the investment is done to increase the efficiency, through economies of scale and scope.
- Asset-seeking: the investment is done to increase the competitiveness, through the acquisition of a new technology.

The first two categories (resource-seeking and market-seeking investments) are even respectively called vertical FDIs and horizontal FDIs in literature. Vertical FDIs consist in allocating some steps of the production chain in a foreign country, having advantages in the lower cost of resources, while horizontal FDIs consist in replicating the same steps of the production chain in a foreign country, to reduce transportation costs and to avoid duties (tariff jumping).

It is crucial to keep in mind this distinction, since the two different types of FDI have a totally different "behaviour" toward trade, as the next chapter will explain.

[13] C. Franco et al. *Why do firms invest abroad? An analysis of the motives underlying Foreign Direct Investments*, Department of Economics, University of Bologna, August 2008

3.2. The relationship between trade and FDIs in the literature

3.2.1. FDI and trade: substitutes or complements?

The already existing literature about this topic has deeply analysed the relationship between trade and FDI, regardless of the stage of the economic integration. The typical research question is about whether trade and FDI are substitutes or complements. The answer to this question is very articulated and depends on the hypothesis done at the beginning of the paper but there is a common point. Vertical FDIs are generally positively correlated with trade. This is due to the fact that the investment introduces a step to the vertical integration of the investing company and this "pushes" towards new trade flows between the old steps and the new one. Vertical FDI and trade can be seen as complements, as it is suggested by Helpman (1984) [14]. The opposite situation is verified for Horizontal FDIs, which are negatively correlated with trade. The investment has the aim to replicate the activity in a foreign country and this substitutes part of the home production with foreign production. This implies that Horizontal FDI and trade are usually substitutes, as it is sentenced by Markusen (1984) [15].

This is a very important point for the analysis: investments among European countries are generally Horizontal FDIs and so substitution between FDI and trade should be verified. This should facilitate the analysis: if a change in the level of economic integration occurs and if this has a huge impact on the decision to opt for FDI or trade, the ratio between FDI and trade should change a lot since the numerator is inversely correlated with the denominator.

Blonigen [16] put together this issue related to substitutes/complements and the economic integration: he sentenced that regional trade agreements increase FDIs when these are complements of trade while decrease FDIs when these are substitutes of trade. The author observed even that the correlation between trade and FDI can be determined by the nature of the product which is traded or locally produced. He stated that when the good is a finished product, trade and FDI are more likely to be substitutes, while when the good is a WIP, trade and FDI are more likely to be complements.

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[14] E. Helpman, *A Simple Theory of International Trade with Multinational Corporations*, Journal of Political Economy, 1984

[15] J. Markusen, *Multinationals, multi-plant economies, and the gains from trade,* Journal of International Economics, 1984

[16] A. Blonigen, *In search of substitution between foreign production and exports*, Journal of International Economics, 2001

Amiti et al.[17] underlined the lack of a unified theory: they confirm that theories on horizontal FDI predict a negative relationship while theories on vertical FDI predict a positive relationship, but this is due to the cross-sectional strategy, which has been adopted by most empirical studies. More recent studies suggest that the relationship may be different in a time series context. Through a panel dataset, the authors show that whether the relationship is positive or negative depends on the years and countries under study.

Markusen stated that horizontal MNEs dominate when countries are similar in size and endowments, and trade costs are moderate high (trade-off between cost of setting up a plant and saving on trade costs), while vertical MNEs dominate when factor prices are very different and trade costs are not high.

Head and Ries [18] gave evidence of this issue taking a particular approach and starting from an apparently contradictory thesis: they stated that coexistence and correlation of FDI and exports are consistent with models where the two modes are substitutes. This is due to three effects associated with an increase in the size of the foreign market: it increases the number of firms pursuing replication and decreases the number of exporters, it increases foreign production of firms that choose to be multinationals even in small markets but increases even trade of firms who continue to export. FDIs increase as the foreign market expands, but the total effect on exports is ambiguous. Their conclusion was that empirical works find complementarity between trade and FDI even when theory would predict substitutability. This is due to the different focus of expectation and reality: we expect that a certain firm selling a certain product in a certain market will substitute trade with FDI if the market becomes big enough (pushing for home replication strategy), but industries include many firms with different cost structures and this let firms make different decisions about trade and FDIs (considering a market big enough depends on each single firm). The increase in demand for the product can lead to a positive correlation between trade and FDI at industry level, while this correlation would be negative at firm level.

Another approach which can be used when studying substitutability and complementarity is based on the analysis of factor mobility, as it was done by Goldberg et al. [19]

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[17] Mary Amiti, David Greenaway, Katharine Wakelin, *Foreign direct investments and trade: substitutes or complements?* , University of Melbourne, 2000

[18] Keith Head and John Ries, *Exporting and FDI as Alternative Strategies*, in Oxford Review of Economic Policy, February 2004

[19] Linda S. Goldberg and Michael W. Klein, *International Trade and Factor Mobility: An Empirical Investigation*, National Bureau of Economic Research, 1999

Mundell (1957) [20] established that the higher is the factor mobility (between two countries), the lower is level of trade (between them) and this was confirmed even in the Heckscher-Ohlin-Samuelson (H-O-S) model. Even if these authors are consolidated in the existing literature and cannot be ignored when studying international economics, there are many other "minor" authors who could even find some evidence of complementarity between factor mobility and international trade, once the appropriate hypothesis were done. Different technology endowments, taxation schemes on production, monopolies, external economies of scale and limitations on capital mobility can affect the relationship between FDIs and trade, which can become complements.

Mundell stated even that, when international capital flows are not negligible, trade cannot be used as a proxy for openness.

Table 3.1 summarizes the findings of the various authors who studied the relationship of complementarity and substitutability between trade and FDIs.

Table 3.1

FDI and trade: substitutes or complements?	
Helpman	Vertical FDI and trade are complements
Markusen	Horizontal FDI and trade are substitutes
Blonigen	Regional trade agreements: • increase FDIs when complements of trade • decrease FDIs when substitutes of trade Trade and FDI are more likely to be: • substitutes for finished products • complements for WIP
Amiti et al.	Lack of unified theory: whether the relationship is positive or negative depends on the years and countries under study.
Head and Ries	Coexistence and correlation of FDI and exports are consistent with models where the two modes are substitutes.
Goldberg and Klein	Analysis of factor mobility

[20] R. Mundell, *International Trade and Factor Mobility*, The American Economic Review, 1957

The lack of unified theory has been even sentenced by Fontagné [21]. The author said that this inconclusiveness is due to many differences in the datasets used by other authors. The dataset can in fact involve different factors, countries and especially levels of data aggregation:

- macroeconomic data (country-level)
- sectorial data
- microeconomic data (firm-level)

3.2.2. FDI and trade decisions as an arbitrage

Let's consider an MNE, which performs all the steps of the production chain locally and serves many other countries through export. This is the "status quo company". Let's now suppose two alternative scenarios in which the company tries to decrease costs through internationalization processes.

A possible solution to decrease costs is to make a vertical FDI in a lower labour cost country at least for the low-value added activities of the company, according to the smiling curve pattern [22]. This decision, however, cannot be done by just considering production costs, since transportation costs increase, being vertical FDIs positively correlated with trade. The selection of the best alternative between keeping the "status quo company" and making the new FDI is an arbitrage for the economic agents who make decisions in the company: the investment will be made if the increase in transportation costs is unable to offset benefits generated by the decrease in production costs.

Another possible solution to decrease costs is to make a horizontal FDI in one of the served countries, splitting the production (half local and half foreign) and serving half of the countries through foreign production. Even in this case, the arbitrage of the economic agents will lead to the most appropriate alternative: the horizontal FDI reduces transportation costs but generates an increase in the production costs compared to the "status quo company" and so the investment will be done when savings in transportation costs are significantly higher than losses due to split production. The important aspect to keep in mind is that the same investment decision can lead to different results, according to the period in which this decision is taken. Macroeconomic factors impact a lot on production costs (cost of energy)

[21] Lionel Fontagné, *Foreign Direct Investment and International Trade. Complements or substitutes?* , 1999

[22] For a deeper understanding of this pattern, see R. Mudambi, *Location, control and innovation in knowledge-intensive industries*, Journal of Economic Geography, 2008

and especially on transportation costs (oil prices), so that the generated cyclicities and fluctuations have huge impact on the decisions of the economic agents.

Another related issue is the industry specificity: there are some industries which are so little influenced by transportation costs that companies tend to make vertical investments in many cases (example: diamond industry), while there are some industries which are very influenced by transportation costs, so that companies tend to make horizontal investments (example: cement industry). This issue, however, has no impact in the econometric model for two reasons: we are considering the average and not the single industries and we are more interested in trends rather than in values for each year.

Table 3.2 shows the impacts on production costs, transportation costs and duties of vertical FDIs and horizontal FDIs respectively.

Table 3.2

	Vertical FDI (compared to status quo)	Horizontal FDI (compared to status quo)
Production costs	Decrease	Increase
Transportation costs	Increase	Decrease
Duties	Increase	Decrease

3.3. Important issues on trade and FDI in the existing literature

3.3.1. The importance of timing

An important aspect to keep in mind in our research is related to the "timing" in which economic agents change their behaviour and choices about trade and FDIs. This is an issue which is not always explained in the pure theory, but which has been very debated in academic papers. The reason of this different attitude toward this issue is due to the fact that researchers base their work on econometrical models: in order to build a better regression, they want to understand not only "if" but even "when" an event (the independent variable) has impact on another event (the dependent variable).

The misunderstanding that we would have by simply considering pure theory is to think that as soon as there is an increase in the level of economic integration, economic agents radically

change the way through which they take decisions on trade and FDIs. What it really happens in practice is more complex and it is possible to understand this complexity by considering academic papers. By summarizing the main issues evidenced by researchers, it is possible to obtain the following four problems, which should be considered when running a regression analysis:

- Gradual effects: it refers to the situation in which economic agents do not suddenly change their behaviour when a new level of economic integration is reached. This implies that the changes in intra-trade and intra-FDI are gradual: as soon as the new step is reached, just some of the economic agents start to make changes while some of them postpone these changes. It is even important to underline that that graduality does not imply linearity: most economic agents change their behaviour at the beginning, while few of them change later in some case, while in other cases the opposite scenario is verified, and so most economic agents change their behaviour later and few of them at the beginning. In many case, however, it is possible to assume that the trend with which economic agents change their decisions is similar to the innovation adoption curve, which implies that there are few "innovators" who change their decisions suddenly, many "early adopters" who change their decisions after the innovators and finally few "laggards" who change their decisions much time after the new step of the economic integration has been reached.

  A huge lateral issue that may arise is related to the fact that gradual effects can be due both to the different timeliness with which economic agents change their behaviour and to a hidden and not explicit distribution of causes.
- Gradual causes: it refers to the situation in which the introduction of a new step of the economic integration does not occur in a specific time (year) but is more distributed and requires many years. The EEC - custom union was in fact introduced in 1958 but other ten years were necessary to complete it (it was completed in 1968). The common currency, instead, came into force in 1999 but the real circulation of Euro coins and banknotes started in 2002. The key point here is to consider that the use of a binary variable which signals the membership or not of a country to a certain trade bloc in a given time can be misleading.

- Fuzzy steps: it refers to the situation in which it is not so immediate to perceive the change in the step of the economic integration. The common market in Europe required for example so many years that it was partially introduced together with EEC - custom union (1958 - 1968), partially after the Single European Act (1986), mainly with the European Single Market (1993), but it is not totally completed even nowadays. This issue, however, can be solved in the econometric model by taking as year of reference the one in which the situation changed the most.
- Anticipation: it refers to the situation in which economic agents start to change their behaviour before the introduction of a new step in the economic integration, mainly because of the simple announcement of it by institutions. This is particularly true for FDIs: since investments require time to generate benefits, some economic agents prefer to invest as soon as possible to start exploiting the new opportunities before.

3.3.2. Creation, diversion and unequal benefits

A common purpose for many researchers is to understand if the establishment of a new level of the economic integration between two countries can have impact even on a third country, not involved in the trade bloc. If there is not an impact, researchers talk about trade-creation / FDI-creation, while if there is impact, they talk about trade-diversion / FDI-diversion. This issue is relevant when trade with extra-communitarian countries and FDIs from abroad are analysed, while it becomes less important when intra-trade and intra-FDI are considered. This is due to the fact that if the trade bloc is considered only internally, the relations with the "rest of the world" are ignored and so, even if there is diversion, the decrease in trade or FDI flows is not perceived.

Another similar issue is the unequal distribution of benefits: whenever a trade bloc is created or a new step in the economic integration is reached, there are countries who seem to benefit more than others, increasing trade and FDI flows at a higher pace. This is due to many reasons as for example frictional barriers for trade and different legislations and different levels of productivity for FDI flows. The "concentration of advantages" or "cannibalization" due to unequal distribution of benefits, however, does not mean that there are some member countries who have losses while other have benefits: all countries get benefits, but some can benefit more from their membership. Even in this case, the issue is stronger for trade with extra-communitarian countries and FDIs from abroad (Example: referring to the NAFTA

case, the US seem to get most of the benefits while Mexico seems to have more difficulties in catching the new investments from abroad). Since we are more interested in the average behaviour, unequal benefits will be not treated in the econometric model. It is however important to consider that high variability in the behaviour across countries exist.

3.4. The focus on intra-trade and intra-FDI

The peculiarity of this thesis is related to the focus, which is on intra-trade and intra-FDI. Many papers of the existing literature generally consider trade in general or FDIs in general, leaving a chapter or paragraph for the "intra-case" and its comparison with the case of trade with non-member countries and FDIs from abroad.

A positive aspect of this approach is that the issue related to trade (or FDI) creation and trade (or FDI) diversion is not perceived and can be partially ignored. Even the cannibalization effect in attracting FDIs becomes less perceived.

A drawback of this approach is instead due to the lack of exiting literature totally focused and useful for our aim. Especially in the FDI case, the existing literature can be subdivided in two macro-categories:

- Those whose research question does not mention the country from which the investment comes: in this case, the research question analyses the capability of the trade bloc to attract FDIs, without making a distinction between investing countries who belong to the trade bloc and investing countries who do not.
- Those whose research question focuses on the effect of the trade bloc on intra-FDIs (i.e. the investments made by member countries in other member countries)

In any case, papers of the "first group" are not discarded a priori, especially when their conclusions fit well with what papers belonging to the "second group" say. The conclusions of a small set of papers about intra-FDI is made more robust by showing what a large set of papers about FDI in general says. Whenever trade in general and FDIs in general are considered, it is necessary to make further considerations to understand if what the paper says is coherent even with the "intra-case". There are even some cases in which, given the same context, intra-trade and intra-FDIs behave in the opposite way of general trade and FDIs as it is sentenced by Francesca di Mauro [23]. An example is the creation of a free trade

[23] Francesca di Mauro, *The impact of economic integration on FDI and exports: a gravity model approach,* 2000

area: member countries will opt for intra-trade instead of intra-FDI once integration is completed, while "left-out" countries will opt for an increase in FDI flows toward the new trade bloc, to get benefit of the new integrated market. The reason of such behaviour will be presented in the next sections.

3.5. The gravity model approach: a typical ingredient in the existing literature

A very common method used to run the regression when authors study the impact of the economic integration on trade / FDIs / intra-trade / intra-FDIs is the gravity model approach. This term was introduced for trade at first and was used to underline the analogy with Newton's law of gravity which states that the attraction between two objects is directly proportional to the product of their masses and inversely proportional to their squared distance. In a similar way, the amount of trade between two countries can be seen as directly proportional to their GDPs and inversely proportional to their distance, as the following formula shows:

$$Trade_{ij} = (GDP_i * GDP_j)^a * (1/distance_{ij})^b$$

Where "a" and "b" are unknown coefficients.

This basic idea has been later used and developed in many papers to run the regression. When authors talk about gravity approach, they refer to a regression model in which:

- The dependent variable is the amount of trade or the level of FDI stock or flow
- The independent variables may include the GDP level, the population, the GDP per capita, the distance, the differences in factor endowments of the two countries
- The independent dummy variable signals the membership to the regional agreement

The first three independent variables are generally positively correlated with the amount of trade between the two countries and even with the amount of FDI outflows, while the distance between the two countries is negatively correlated with both the two dependent variables.

Even if the independent variables are expressed as perfect complements in the example, they are generally treated as perfect substitutes in the existing papers. Some of them, however, include both complementarity and substitutability. This means that an example of regression model can be the following one:

$$Trade = \beta_0 + \beta_1 GDP_i * GDP_j + \beta_2(1/distance_{ij}) + \beta_3(GDP_i * GDP_j)*(1/distance_{ij}) + \beta_4 d$$

Where d is the dummy variable which signal the membership of the two countries to the same trade bloc.

To better understand whether FDI and trade are substitutes or complements, it is possible to select one of them as dependent variable and the other as independent variable, correlating them through a coefficient β. This is exactly the same approach used by Martinez et al. (2012) [24], when analysing the impact of the common market on intra-FDIs and FDIs from abroad. If this coefficient is positive, it means that trade and FDI are complements, while if it is negative, trade and FDI are substitutes.

Martinez at al. (2012) suggest including in the model a variable which signals the diversity in factor endowments of the two countries for the FDI case. In the European case, however, endowments are not significantly different to justify the presence of such a variable.

3.6. The impact of the European economic integration on trade and FDI

3.6.1. Impact of the free trade area on intra-trade and intra-FDI

As the definition suggests, a FTA has a strong positive effect on the creation of trade flows among the members of the FTA itself. This is quite tautological and the papers analysing this issue try to investigate the entity of the correlation rather than the correlation itself (the positive correlation is always verified or assumed to be true a priori while the magnitude of the coefficients is what the research questions investigate).

This is the step of the economic integration about which the already existing literature tries even to investigate the trade creation and trade diversion effects with the highest effort. This distinction is something which goes a little beyond the limits of the analysis: both types of trade are in fact positively correlated with the creation of a FTA if the analysis is limited to what happens within the FTA itself.

A significant paper about this topic is the one written by Krueger [25]. The author investigated the effects of NAFTA on trade among Canada, Mexico and the U.S. Her conclusion was that the membership of these countries to the free trade area was positively correlated with the amount of intra-trade, even though the coefficients were not significantly high. What really

[24] Valeriano Martínez, Marta Bengoa, Blanca Sánchez-Robles, *Foreign Direct Investment and Trade: Complements or Substitutes? Empirical Evidence for the European Union*, 2012

[25] Anne O. Krueger, *Trade creation and trade diversion under NAFTA*, December 1999

matters in her research is not the numerical result itself but all the "lateral" findings that should be kept in mind even while making the same analysis for the European case and confirm what it was said about anticipation and gradual effects:

1. A tricky point and important issue that can arise while running a regression analysis is given by anticipation effects: setting a FTA is something which requires many years of negotiation and the huge time-lag between the beginning of the negotiates and the come into effect of the agreement may lead to some unexpected results. A significant increase in trade can be verified after the announcement of the FTA and not after the first day of the agreement itself.
2. Another aspect to consider while doing empirical research is related to the gradual and not sudden decrease of tariffs which occurs among countries who joined the FTA. The first step of economic integration in Europe was the European Coal and Steel community (1952) which was based on a huge tariffs reduction on both Coal and Steel. The custom union was later created only in 1957 through the Treaty of Rome but countries had more than ten years to eliminate tariffs at all on all products.

It is important to consider both these aspects for the econometric model: the increase in trade can precede the actual moment in which the FTA is set and the increase in trade must be thought as something gradual and no as something which suddenly occurs: the effects are distributed over time since the cause itself is distributed on a time window and is not concentrated in a specific time, as it is possible to observe in graph 3.1.

Graph 3.1: The trend of the amount of export from the US to Mexico between 1985 and 1999 is positive, but there are no "steps". This means that there is a distribution of effects over time, which is due to a distribution of causes: the elimination of tariffs was in fact gradual. The effects of the NAFTA can be seen by separating the curve into two shorter curves: the slope of the curve which goes until 1994 (year of the come into force of the free trade agreement) is lower than the slope of the curve which goes from 1994 on.

The impact of a FTA on intra-FDI flows among its countries is instead less immediate and more ambiguous. The ambiguity is due to the difference between vertical and horizontal FDIs: free trade implies absence of duties between countries and so one of the main reasons for making horizontal investments (tariffs jumping) disappears as soon as the FTA is set. In the same way, a FTA makes a vertical FDI become more desirable: the absence of tariffs allows to export resources from the country in which the investment has been done (host country) and import them to the home country at a lower cost.

The conclusion is that when a free trade area is created, the economic context changes in a radical way so that it is not easy to establish how the composition between intra-trade and intra-FDI behaves. The already existing literature converges on a positive effect of free trade areas on the amount of intra-trade among member countries, even if the "degree of correlation" is not easy to determine and strictly depends on both the specific analysed case and the dataset used in terms of years and number of countries involved. For the investment side, there is few literature about how intra-FDIs behave when a free trade area is created but an important aspect to keep in mind is that vertical FDIs are positively correlated with a FTA while horizontal FDIs are negatively correlated with a FTA. The problem due to the opposite effects of a FTA on intra-FDIs is that it could be difficult to establish if intra-trade and intra-FDI behave as complements or substitutes when a FTA is created. To solve this issue, it is possible to observe that in case of positive correlation (vertical FDI), the investment is "trade-driven". The ratio intra-trade / intra-FDI increases when a FTA is set for two reasons: on one hand, trade becomes a valid alternative (i.e. substitute) for horizontal FDIs, on the other hand, vertical FDIs increase but this increase pushes toward a more than proportional increase in the level of trade.

There is even another reason why the ratio increase: when a FTA is set, it is even possible to increase home production, addressing the new production to foreign countries. The

absence of tariffs should in fact increase the possibility to obtain a positive margin on sales even when products are sold abroad (if the good is produced locally and sold abroad, huge costs will be caused by transportation and duties). In this case there is not a shift in the production across countries, but the company could invest in sales subsidiaries and logistic facilities in the foreign country to facilitate sales.

Summarizing the analysis of the impact of a FTA on intra-trade and intra-FDI, it is possible to obtain the following key points, to be considered when the regression will be applied:

- Positive correlation between FTA and intra-trade
- Not clear correlation between FTA and intra-FDIs (it depends on the typology)
- Most FDIs are trade-driven (vertical ones and those to facilitate foreign sales)
- The ratio intra-trade / intra-FDI increases when a FTA is set

The following scenarios are two examples of complementarity between trade and vertical FDI (resource seeking) and of substitutability between trade and horizontal FDI (market seeking).

- Country A and country B (lower labour cost country) decide to join the same FTA. Country A used to produce and sell goods just locally and so was not used to trade with country B. As soon as the FTA is set, Country A has no interest in serving country B but can opt for a new solution: investing in a new plant in country B getting the benefits of low labour cost plus no duties on export and trading goods back. In this case, the FTA allows a new FDI to occur and the new FDI allows a huge amount of new trade to occur between the two countries. This was the scenario supposed by Ross Perot for the US and Mexico after NAFTA agreement (Giant sucking sound).
- Country A and country B decide to join the same FTA. Country A used to produce and sell goods both locally through local production and to country B through foreign production. So, country A was not used to trade with country B, because of high tariffs. As soon as the FTA is set, country A can decide to concentrate the production in one of the two countries, serving the other one through export. In this case, the FTA causes a disinvestment and the decrease in FDI stock is counterbalanced by a huge increase in trade between the two countries.

The proposed scenarios are useful to better understand substitutability and complementarity in case of free trade area. It is important to observe that a simplification was used: not

countries but companies or economies agents belonging to countries make decisions. Referring to them as countries was decided to avoid a redundant paragraph.
Another simplification is related to the unique company: in the reality, already existing companies are more rigid and less sensitive to changes of the competitive environment and economic context. The different ways of serving foreign markets which should be verified after the implementation of a new step of the economic integration (FTA in this case) are mainly due to the decisions of new companies.

3.6.2. Impact of the common market on intra-trade and intra-FDIs

The definition of common market given in the previous chapter underlines that this stage of the economic integration is a sort of extension of the previous step (free trade area or customs union). If the FTA allows the free movement of trade and so of goods/services, the common market allows the free movement of capital and people across countries. The immediate inference that can be done by considering this, is that a common market should have a positive impact on the increase of FDIs across member countries, while no effect on trade should be recorded. The increase of trade would be in fact a consequence of the free trade area which, in this paper, is supposed to be the obliged step before the common market. Of course this is true, but just theoretically and by simplifying a lot, through a simple positive approach. Since the aim of this paper is to understand what happens in Europe, it is necessary to adopt even a normative approach, paying extreme attention to all the implication of the European Single Market.
If compared to the free trade area case, the study of the effects of the common market on the "composition" between intra-trade and intra-FDIs would be more difficult and even more ambiguous once a conclusion will be taken. It is not a case that the correlation between intra-FDI and the common market is something which has already been analysed a lot.
Even in this case, the crucial point is to understand whether FDIs can benefit more than trade or vice-versa. In other words, the question to which we should be able to answer is whether the European Single Market has favoured more the further increase of free mobility of goods, which favours intra-trade or the mobility of capital, which favours intra-FDIs.
In the part dedicated to the impact of the common market on intra-FDIs, two researches will be integrally reported, providing the econometric models, without making short summaries. The deeper analysis of these two papers is made, since they already provide a model in which

the level of intra-FDI is the dependent variable, while the level of intra-trade is one of the independent variables. One of these papers will also consider the "home bias effect" which, as it will be seen in the following paragraphs, is an important concept to consider, to understand how intra-trade and intra-FDIs behave when a common market is set.

Since the creation of the European Single Market, intra-communitarian trade has increased, passing from 9% to 21% of communitarian GDP. It is not possible to say if this extra amount of trade is due to the new opportunities created by the common market or to the huge increase in globalization in the 90s (absence of counterfactual). Despite of this, it is possible to make the hypothesis that at least some of this increase was due to the common market. Trade with non-communitarian countries has in fact increased at a much slower pace in the same period, passing from 6% to 12% of GDP. This hypothesis is even made more robust by considering that the ratio between intra-EU trade and GDP has increased during the 1990s. The increase in trade which occurred even with non-member countries should let hypothesize that trade-diversion was not verified. Straathof et al. [26] seem to confirm this hypothesis. They investigated the effects of the single market using a long dataset, which covers the period from 1961 to 2005 and considers both member and non-member countries. The result is that the single market has a positive impact on intra-communitarian trade (18% in the first years) in Europe but no trade diversion from non-member countries is recorded.

Another approach which was very used by authors when studying the effects of the common market on trade implies the so-called home bias effect. This term refers to a situation in which locally produced goods are still more consumed than imported goods. This means that when the home bias effect is huge, borders among member countries still play an important role and negatively affect the amount of trade which can occur between two countries. There are many studies confirming that there is home bias effect which is spread in all the European Single Market. Some of these studies even underline that the home bias effect is much lower in the states of the USA, which, being a unitarian country, constitute an already and fully completed common market. This is the reason why home bias is an indicator which can be used as a proxy to understand how the single market is actually integrated.

Delgado [27] found that the home bias effect is two or three times higher in the European Single Market than in the USA, but the difference is decreasing, and a huge decrease in home bias

[26] Bas Straathof, Gert-Jan Linders, Arjan Lejour, Jan Möhlmann, *The Internal Market and the Dutch Economy. Implications for trade and economic growth*, 2008

[27] Juan Delgado, *Single market trails home bias*, 2006

effect has been recorded in the 1995-2000 period. The bias effect seems to be higher for those countries belonging to the periphery (e.g. Spain and Greece) while it is lower for core-countries (e.g. Austria and Belgium).

Cafiso (2009) [28] found a decrease in the home bias affect which involved the 80% of the industrial sectors in the European Single Market around 2000.

Martinez et al. (2012) [29] stated that the decrease in home bias effect was still verified in the first decade of the new millennium, at least until 2007.

The general conclusion is that national borders seem to negatively affect the existence of a "real" single market, limiting trade across communitarian countries, but the magnitude of the effect is decreasing. Even in this case, we should expect that the increase in trade is something gradual and inversely proportional to the "home bias level".

The important aspect which should be later considered in the econometric model is related to the fact that the amount of intra-trade does not just depend on the membership to the common market but depends even on the degree of completeness of the common market itself. A dummy variable which signals the membership to the common market can be not sufficient to explain the behaviour of intra-trade, so that a variable assuming more values (example: years passed since the establishment of the single market) can be more explicative.

Table 3.3 summarizes the main findings related to the impact of the common market on intra-trade

Table 3.3

Impact of the common market on intra-trade	
Straathof et al.	The single market has a positive impact on intra-communitarian trade (it generates a 18% increase).
Delgado	The home bias effect is an existing but decreasing phenomenon which involves intra-trade.
Cafiso	
Martinez et al.	

[28] Gianluca Cafiso, *Sectorial border effects in the European single market: an explanation through industrial concentration*, 2009

[29] Valeriano Martínez, Marta Bengoa, Blanca Sánchez-Robles, *Foreign Direct Investment and Trade: Complements or Substitutes? Empirical Evidence for the European Union*, 2012

The study of the impact of the common market on intra-FDI has two positive aspects: on one hand, the existing literature already talks about the European case and so the regression analysis and the empirical evidence are related to the European Single Market, on the other hand, already existing papers seem to converge on the same result.

Ilzkovitz at al. [30] observed that the ratio between intra-communitarian FDI and total FDI has increased a lot after the creation of the European Single Market, in ten years covering the 1995-2005 period. In particular, intra-communitarian FDI inflows passed from 53% to 78% of total FDI inflows, while intra-communitarian FDI outflows passed from 50% to 66% of total FDI outflows.

The distinction between FDI inflows and outflows is something which will not be considered in the research, since intra-FDIs inflows are equal to intra-FDIs outflows, but the result suggests that there is a positive impact of the common market on intra-FDI.

Straathof et al. [31] observed that the European Single Market has a positive impact on both intra-FDI and FDI with non-member countries, but the impact on intra-FDI is higher. Through the regression analysis which considered bilateral FDI stocks in the period 1981 - 2005, the author could find that bilateral intra-FDI stocks and bilateral FDI between a member and a non-member were respectively 28% and 14% higher than bilateral FDI stocks between two non-member countries. The European Single Market can explain 8.5% of new outward FDI and 16% of new inward FDI for the EU15.

This positive impact of the Single Market on intra-FDIs is confirmed even by Forslid (2014) [32]. According to the author, the increase in intra-communitarian FDI is due to competitive reasons. Before the implementation of the single market, firms were in fact protected by the already-existing barriers, while, once the single market was established, they started to suffer competition from abroad. To counterbalance the new competition, firms started to invest abroad, increasing the amount of intra-communitarian FDIs.

Egger and Pfaffermayr [33] found evidence of huge anticipation effects and stated that the European Single Market has a positive but not so significant impact on FDIs for the EU12.

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[30] Fabienne Ilzkovitz, Adriaan Dierx, Viktoria Kovacs and Nuno Sousa, *Steps towards a deeper economic integration: the internal market in the 21st century*, 2007

[31] Bas Straathof, Gert-Jan Linders, Arjan Lejour, Jan Möhlmann, *The Internal Market and the Dutch Economy. Implications for trade and economic growth*, 2008

[32] R. Forslid, *Integrationens spjutspets: den inre marknaden Studentlitteratur*, Lund, Sweden, 2014

[33] Peter Egger and Michael Pfaffermayr, *Foreign Direct Investment and European Integration in the 90's*, 2002

The main increase in FDI for countries joining the EU in 1995 (Austria, Finland, Sweden) occurred in the previous two years (1993-1994).

A particular aspect and common point for all these analyses is related to the fact they do not distinguish between vertical and horizontal FDIs, as it was common in the free trade area case. The main reason of such a different approach must be found in the drivers which lead economic agents to take decisions about FDIs when a common market is established. For the free trade areas case these drivers where production costs on one side and transportation costs and tariff on the other. In the common market case, instead, the free mobility of capital and workers allows to better manage resources, through the exploitation of economies of scale and scope and to better integrate assets and competences in a company. In other words, a common market should favour those investments which are called efficiency-seeking and asset-seeking in Dunning taxonomy. Investments of this kind were done in Europe through mergers and acquisitions in the same years in which the common market was implemented.

Example of efficiency seeking investment:

- Country A and country B decide to join the same common market. Company A in country A and company B in country B used to produce the same product both locally and for many foreign countries, in a very competitive environment made up of many other companies. Their willing to merge in a unique company A+B was obstacle by low mobility of capital, low mobility of workers and human resources, different legislations about their core activities and so on. The establishment the common market drastically reduces these problems so that now it is possible to merge for them. The new unique company A+B can decide to reallocate production as it wishes and so many intra-FDI occur. Now the company can benefit from economies of scale or economies of scope.

Example of asset seeking investment:

- Country A and country B decide to join the same common market. Company A in country A and company B in country B used to produce different products both locally and for many foreign countries, in a very competitive environment. The willing of company A to acquire some specific assets and know-how belonging to company B was obstacle by low mobility of capital, low mobility of workers and

human resources, different legislations about their core activities and so on. The establishment of the common market drastically reduces these problems so that now it is possible for company A to acquire what it wishes from company B.

Table 3.4 summarizes the findings related to the impact of the common market on intra-FDIs.

Table 3.4

Impact of the common market on intra-FDI	
Ilzkovitz at al.	Membership to the single market has a positive impact on intra-FDIs: • Intra-communitarian FDI inflows passed from 53% to 78% of total FDI inflows in the 1995-2005 period. • Intra-communitarian FDI outflows passed from 50% to 66% of total FDI outflows in the 1995-2005 period.
Straathof et al.	Membership to the single market has a positive impact on intra-FDIs: bilateral intra-FDI stocks were 28% higher than bilateral FDI stocks between two non-member countries in the 1981-2005 period.
Forslid	Membership to the single market has a positive impact on intra-FDIs:
Pfaffermayr	There are significant anticipation effects for intra-FDIs.

Martinez [34] tries to explain how home bias affects intra-FDIs. The author divides intra-FDIs in three categories: horizontal, vertical and "knowledge capital" driven, which, according to Dunning taxonomy, are the equivalent of efficiency and asset seeking investments. A two-step econometric model is used: the first regression is done to obtain the values of the economic integration in the EU in each year from 1995 to 2006, while the second regression takes these values as independent variables to understand their effect on intra-FDIs. The relationship between intra-trade and intra-FDIs is here obtained in an "indirect way": if two countries have high intra-trade flows, the home bias effect will be low, and the research question is whether being more integrated has a positive impact on intra-FDIs or not.

[34] Valeriano Martinez, Marta Bengoa, *Integration Effects and Trade Barriers: Does European Economic Integration affect Foreign Direct Investment?* , February 2010

First regression model:

$Ln(X_{ijkt}) = \alpha + \beta_1 \ln(Y_{it}) + \beta_2 \ln(Y_{jt}) + \beta_3 \ln(D_{ij}) + \beta_4$ home1996 $+ \beta_5$ home1997 $+ \ldots +$
$+ \beta_{15}$ home2006 $+ \beta_{16} \ln(R_{it}) + \beta_{17} \ln(R_{jt}) + \beta_{18}$ language $+ \beta_{19}$ adjacency $+ u_{ijkt}$

- X_{ijkt} = level of trade between countries i and j at time t
- Y_{it} = GDP of country i at time t
- Y_{jt} = GDP of country j at time t
- D_{ij} = distance between countries i and j
- Homet = dummy variable which signals whether exporter and importer coincide (1) or not (0) in year t
- R_{it} = remoteness of country i at time t (not important for our purpose)
- R_{jt} = remoteness of country j at time t (not important for our purpose)
- Language = dummy variable which signals whether countries i and j have the same language (1) or not (0)
- Adjacency = dummy variable which signals whether countries i and j have a common border (1) or not (0)

The results are not surprising, since trade (X_{ijkt}) is:

- positively correlated with levels of GDP of the two countries (Y_{it} & Y_{jt})
- negatively correlated with distance (D_{ij})
- positively correlated with having a common language (language)
- positively correlated with having common border (adjacency)

The most important and even newest finding due to the new approach is related to the values of coefficients from β_4 to β_{15}, which are reported in table 3.5.

Table 3.5

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
β	0	0	-0.122	-0.199	-0.229	-0.304	-0.393	-0.465	-0.555	-0.643	-0.696	-0.778
e	1	1	0.885	0.820	0.795	0.738	0.675	0.628	0.574	0.526	0.499	0.459

These values can be a little bit misleading if analysed in a cross-sectional way, since the coefficients are negative and so one could conclude that if the importer country coincide with the exporter country, the importer (exporter) country imports (exports) less. This is not

the correct way of reading data. Since there is a panel dataset, these values should be read in a time-series way: each country trade again more with itself but this fact, called home bias effect, is decreasing over time and this mean that regional integration is increasing, pushing the common market to be a real single market. The home bias effect is then made positive, through the exponential formula.

Second regression model:

$FDI_{ijt} = \alpha + \beta_1 \text{ Integration}_t + \beta_2 \Sigma GDP_{ijt} + \beta_3 (\Delta GDP)^2_{ijt} + \beta_4 \text{ INT1} + \beta_5 \text{ INT2} + \beta_6 \text{ INT3} +$
$+ \beta_7 \text{ Distance}_{ij} + \beta_8 R_i + \beta_9 R_j + \beta_{10} INVC_{jt} + \beta_{11} TC_{it} + \beta_{12} TC_{jt} + \varepsilon_{ijt}$

- FDI_{ijt} = FDI of country i in country j at time t
- Integration_t = level of integration at time t
- ΣGDP_{ijt} = sum of the GDP levels of countries i and j at time t
- $(\Delta GDP)^2_{ijt}$ = squared difference of the GDP levels of countries i and j at time t
- INT1, INT2, INT3 = interaction terms between skilled labor and GDP (not important for our purpose)
- Distance_{ij} = distance between countries i and j
- R_i = remoteness of country i (not important for our purpose)
- R_j = remoteness of country j (not important for our purpose)
- $INVC_{jt}$ = investment costs at time t
- TC_{it} = trade cost of country i at time t
- TC_{jt} = trade cost of country j at time t

Even in this case, results are not surprising and behave as one would expect, but great attention should be paid to independent variable "integration". When its value is high, it means that boarder effects are significant and so economic integration is low. This is the reason why coefficient β_1 is positive: as the author underlines, this implies that economic integration is FDI resisting and not promoting. In other words, home bias seems to promote FDI, while high similarities across countries have a negative impact on the level of FDIs. The author even underlines that the magnitude of the coefficient β_1 is not significant in the horizontal and knowledge-capital driven investments, which are the two main types of intra-FDI in Europe. This should imply that the common market in Europe has no significant impact on the amount of intra-FDIs between countries. The explanation of this phenomenon given by the author is the following: the decrease in barriers between countries due to the

economic integration in Europe in the 1995-2006 period had a double effect. On one hand, it pushed toward a higher number of intra-FDIs, thanks to lower distribution costs. On the other hand, however, the existing horizontal multinational enterprises started to serve foreign countries through export, thus becoming no horizontal anymore and substituting intra-FDIs stocks with intra-trade flows. These two opposite effects partially offset each other, and this is the reason why β_1 is not so significant: intra-FDI flows can be considered independent from the economic integration in Europe due to the common market.

Martinez et al. [35] made another empirical research (2012) on whether trade and FDI are complements or substitutes in the European Union (European Single Market). Since the dataset used covers the period 1995 - 2006, it is possible to make a direct comparison with the previous research of 2010.

The methodology used consist in a gravity model made us follows:

$\ln(FDI)_{ijt} = \alpha + \beta_1 * open_t + \beta_2 * \ln D_{ij} + \beta_3 * \ln(Y_{it} + Y_{jt}) + \beta_4 * \ln(Y_{it} - Y_{jt})^2 + \beta_5 * \ln DifSK_{ijt} + \beta_6 TC_{it} + \beta_7 TC_{jt} + \beta_8 CPI_{jt} + \mu_{ijt}$, where:

- $\ln D_{ij}$ = Distance between country i and j
- $\ln(Y_{it} + Y_{jt})$ = Sum of GDPs of countries i and j →
- $\ln(Y_{it} - Y_{jt})^2$ = Squared difference of GDPS of countries i and j, to consider if i an j are similar or not.
- $\ln DifSK_{ijt}$ = Difference in skilled labour between countries i and j
- TC_{it} = Market protection of home country
- TC_{jt} = Market protection of host country
- CPI_{jt} = Investment costs in host country

In this case FDIs are seen as a dependent variable, while openness, which is an independent variable, is used as a proxy for trade level. It is possible to understand whether FDIs and trade are substitutes or complements by looking at the value of β_1. The most interesting aspect of this paper is given by the regression analysis made on two different datasets: the first one includes member countries of the EU, while the second one is made up of some extra-EU countries (Korea, Japan, Norway, Switzerland and the United States) which are considered investors (home countries) in the model and of EU members which are

[35] Valeriano Martínez, Marta Bengoa, Blanca Sánchez-Robles, *Foreign Direct Investment and Trade: Complements or Substitutes? Empirical Evidence for the European Union*, 2012

considered host countries. This gives the possibility to understand both intra-FDI and FDI from abroad cases and allows to make the comparison between the two.
The output of the regression is reported in table 3.6.

Table 3.6

Coefficient	Associated variable	Intra-FDI case	FDI from abroad case
β_1	$open_t$	4.565*** (0.954)	1.815*** (0.495)
β_2	lnD_{ij}	–0.494* (0.256)	–2.176*** (0.237)
β_3	$ln(Y_{it} + Y_{jt})$	0.517** (0.043)	2.531*** (0.173)
β_4	$ln(Y_{it} - Y_{jt})^2$	–0.062** (0.049)	–0.075** (0.030)
β_5	$lnDifSK_{ijt}$	0.027 (1.169)	0.158 (0.722)
β_6	TC_{it}	–0.223*** (0.053)	0.108*** (0.033)
β_7	TC_{jt}	0.090* (0.051)	–1.004*** (0.260)
β_8	CPI_{jt}	–0.249** (0.122)	–2.675*** (0.959)

By looking at β_1, it is possible to conclude that trade and FDI are complements in the common market phase of the EU: if the openness of a country increase, an increase in FDI inflow is forecasted. This is true in both cases of intra-FDI and FDI from abroad, but it is even important to underline that the magnitude of the coefficient related to the "intra" case is higher. This means that it is more likely to have a more than proportional increase in intra-FDI than in FDI from abroad when trade increases in the common market phase. By just looking at the coefficient, however, it is not possible to say whether intra-FDIs increase faster than trade.

By looking at β_4, it is possible to observe that differences in economic size are negatively correlated with both intra-FDI and FDI from abroad. This means that the more countries are equal, the higher is the probability that many FDI flows will occur between them. This conclusion is even suggested by coefficient β_5: the diversity in skilled labour endowment does not significantly affect the increase in intra-FDIs and FDIs from abroad flows. Differences in cost in different countries are not a driver and this confirms that vertical FDIs are not so significant in the EU.

It is difficult to come out with a conclusion for the impact of the common market on the ratio between intra-trade and intra-FDI. The existing literature seems to converge on the same result when intra-trade and intra-FDIs are considered separately. The common market seems to have a positive impact both on intra-trade (Ilzkovitz at al., Forslid, Straathof et al.) and intra-FDI (Straathof et al., Delgado, Cafiso, Martinez et al.). The problem arises when the relationship between intra-trade and intra-FDI is analysed. This issue has already been discussed by Valeriano Martinez in two different papers (2010 and 2012). The result is partially the same, since both researches find a positive correlation between intra-trade and intra-FDI during the common market phase in Europe and this correlation is higher when non-vertical FDIs are considered. In the first paper (2010), however, the significance seems to be low, while it is high in the second paper (2012). It is difficult to predict the result of our empirical research in this case, especially because empirical studies differ from what theory would suggest. In fact, if we analyse efficiency seeking and asset seeking investments, we can observe that their degree of correlation with the value of trade is low and of ambiguous sign. Let's consider the case of efficiency seeking investment to reach economies of scale and let's try to understand how this investment is correlated with trade. We can obtain the following result: trade in absolute value seems to be not so affected by the reallocation of production. This is due to the fact that if company A used to produce and export two products a1 and a2 while company B used to produce and export two products b1 and b2, after merging in a unique company A would produce and export a1 and b1 while B would produce and export a2 and b2. The traded "mix" changes but its value should remain stable, at least in average terms (so considering many companies in many sectors).

Because of this difficulty in realigning theory and empirical results, we do not make any prediction or inference on the impact of the common market on the ratio intra-trade / intra-FDI. If we make the hypothesis that the increase in intra-trade is negligible if compared to

the increase in intra-FDIs, we can however suppose that the impact of the introduction of the common market in Europe on the ratio is negative.

3.6.3. Impact of the currency union on intra-trade and intra-FDIs

The definition of currency union given in the previous chapter underlines that countries joining this institution do not just share something physical (the currency itself) but even the monetary and foreign exchange policy. This is the key reason why such an institution should imply a huge increase in trade: the risk related to the exchange volatility suddenly disappears as a common currency is established among countries. It is important to specify that the existing literature on this topic can include Eurozone or African currency unions which include old French colonies. The papers analysing the African context have been discarded since these currency unions are not the final step of an economic integration process but can exist independently from the common market or even the free trade area. The extremely different economic context is another reason why these papers are not considered. In any case it may be interesting to know that these papers came out with the conclusion of a huge positive impact of the currency union on the level of trade.

If we consider the European case, we have two significant papers, which come out with two different in magnitude conclusions. Rose and van Wincoop [36] forecasted an increase in trade equal to 60% for those countries belonging to the Eurozone, while Micco et al. [37] found a positive impact of Euro on intra-eurozone trade, which was estimated to be included in the 4-16% range.

As it is possible to observe, these papers converge on the result of a positive correlation between membership to a currency union and amount of intra-trade flows. A non-clear issue is instead related to coefficient which should correlate the independent variable (membership to the currency union) and the dependent variable (amount of intra-trade flows). The reason of such a different result can be due to the difference in time in which the analysis was done: Rose and van Wincoop had to use estimations, while Micco, Stein and Ordonez could benefit from having some data.

[36] Andrew Rose and Eric van Wincoop, *National Money as a Barrier to International Trade: The Real Case for Currency Union*, 2001

[37] Alejandro Micco, Ernesto Stein, Guillermo Ordoñez, *The Currency Union Effect on Trade: Early Evidence from EMU*, 2003

The finding of Micco, Stein and Ordonez (2003) has been then criticized by many other authors, who have tried to use different data or approach on the same gravity model. In particular, the different dataset involves the number of years considered, while the different approach involves the way of running the regression: it can be done by using time-series, cross-sectional or panel data.

Gomes et al. [38] could understand the importance of the dataset through which inferences are done. The authors could show that when the sample is not extended back many years before the creation of the EMU, a strong positive correlation of Euro and intra-EMU trade is verified. This is not true anymore in the opposite situation, when a longer dataset is used.

It is not even clear if the increase in trade is the effect or the cause of the currency union. The increase in trade which was registered among EMU countries starting from 1999 can be seen as the continuation of the effects of the EU itself: in this perspective, the currency union should be considered an effect of the increase in trade rather than a cause. The authors call this relationship the endogeneity of EMU self-selection: European countries who adopted the common currency did this choice not because they wanted to increase trade but rather because they were already trading a lot. The authors could even find that this is particularly true for the so-called core countries of the EU (the six founders plus Austria) while there was less evidence for the periphery countries (Ireland, Finland, Spain, Portugal and Greece). Table 3.7 summarises the findings related to the impact of currency union on intra-trade.

Table 3.7

Impact of currency union on intra-trade	
Rose and van Wincoop	positive impact of Euro on intra-eurozone trade. Forecast: 60 %
Micco, Stein, Ordonez	positive impact of Euro on intra-eurozone trade. Estimation: 4 - 16 %
Gomes et al.	When the sample is not extended back many years before the creation of the EMU, a strong positive correlation of Euro and intra-EMU trade is verified. This is not true in the opposite situation, when a longer dataset is used.

[38] T. Gomes, C. Graham, J. Helliwell, T. Kano, J. Murray, L. Schembri, *The Euro and Trade: Is there a Positive Effect?* , 2006

The impact of Eurozone on intra-FDI is not so immediate. The existing papers diverge on the main result and so there is no clear finding about the degree of correlation between membership to a currency union and amount of intra-FDIs.

The theory suggests that a currency union should facilitate intra-FDIs for two reasons. The sudden elimination of exchange rates decreases both the volatility of returns and the transaction costs of international investment flows as it is sentenced by Aristotelous and Fountas [39]. This has been later tested by the mean of empirical works: there is in fact a lot of literature which analyses this issue.

Campa (1993) [40] tried to explain the relationship between currency union and intra-FDIs through the exchange rate volatility: when it is high, the expected returns of the investments (i.e. FDIs) of firms are lower, because of the risk-adverse attitude. The establishment of a common currency makes the volatility equal to zero and so should be positively correlated with the amount of FDI received from other communitarian countries. Another observation made by Campa (1993) is related to the postponement effect: if the volatility related to exchange rates is high, firms are more willing to wait and so are more likely to postpone the investment and this reduces intra-FDIs.

Even Goldberg and Kolstad [41] studied the relationship between exchange rate uncertainty and amount of FDIs. Their conclusion is the opposite of the one of Campa. High exchange rate volatility seems to push risk-adverse firms to invest more in foreign markets, increasing intra-FDIs. These contrary findings can be explained by the methodology used: while Campa only refers to FDIs, without thinking about trade, Goldberg and Kolstad consider FDIs as substitutes of trade and so as an alternative option to serve the foreign market when exchange rate volatility is too high. This problem of divergence in the results is even exacerbated by considering the paper by Pantelidisa et al. [42] Their aim was to analyse intra-EMU FDIs as a function of the location advantages such as market size, labour cost, openness, technology, interest rate and introduction of the Euro. The conclusion is that common currency has no significant impact on intra-FDI flows across member countries. This result is due to different

[39] Kyriacos Aristotelous and Stilianos Fountas, What is the impact of currency unions on FDI flows? Evidence from Eurozone countries, 2009

[40] J. M. Campa, *Entry by Foreign Firms in the United States Under Exchange Rate Uncertainty*, Review of Economics and Statistics, 1993

[41] Linda Goldberg and Charles Kolstad, *Foreign Direct Investment, Exchange Rate Variability and Demand Uncertainty*, 1995

[42] P. Pantelidisa, D. Kyrkilisb and E. Nikolopoulosc, *Effects of European Monetary Integration on Intra-EMU Foreign Direct Investment*, 2014

but complementary reasons. On one hand, market seeking FDIs across member countries have been a consequence of the European market integration (European Single Market) rather than of the European monetary integration (European Monetary Union). On the other hand, it is easier to serve other countries through intra-trade rather than through intra-FDIs. Sousa and Lochard [43], however, found that intra-EMU FDI stocks could increase on average by 30% after the creation of the currency union, confirming the thesis of Campa. The same two authors found that EU but non-EMU countries were not negatively affected and did not suffer the "costs of being left out". This should suggest that new FDIs received by EMU members are created and not diverted from other countries.

Other non-core but interesting findings are the following:

- Petroulas (2006) [44] analysed the distribution of benefits from new FDIs to the Eurozone: he noticed that the membership to the currency union is positively correlated with the amount of received FDIs. The magnitude of the increase is between 14% and 16% but this is just a weighted average, since countries do not benefit equally: large economies can attract most of the FDIs generated by the Euro.
- Aristotelus and Fountas (2009) could find the same result, with the only difference that they explicitly talk about core and periphery: core countries are those who could benefit the most from newly created FDIs. Even in this case, the positive correlation between membership to the currency union and capability to attract FDIs is verified.
- Brouwer et al. (2007) [45] could show that the adoption of the common currency by the so-called eastern countries (those of the eastern enlargement of the EU) would positively affect their capability to attract new FDIs.

A significant problem related to the analysis of the impact of EMU on FDI (and trade as well) is the short existing dataset which has characterized the researches done in the first years. This is especially true for the analysis related to intra-EMU FDIs: in this case the dataset is both short and narrow (it covers few years for few countries) so that the final finding can be distorted by other specific events which are not "cleaned" in the regression

[43] Jose de Sousa and Julie Lochard, *Does the Single Currency Affect Foreign Direct Investment?* , 2011

[44] P. Petroulas, *The Effect of the Euro on Foreign Direct Investment*, Bank of Greece, 2006

[45] Brouwer, Jelle; Paap, Richard; Viaene, Jean-Marie, *The trade and FDI effects of EMU enlargement*, Center for Economic Studies and Ifo Institute (CESifo), Munich, 2007

model. This is the main reason why papers seem to diverge a lot on the conclusion and the answer to the same research question.

Another issue which may lead to different results is related to the year in which the common currency is supposed to be introduced: it is possible to consider both the 1999 and the 2002, which is the year in which the physical circulation of euro coins and bank notes started.

Table 3.8 summarises the findings related to the impact of currency union on intra-FDIs.

Table 3.8

Impact of currency union on intra-FDIs	
Aristotelous, Fountas	The elimination of exchange rates decreases the volatility of returns and the transaction costs of international investments.
Campa	The establishment of a common currency makes the volatility of returns equal to zero and so should be positively correlated with the amount of FDI received from other member countries.
Goldberg, Kolstad	High exchange rate volatility seems to push risk-adverse firms to invest more in foreign markets, increasing intra-FDIs.
Pantelidisa et al.	The common currency has no significant impact on intra-FDI flows across member countries.
Sousa, Lochard	Intra-EMU FDI stocks could increase on average by 30% after the creation of the currency union.

By looking at the previous considerations, it is possible to conclude that the ratio intra-trade / intra-FDI should increase when a currency union is created: the existing literature seems to converge on a positive effect on the numerator while the impact on the denominator is more ambiguous, but, even when positive, it is negligible if compared to the magnitude of change which occurs to the numerator.

Table 3.9 shows the expected impact of the three steps of the economic integration on the various types of investments and on trade. These expectations are coherent with what the previous literature review says. Since our aim is to understand the effects of the economic integration on the ratio between trade and FDIs in general, table 3.10 reports the global effect, without declining it in the three different types of FDI. It also contains the effect on the ratio

Table 3.9

	Resource seeking (vertical FDI)	**Market seeking (Horizontal FDI)**	**Efficiency seeking Asset seeking**	**trade**
Free trade area	Positive impact	Negative impact	Negligible impact	Positive impact
Common market	Negligible impact	Negligible impact	Positive impact	Negligible impact
Currency union	Negligible impact	Negligible impact	Negligible impact	Positive impact

Table 3.10

	FDI	**trade**	**trade / FDI**
Free trade area	Undetermined impact	Positive impact	Positive impact
Common market	Positive impact	Negligible positive impact	Negative Impact
Currency union	Negligible undetermined impact	Positive impact	Positive Impact

3.7. Appendix to chapter 3

Foreign Direct Investment (FDI): [46]

According to the Balance of payments manual, FDI refers to an investment made to acquire lasting interest in enterprises operating outside of the economy of the investor. Further, in cases of FDI, the investor´s purpose is to gain an effective voice in the management of the enterprise. The foreign entity or group of associated entities that makes the investment is termed the "direct investor". The unincorporated or incorporated enterprise-a branch or subsidiary, respectively, in which direct investment is made-is referred to as a "direct investment enterprise". Some degree of equity ownership is almost always considered to be associated with an effective voice in the management of an enterprise; the Balance of payments manual suggests a threshold of 10 per cent of equity ownership to qualify an investor as a foreign direct investor.

[46] http://unctad.org/en/Pages/DIAE/Foreign-Direct-Investment-(FDI).aspx

4. The empirical analysis

This chapter is dedicated to the empirical research and can be logically and chronologically subdivided in two main parts. The first part is represented by sections from 4.1 to 4.7. The aim of this part is to build a good econometric model.

Section 4.1 shows the implications of using the ratio as dependent variable, while section 4.2 describes the differences between our econometric model and the gravity model approach.

Sections 4.3 and 4.4 are instead respectively dedicated to the description of available data and to the presentation some interesting observations.

Section 4.5 allows to better understand the regressors, while some preliminary regressions are run in section 4.6. These preliminary regressions allow to better understand the impact of the regressors on intra-trade and intra-FDI separately and not considered as a ratio.

Section 4.7 shows the final version of the econometric model, which is the run in the first regression of the following section. Section 4.8, however, contains five regressions, since some improvements are introduced by comparing the results of the already implemented regressions with what the existing literature suggests. So, while sections from 4.1 to 4.7 are focused on the econometric model as something static, which does not change, section 4.8 is instead focused on the implementation of the regressions and on the continuous improvement of the econometric model itself when the result of the regressions is not totally satisfactory.

Section 4.9 investigates whether the panel approach is the best or not, while section 4.10 constitutes the appendix to chapter 4.

4.1. The ratio as dependent variable

The most innovative aspect of this thesis is related to the ratio between intra-trade and intra-FDIs, which will be the dependent variable when the regressions will be implemented. The behaviour of this ratio is even discussed in the literature review, when trying to mix the already existing literature about intra-trade with the already existing literature about intra-FDIs.

The choice of using the ratio as dependent variable is due to the positive impact of each step of the economic integration on both intra-trade and intra-FDIs. As the already existing

literature suggests, there is in fact huge evidence that whenever a new step between two countries is reached, both their intra-trade levels and their intra-FDI flows increase. This scenario is even compatible with those cases in which trade and FDIs are substitutes and so the increase of the first should imply the decrease of the second and vice-versa. But the economic integration has a so huge impact, that it can off-set this eventual decrease, since it favours economic relations in general. In other words, a new step of the economic integration stimulates both intra-trade and intra-FDIs. If this step makes intra-trade more appetible than intra-FDIs, some economic agents will substitute intra-FDIs with intra-trade, but the net effect will be an increase of both these variables. In such a context, it is more interesting to analyse which of these two variables better reacts and is more positively influenced by the presence of the new step of the economic integration. The variable which allows us to make this analysis is the ratio between intra-trade and intra-FDIs. If a certain step of the economic integration has a positive impact on the ratio, this means that the impact on intra-trade is stronger than the impact on intra-FDIs, while, in the opposite case, if a certain step of the economic integration has a negative impact on the ratio, this means that the impact on intra-FDIs is stronger than the impact on intra-trade.

4.2. Differences with the gravity model approach

The gravity model approach, which has been presented in chapter 3 and which was used by most authors as for example Martinez, is not the best choice for the research question of this thesis in a strict sense. It is instead possible to use some of the "ingredients" of the gravity model but discarding some of its typical independent variables.

The dependent variable is in fact the ratio between level of intra-trade and amount of intra-FDIs. While these two variables taken alone strongly depend on the level of the GDPs of the two countries involved in the economic interaction, the ratio should not be significantly correlated to the sum of the GDPs. Both the numerator and the denominator are in fact positively correlated with the sum of the GDPs and it is difficult to establish whether GDPs have higher influence on intra-trade or on intra-FDIs. To test the low influence of GDP levels on the ratio, we will run some preliminary regressions in section 4.6 where the behaviour of the two separated variables will be analysed. If the elasticity of intra-trade to the sum of the GDPs is similar to the elasticity of intra-FDIs to the sum of the GDPs, it is possible to discard the GDPs from the econometric model.

A similar reasoning can be done for the magnitude of the coefficient which correlates distance and ratio intra-trade/intra-FDI. This coefficient should be not so significant as it would be if the two dependent variables were considered separately. The distance is in fact very correlated with the amount of intra-trade and the amount of intra-FDIs. The problem is due to the same direction of the correlation, since distance has a negative impact on both variables. It is necessary to understand whether distance as a huger impact on intra-trade or on intra-FDIs. Even in this case, the analysis of the elasticities in the preliminary regressions will allow to better understand how the two variables behave: if one of them is more elastic than the other, the variable "distance" will be included in the econometric model.

An extreme case of short distance between two countries is verified when they share a common border. This situation is something which cannot be simply considered as "distance equal to zero", since it is empirically shown [47] that when countries have a common border, trade between the two areas which are close to the border itself is "abnormally" higher than the trade between other areas far from the border. It is as if the common border were able to compensate the home-bias effects. This is the reason why a dummy variable which signals this case is put in some of the econometric models using the gravity approach. The preliminary regressions will help us to understand whether the presence of a border is even correlated with significant changes in intra-FDI levels. Our econometric model will include this dummy variable only if intra-trade and intra-FDIs react with different magnitudes to the presence of a border. Differently from the other two previous variables (sum of the GDPs and distance), it is just possible to analyse the semi-elasticities of intra-trade and intra-FDIs to the variable "border", since this regressor is a dummy and so it cannot be substituted by the logarithmic form. When considered, "distance" and "border" will be used as control variables.

The other variables which must be included in the model are those related to the membership to trade bloc. These variables will be the three regressors. The existing literature, however, suggests that using a simple dummy may be something to simplistic, since the effects are not sudden verified but can occur little by little. The problem of using a continuous variable and not a dummy is the related to the degree of completeness of the trade bloc, which can be non-constant: if the free trade area in Europe is considered, it is possible to observe that it starts with the Treaty of Rome in 1957 and it is completed with the creation of the ECC

[47] https://ourworldindata.org/international-trade

custom union in 1968. In this decade, duties were abolished little by little, but a deeper research should be done to understand if this decrease in tariffs was constant (i.e. 1/10 of duties were abolished each year more or less) or not.

Thanks to the existing literature, it was even possible to notice that some of the effects may also anticipate what we generally call the cause, i.e. the year in which the trade bloc is created, or the economic integration is increased.

The problem of using a gravity model, in which one of the two variables (trade and FDI) depends on the other, is due to the fact there would be a unique conclusion, establishing once and for all the relationship of the two variables in any considered year, regardless of the economic integration. Let's consider the following example:

$(FDI)_{ijt} = \alpha + \beta_1 * trade_{ijt} + \beta_2 * lnD_{ij} + \beta_3 * (Y_{it} + Y_{jt}) + \beta_4 * FTA + \beta_5 * ESM + \beta_6 * EMU$

β_1 can assume a single value and this value would be a weighted average of the three hypothetical trends that it would assume when running the regressions without β_4, β_5 and β_6, but considering only the periods of the free trade area, the common market and the currency union respectively. Another problem associated with an econometric model like this is the underestimation of β_1. The level of intra-FDI would in fact be partially explained by trade, while part of the explanation would be provided by FTA, ESM and EMU.

4.3. Data selection and data availability

The dependent variable is the ratio between a measure of level of trade and a measure of level of FDI. Both the numerator and the denominator can be expressed by using two perspectives: from inside to outside or vice versa. It is important to be coherent, so that if the "inside to outside" perspective is used in the numerator, the same perspective must be adopted even in the denominator. The obtained ratio would be export / outward FDI in this case, while if the "outside to inside" perspective were adopted, the ratio import / inward FDI would be obtained. The results of the regression analysis would not be significantly different, since we are considering all member countries' bilateral trade and FDI. Export of country A to country B is equal to import of country B from country A. This perfect symmetry is not verified in the FDI case, but trends do not differ a lot.

Since trade and FDI have been discussed even as decisions of the economic agents on how to serve foreign markets, the dataset used is based on the "inside to outside" perspective and so export and outward FDIs are used.

Another issue related to the denominator is the selection of the most appropriate indicator. When we talk about outward FDIs, we can in fact refer both to the outflows and to the outward stocks. The second measure is a proxy of the cumulated function of the first measure. In other words, the sum of all the foreign direct investments and disinvestments of country A in and from country B since the first year in which they had economic interaction is directly correlated with the level of invested capital of country A in country B. The dis-alignment between the two measures is due to the fact that the stock can be increased even through made-abroad profits. The data used in the econometric model are those related to intra-FDIs stocks. This is due to two different reasons:

- Cumulated FDIs (i.e. stocks) better represent the real capacity of serving foreign markets instead of using export. Whenever economic agents decide to increase FDI flows toward a certain country, they do not just consider the current year in which the investment is made, but even the following years.
- FDI stocks are positive in most cases. They can assume even negative values, but this is a rare case which can happen when disinvestments are higher than investments made in the previous years. In any case, negative FDI stocks are never high in absolute value. FDI flows can be instead positive when there is investment or negative when there is disinvestment. Having a denominator which can be positive or negative implies a huge variability of the dependent variable, which would be positive or negative as well.

The availability of data on the dependent variables is a critical issue. The ideal database would require all the bilateral economic relations of twenty-seven member countries with all the other twenty-six (27-1) member countries both for trade and FDI for a time period which should go back at least some years before the introduction of the European Single Market. This huge dataset is ideal but unavailable, especially for FDIs. There is in fact a very complete database on bilateral trade flows for each couple of countries in CEPII website [48]. This dataset goes back to the XIX century and is just related to the physical flows and so it does not contain any piece of information on export and import of services. This is not a problem and can be even a positive point: data on physical products fit better with all the previous analysis and literature review, which was very centred on production (export as home production and FDI as foreign production).

[48] http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp

The database on bilateral FDIs is instead more critical. It is provided by the Organisation for Economic Co-operation and Development (OECD) [49] but covers a shorter period, which starts in 1985 just for few countries. Another critical aspect is the absence of outward stocks of countries which do not belong to the OECD (Cyprus, Malta, Romania, Bulgaria and Lithuania) or which have joined the OECD in the recent years (Estonia and Latvia). Data on outward stocks of OECD members in these "outer" countries are instead available. This implies that the econometric model would only consider the choices made by the economic agents living in countries belonging to the OECD (except Estonia and Latvia). The consequence is a reduction in the heterogeneity of the dataset, which has a negative impact on the initial aim of having a holistic approach, covering all the communitarian countries. The result of the regression would be centred on the OECD member countries. The positive aspect of this lower heterogeneity is instead the higher probability of having coefficients with a higher significance: if homogeneous countries are considered, a similar behaviour of the economic agents is expected.

It is important to underline that most of the reduction is instead due to the elimination of existing and provided bilateral relations on intra-FDIs which were not very reliable.

The number of observed bilateral relations falls from the ideal 702 (26 bilateral relations for each of the 27 considered countries) to 343. The available bilateral relations are the 48.86% of the total. 186 out of 702 ideal observations are not possible because of not reported bilateral relations involving FDIs coming from "outer" countries while 173 out of 702 ideal observations are excluded because of low reliability. Table 4.1 summarises this process.

Table 4.1

A	ideal number of bilateral relations	702	27*26	100.00%
B	unavailable bilateral relations	186	7*26	26.50%
C	available but uncomplete bilateral relations	173	-	24.64%
A - (B+C)	number of considered bilateral relations	343	-	48.86%

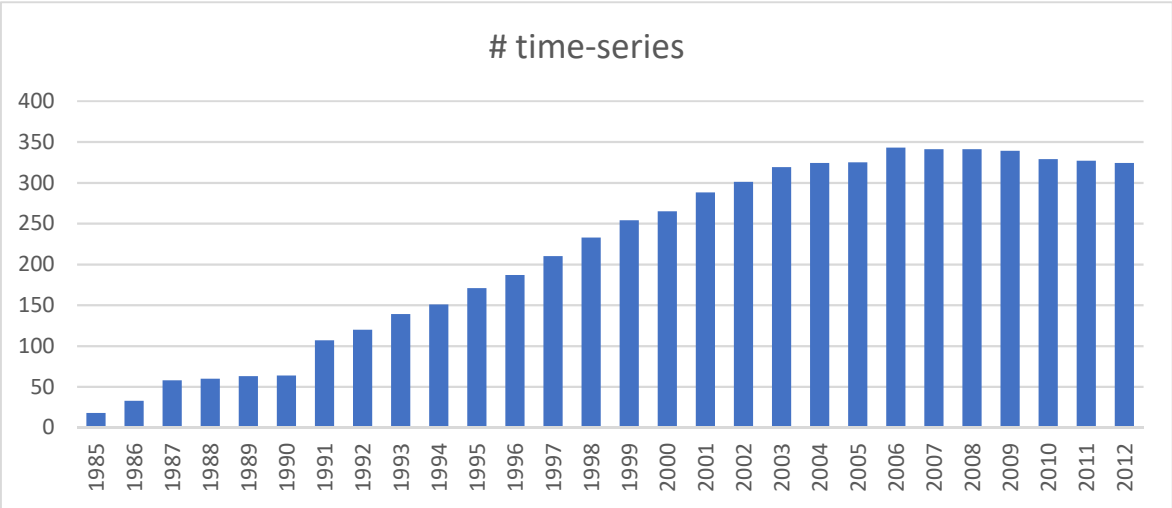
This problem of data availability is related to the intra-FDIs dataset but affects the dependent variable, which needs both data on intra-trade and intra-FDIs. The new dataset containing

[49] https://data.oecd.org/fdi/fdi-flows.htm

the ratio between intra-trade and intra-FDIs is given by the union of the two separated datasets and so, a missing data in one of the two implies the unavailability of the observation of the dependent variable.

It must be noticed that 343 is the number of considered bilateral relations and not the number of observations. To determine the dimension of our sample, it is necessary to count the number of years for which there is un available piece of data for each of these 343 bilateral relations. This number is not constant and the first year of observation requires data availability of both countries involved in the bilateral relation. In most cases, there are no unavailable data between the first and the last year of observation ("holes" are outside this interval) but in the few cases in which these holes were within the interval, they have been filled through an average of the previous and the following year or assuming a constant trend between the last available year before the hole and the first available year after the hole. The drawback of this choice is represented by the creation of some fictitious pieces of data, but this should not have a huge impact on the results: this technique has been used in few occasions and the variability and not the trend is what disappears from the dataset.

Graph 4.1 shows the number of available time series in each year, while table 4.2 shows all the available bilateral relations. It is important to underline that countries on the top horizontal row are those exporting or making the investments, while countries on the vertical row on the left are those importing or receiving the investments from abroad.



Graph 4.1: The available number of time series has increased a lot in the 28 years period: while are just less than 25 time-series in 1985, the peak number of time-series (almost 350) is reached in 2006.

Table 4.2

	AUT	CZE	DNK	FIN	FRA	DEU	GRC	HUN	IRL	ITA	LUX	NLD	POL	PRT	SVK	SVN	ESP	SWE	GBR
AUT		✔	✔	✔	✔	✔	✔	✔		✔		✔	✔		✔	✔			✔
BEL	✔		✔	✔	✔	✔				✔	✔	✔	✔	✔				✔	✔
BGR	✔	✔	✔	✔	✔	✔	✔	✔		✔		✔	✔	✔		✔		✔	✔
CYP	✔	✔	✔	✔	✔	✔	✔	✔		✔		✔	✔	✔				✔	✔
CZE	✔		✔	✔	✔	✔	✔	✔		✔		✔	✔	✔	✔	✔		✔	✔
DNK	✔			✔	✔	✔		✔		✔		✔	✔	✔		✔	✔	✔	✔
EST	✔		✔	✔	✔	✔				✔		✔	✔					✔	
FIN	✔		✔		✔	✔				✔		✔	✔					✔	✔
FRA	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
DEU	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔
GRC	✔		✔	✔	✔	✔				✔		✔		✔				✔	✔
HUN	✔		✔	✔	✔	✔	✔			✔		✔	✔	✔	✔	✔		✔	✔
IRL	✔	✔	✔		✔	✔	✔	✔		✔		✔	✔	✔					✔
ITA	✔	✔	✔	✔	✔	✔	✔	✔	✔			✔	✔	✔	✔	✔		✔	✔
LVA	✔		✔	✔	✔	✔				✔		✔			✔			✔	✔
LTU	✔		✔	✔	✔	✔		✔		✔		✔	✔					✔	✔
LUX	✔				✔								✔		✔	✔			
MLT	✔		✔		✔	✔	✔	✔		✔		✔	✔		✔				✔
NLD	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔			✔	✔		✔	✔	✔	✔
POL	✔	✔	✔	✔	✔	✔		✔		✔		✔		✔	✔	✔		✔	✔
PRT	✔		✔		✔	✔	✔			✔		✔					✔	✔	✔
ROU	✔		✔	✔	✔	✔	✔			✔		✔	✔	✔		✔	✔	✔	✔
SVK	✔	✔	✔	✔	✔	✔		✔		✔		✔	✔			✔		✔	
SVN	✔	✔	✔	✔	✔	✔	✔	✔		✔		✔						✔	
ESP	✔	✔	✔	✔	✔	✔	✔			✔	✔	✔	✔	✔		✔		✔	✔
SWE	✔		✔	✔	✔	✔	✔			✔		✔	✔	✔		✔	✔		✔
GBR	✔	✔	✔	✔	✔	✔		✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	

Beside problems of data availability in the FDI case, there are other minor issues related to how data are provided for both FDI and trade:

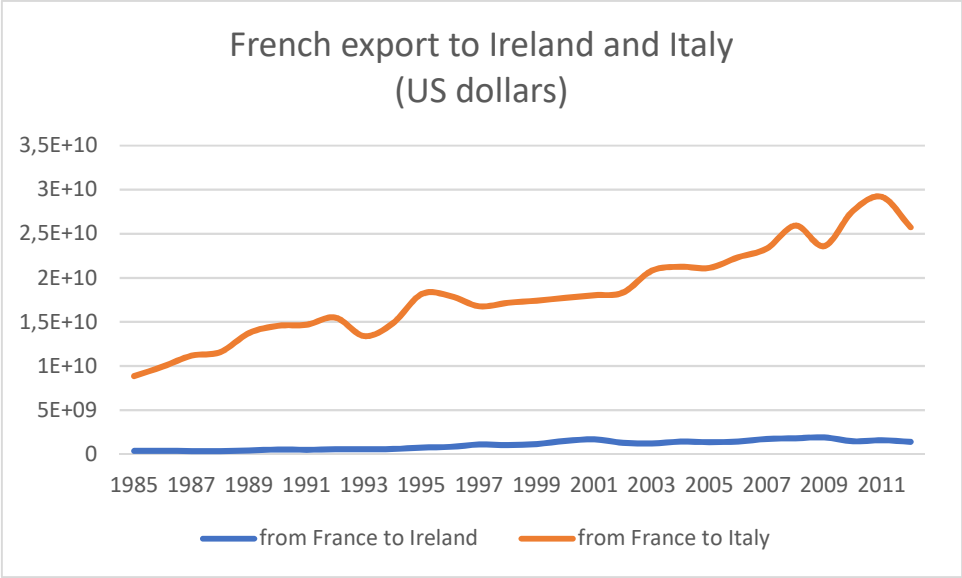
- Observations involving relations with Czech Republic and Slovakia start in 1993. These two countries constituted Czechoslovakia, so that is possible to find aggregated data before 1993.
- Observations involving relations with Slovenia start in 1992. This country was part of Yugoslavia together with other countries, so that it is not possible to find data before 1992.
- Observations involving relations with Baltic states (Estonia, Latvia, Lithuania) start in 1992. These three countries were part of the USSR together with other major countries, so that it is not possible to find aggregated data for Baltic states before 1992.
- Observations involving trade relations with Germany start in 1991. This country was in fact constituted by the German Democratic Republic (GDR) and the Federal Republic of Germany (FRG). It is possible to find disaggregated data for the two previous countries before 1991.
- Observations involving FDI relations with Belgium and Luxembourg are separated from 1996, while they are put together in the previous period. This is due to the presence of a unique central bank for these two countries before the creation of the common currency and so of a common accounting, which do not consider whether the investment is made by / received by Belgium or Luxemburg. The common economic entity, which was a monetary union, is called BLEU (Belgium - Luxembourg economic union)

All these issues have been solved in the following ways:

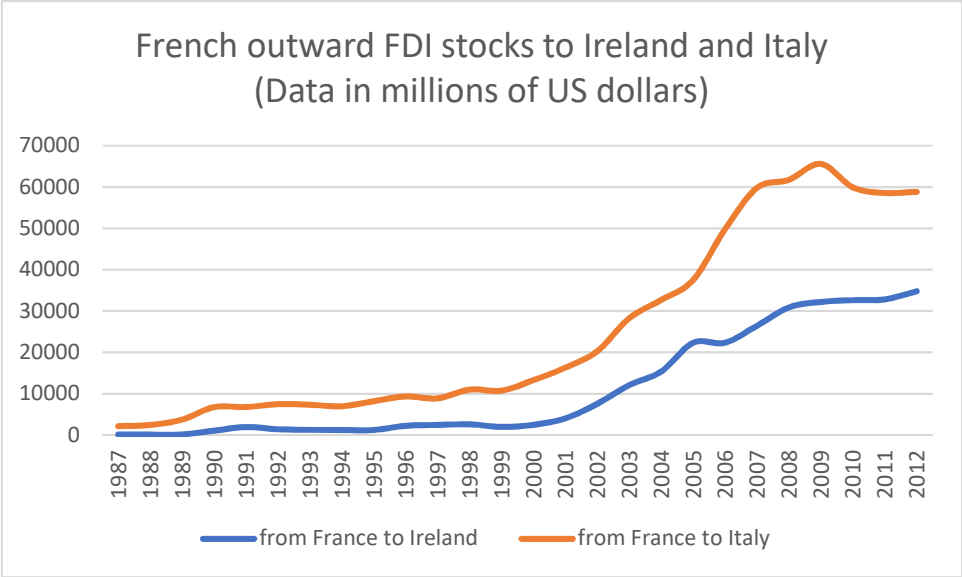
- Czech Republic and Slovakia are considered since 1993. This does not significantly affect the results, since these two countries entered the European Union in 2004 and so there is a long enough dataset (eleven years between 1993 and 2004) in which they were out of any type of economic integration.
- Slovenia is considered since 1992. The same reasoning made for Czech Republic and Slovakia can be applied here, since Slovenia entered the European Union in 2004.

- Baltic countries are considered since 1992. The same reasoning made for Czech Republic and Slovakia can be applied here, since Estonia, Latvia and Lithuania entered the European Union in 2004.
- Germany is considered since 1991. This can affect the results of the empirical research, since data about the two separated countries (GDR and FRG) are not considered. In this case, data aggregation for the period before 1991 can be easily done by summing the two separated datasets but the new data become useless: it is in fact impossible to say whether Germany as a whole was part of the European Union or not before 1991, since the West part was a founder member while the East part entered only after the reunification.
- Belgium and Luxemburg are considered separately. Data disaggregation is made by assuming that investments made by / received by the two separated entities of BLEU were proportional to the ones made by / received by the two countries in the first year in which there is a disaggregated accountability.

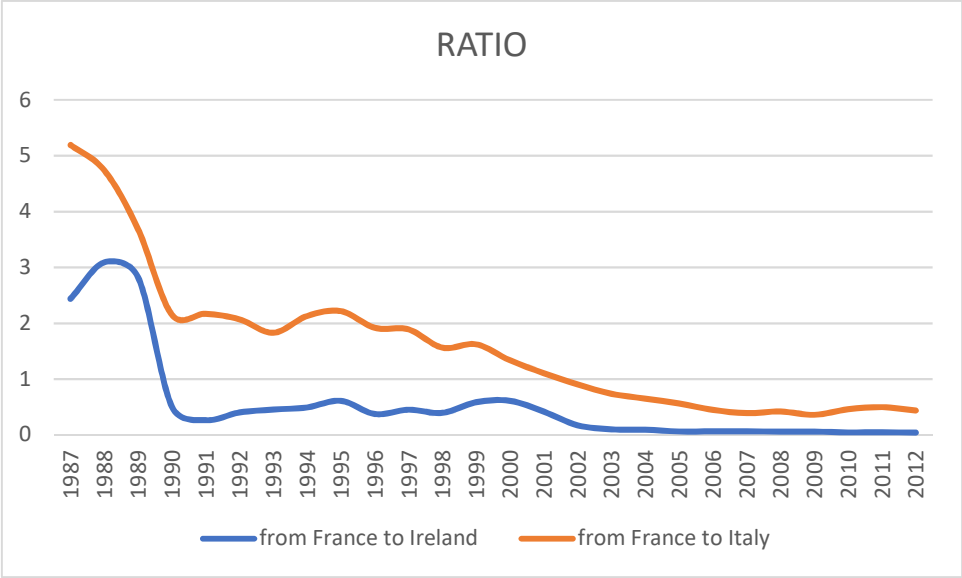
The dependent variable in our research is the ratio between intra-trade flows and intra-FDI stocks for couples of countries. This means that we are not interested in absolute values of intra-trade flows or absolute values of intra-FDIs stocks, even if both these two variables are essential to create our dependent variables. Graphs 4.2, 4.3 and 4.4 provide an example to better understand these three variables.



Graph 4.2: The intra-trade volume from France to Italy is significantly higher than the intra-trade volume from France to Ireland (cross sectional perspective). The trend of both lines is increasing, and this means that export from France to Ireland and Italy has increased between 1985 and 2012 (time series perspective).



Graph 4.3: The intra-FDI stock from France to Italy is significantly higher than the intra-FDI stock from France to Ireland (cross sectional perspective). The trend of both lines is increasing, and this means that the cumulative stock of FDI from France to Ireland and Italy has increased between 1987 and 2012 (time series perspective).



Graph 4.4: the ratio between the two dimensions of the two previous graphs (4.2 and 4.3) is here reported. This will be the dependent variable of our research.

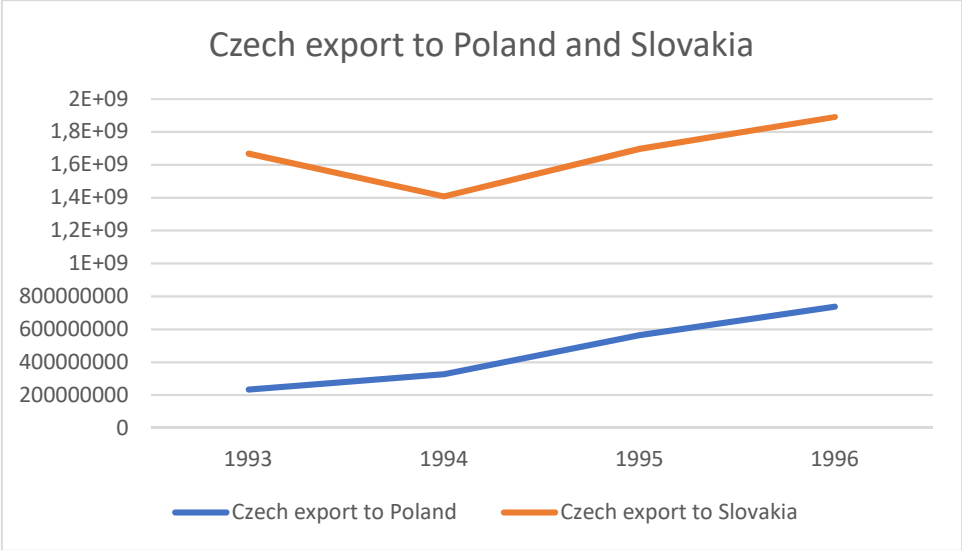
4.4. Observations on dataset - looking for anomalies

An interesting aspect that can be observed for the previous mentioned cases of Czechoslovakia, Baltic countries and BLEU is related to their high level of "inner" economic integration which was already existing before some important steps of the economic integration. Being a unitary country (Czechoslovakia) or part of a unitary country (Baltic countries) before the 90s implies that the first observed data on trade between Czech Republic and Slovakia on one side and between Estonia, Latvia and Lithuania on the other are "abnormally" high. This high level of trade is due to the absence of home bias effect, due to the absence of borders until the independence of these countries was declared. Czechoslovakia and Baltic countries can be even taken as two unique cases in Europe in which a decrease in the economic integration between countries was verified. In both cases common trade policies were kept, since Czech Republic and Slovakia created the Central European Free Trade Agreement (CEFTA) with the other Visegrad members (Poland and Hungary) while Baltic countries crated the Baltic free trade area (BAFTA). The common market and the currency union were instead lost: home bias effects were created, and independent monetary policies and currencies were established.

In the econometric model, observations on bilateral economic relations between couples of Baltic countries will not be considered, because of data unavailability on intra-FDIs.

Bilateral economic relations between Czech Republic and Slovakia will be instead considered in the regression.

Graph 4.5 shows the abnormally high value of trade between Czech Republic and Slovakia, after their independence.



Graph 4.5: Export from Czech Republic to Slovakia was more than seven times higher than export to Poland in 1993, despite Poland had more than seven times the population of Slovakia in that year. This is due to existence of Czechoslovakia until 1993.
Data are expressed in US dollars.

This structurally higher amount of intra-trade between some couples of countries could decrease the squared R of our research, if the same structurally higher amount is not verified even for intra-FDIs. The ratio itself would be in fact higher in this case. A possible solution to "clean" these structural differences is the normalization process, which will be discussed in section 4.8. Since we are more interested in trends, it would be feasible to eliminate structural differences which are verified in a cross-sectional perspective.

4.5. Value of the regressors

As we have already seen in the existing literature, the issue related to the timing is of high importance in our research. It is not only necessary to understand whether some causes have an impact on the dependent variable, but it is even necessary to know when the impact occurred, matching causes and effects in a precis year.

The two main issues related to the timing are anticipation and distribution of effects over time. As it was noticed in the literature review, anticipation generally involves those countries who enter the institution when it is created, and not countries who enter later. Because of this, the anticipation cannot be expressed for the regressor which signals the membership to the free trade area (FTA_dummy). The first available observations start in 1985, when the free trade area was already completed.

The anticipation becomes instead evident in the common market case. The regressor which signals the membership to the common market (ESM_dummy) will assume a value equal to 1 starting from 1991 (two year before the establishment of the European Single Market). As we have already seen when we analysed the evolution of the common market in Europe, some typical aspects of a common market were in fact introduced before 1993. This is especially true after 1986, when the project toward the single market as institution was launched. The 1991 has been selected, since it belongs to the 1986 - 1993 period but it is closer to the 1993, so to the introduction of the European Single Market.

No anticipation has been instead put in the database for the introduction of the common currency. In this case, it is in fact better to decide between 1999 and 2002. The introduction of the virtual common currency (1999) and the introduction of physical coins and banknotes (2002) are in fact two well separated events and do not constitute the extremes of a continuous process. This is the reason why we will consider the 2002 as starting year for the common currency. The analysis could be even run assuming the 1999 as threshold between "before" and "after". Since these years are relatively close, however, no different results should be obtained.

To consider the distribution of effects, some regressions will be run using pseudo-dummies: these variables are equal to 1 in the first year of the introduction of the new step, become equal to 2, 3, 4 in the three following years and finally reach a value equal to 5. Pseudo dummies have the advantage of considering the transition.

4.6. Preliminary regressions

Let's now see the effects of the introduction of the three steps of the economic integration on the two separated variables (intra-trade and intra-FDIs). The analysis is centred on various outputs of an econometric model based on the gravity approach.

The dependent variable of the first preliminary regression is the intra-trade volume, while the regressors are FTA_dummy, ESM_dummy and EMU_dummy. The control variables are "distance", "border", "GDP_sum" and "time". GDP_sum is obtained by summing the GDPs of the two countries involved in the observation.

First preliminary regression

- Ordinary least squares (OLS)
- 7836 observations
- 343 cross sectional units
- Length of time series: min 13, max 28 (from 1985 to 2012)
- Dependent variable: intra-trade
- Regressors: FTA_dummy, ESM_dummy, EMU_dummy
- Control variables: "distance", "border", "GDP_sum", "time"

Table 4.3 - Output of the first preliminary regression

	coefficient	**standard error**	**t ratio**	**p-value**	
Const	−3,04e+08	2,02e+08	−1,51	0,1312	
distance	−1,43e+06	92817,3	−15,39	<0,0001	***
border	4,47e+09	1,81e+08	24,65	<0,0001	***
GDP_sum	4022,36	60,10	66,93	<0,0001	***
time	−8,81e+07	1,09e+07	−8,12	<0,0001	***
FTA_dummy	5,22e+08	2,75e+08	1,90	0,0579	*
ESM_dummy	5,00e+08	3,05e+08	1,64	0,1010	
EMU_dummy	1,92e+09	1,81e+08	10,65	<0,0001	***
Squared R = 0,524					

This model seems to be well built. The coefficients associated with the control variables "distance" and "border" behave as we would expect: if the distance between two countries increases, their volume of intra-trade decreases, while if there is a border between two

countries, an extra amount of intra-trade between them is expected. Even the coefficient associated with the control variable "GDPsum" behaves correctly, since intra-trade volumes are higher between couples of countries whose total GDP (sum of the GDPs of the two countries) is high. Another positive aspect which involves the control variables "border", "distance" and "GDP_sum" is their high significance, due to the very low (<0,0001) p-value. The three regressors (FTA_dummy, ESM_dummy and EMU_dummy) require a deeper analysis: the sign of their coefficients is coherent with what the literature review suggests. There is in fact a positive impact of these three regressors on the exchanged volumes of intra-trade. The p-value of the FTA_dummy and ESM_dummy is however relatively high, so that the significance of these two regressors is low. This issue, however, can be solved thanks to the introduction of pseudo-dummies instead of simple dummies, as it is done in the first preliminary adjusted regression.

Another problem related to these three regressors stems from the magnitude of their coefficients. The literature review suggests that the introduction of a free trade area should imply a huge increase in the volumes of intra-trade, while the positive impact of the currency union on intra-trade volumes should be of lower magnitude. On the contrary, the results of this regression suggest a huger positive impact of the common currency than the free trade area on intra-trade flows. This is due to the higher magnitude of EMU_dummy (1,92e+09), while the magnitude of FTA_dummy is lower (5,22e+08).

Control variable "time" is the only one whose sign is different from what we would expect. As we have noticed in the introduction, the incidence of trade on the GDP at global level has increased. Since the GDP itself has increased, trade volumes in absolute terms should have increased, while there is here a negative correlation between time passed and trade volumes. This unexpected behaviour can be partially due to two different reasons:

- "time" is correlated with other variables in the model, as GDPsum, FTA_dummy, ESM_dummy and EMU_dummy.
- Most observations belong to the last years of the 1985-2012 periods. A huge decrease of trade levels was verified at global level and especially at European level after the 2008 crisis.

The importance of the issue related to the correlations between couples of variables will be discussed in a dedicated section about the limitations of our research.

The most positive aspect of this model is the squared R, which is equal to 0,524. This implies that the model is not only able to explain some macroeconomic phenomena thanks to the low p values of the regressors, but it can be even partially used to forecast the future (it has predictive power). A squared R equal to 0,525 means that only half of the variability remains unexplained, while the other half is explained through the already considered regressors.

The output of the first regression would be similar if FTA, ESM and EMU instead of FTA_dummy, ESM_dummy and EMU_dummy were used. It is possible to see this by looking at the output of the first adjusted preliminary regression in the appendix to this chapter.

By comparing the first preliminary regression and the first adjusted preliminary regression, the only "ingredients" that change are the three regressors related to the three steps of the economic integration. This implies that the two models can be directly compared, to determine the best one in term p-value and squared R. The observations are the same, but FTA, ESM and EMU have replaced FTA_dummy, ESM_dummy and EMU_dummy respectively. This means that three regressors are not dummies anymore while they can be defined as pseudo-dummies.

The results of the first adjusted regression suggest that some improvements have occurred: all the regressors have now a higher significance, since all the independent variables have a lower p-value than before. There is an improvement also for squared R, even if it is negligible, since it passes from 0,524 to 0,531. It is possible to conclude that using pseudo-dummies instead of simple dummies has its own pros and cons. The most important improvement due to pseudo-dummies is the increase in the significance of the regressors, so that it is possible to obtain a better interpretation of result. The introduction of pseudo-dummies, however, does not imply a significant improvement in the prediction. A drawback of pseudo-dummies is instead represented by a lower easiness in reading the coefficients. This is the reason why it is possible to opt for both types of variables (pure dummies and pseudo-dummies), keeping in mind that they both have positive and negative aspects.

Let's now implement the second regression using FTA, ESM and EMU as regressors, the same control variables of the first regression and intra-FDIs instead of intra-trade as dependent variable. The observations of the second regression are lower in number, since they were 7836 in the first regression, while they are 6039 here. Even the average length of time-series decreases, since the shortest series has only 7 instead of 13 observations.

Second preliminary regression

- Ordinary least squares (OLS)
- 6039 observations
- 343 cross sectional units
- Length of time series: min 7, max 28 (from 1985 to 2012)
- Dependent variable: intra-FDIs
- Regressors: FTA, ESM, EMU
- Control variables: “distance”, “border”, “GDP_sum”, “time”

Table 4.4 - Output of the second preliminary regression

	coefficient	**standard error**	**t ratio**	**p-value**	
Const	−7,95e+08	9,88e+08	−0,80	0,4212	
distance	−7,72e+06	397605	−19,42	<0,0001	***
border	8,98e+08	7,40e+08	1,21	0,2252	
GDPsum	6884,29	236,04	29,17	<0,0001	***
time	2,92e+08	5,10e+07	5,74	<0,0001	***
FTA	4,96e+08	2,84e+08	1,75	0,0807	*
ESM	5,65e+07	3,20e+08	0,18	0,8597	
EMU	1,06e+09	1,62e+08	6,55	<0,0001	***
Squared R = 0,264					

Even in this case the sign of the coefficients associated with the control variables “distance”, “border” and “GDPsum” are expected. The variable “border”, however, has a very low significance due to the high p-value: it is very likely that there is no a huge increase in the FDI flows between two countries who share a common border.

Even the sign of the coefficients associated with variables FTA, ESM and EMU behave as we would expect, since they are positive. The significance of FTA and ESM is however low, while the significance of EMU is high. This means that the impact of the currency union is

not negligible in this regression, as it was instead sentenced in the conclusions of the literature review.

The control variable "time" is here positively correlated with the amount of intra-FDIs. This could be due to the lower reactiveness of intra-FDIs to the crisis.

The last important observation is related to the lower squared R, which is here equal to 0,264. This mean that just one fourth of the variability is explained by the model, while the remaining three fourth are unexplained. This should not be surprising: the variability of FDI stocks is higher than the variability of trade volumes and this is the reason why we had a higher squared R in the previous model, where the dependent variable was the level of intra-trade.

We have observed that the impact of the three steps of the economic integration on intra-trade is different from the impact of these steps on intra-FDIs. The regressions of the next section of this thesis are aimed at analysing the impact on the ratio between these two variables (intra-trade and intra-FDIs), which should be coherent with these results and the results of the literature review.

It has sense here to ask whether we should consider the control variables "distance", "border" and "GDP_sum" even in the next section. This stems from the possibility of having the same impact of these variables on intra-trade and intra-FDIs, which would imply no impact on the ratio. Considering these variables even in the next section regardless of this issue is not a mistake: we would obtain a very low significance for the regressors whose impact on intra-trade are too similar to the impact on intra-FDIs. It is however better to anticipate this issue, in order not to use too many variables and to facilitate the analysis discarding the useless variables. To understand whether "distance" and "GDP_sum" have a too similar behaviour on the two dependent variables, it is necessary to introduce the logarithmic form for both the dependent variables and the regressors, so that it is possible to understand the elasticity of intra-trade and intra-FDIs to the variables "distance" and "GDP_sum". To understand the impact of the presence of a border between two countries on their ratio, it is instead just possible to analyse the semi-elasticity of intra-trade and intra-FDIs to the presence of a common border between two countries. This id due to the fact that "border" is a dummy and so it cannot be translated in the logarithmic form. In other words, it is just possible to analyse how log_(intra-trade) and log_(intra-FDIs) behave when the variable "border" is equal to 1. It is possible to predict that the semi-elasticity of intra-trade to border is higher than the semi-

elasticity of intra-FDIs to border. In the previous two models, we have in fact already seen that the presence of a border seems to be highly correlated with the amount of intra-trade while it should be not significantly correlated with the amount of intra-FDIs.
Third and fourth preliminary regressions analyse all these elasticities and semi-elasticities for intra-trade and intra-FDIs respectively. It is necessary to underline here that the following regressions are a proxy, to understand whether intra-trade and intra-FDIs behaves differently in percentage terms to "distance", "border" and "GDP_sum". What we will be able to know after these regressions is whether it is very likely that these regressors have the same impact on the two variables or not. If a variable is selected, then it could be even discarded in the future regressions, if the significance becomes lower.

Third preliminary regression

- Ordinary least squares (OLS)
- 8572 observations
- 343 cross sectional units
- Length of time series: min 21, max 28 (from 1985 to 2012)
- Dependent variable: log_(intra-trade)
- Regressors: log_distance, border, log_GDPsum

Table 4.5 - Output of the third preliminary regression

	coefficient	**standard error**	**t ratio**	**p-value**	
Const	21,77	0,24	90,74	<0,0001	***
log_distance	−0,73	0,03	−22,63	<0,0001	***
border	0,97	0,06	15,47	<0,0001	***
log_GDPsum	0,26	0,004	58,95	<0,0001	***
Squared R = 0,410					

The elasticity of intra-trade to distance is equal to -0,73. This means that a decrease of about 0,73% in the intra-trade volumes between two countries is expected whenever the distance increase of 1%

The elasticity of intra-trade to the sum of the two GDPs is instead equal to 0,26. This means that an increase of about 0,26% in the intra-trade volumes between two countries is expected whenever the sum of the two GDPs increases of 1%.
The coefficient associated to regressor "border" is equal to 0,97. This means that the log_(intra-trade) is expected to be higher of an amount equal to 0,97 when there is a common border. Even if this semi-elasticity is not easily interpretable, it is useful to keep this value in mind for comparing the results of this regression with those of the next regression.
A positive aspect of this regression is due to the high significance of all the variables.

Fourth preliminary regression

- Ordinary least squares (OLS)
- 6205 observations
- 343 cross sectional units
- Length of time series: min 12, max 28 (from 1985 to 2012)
- Dependent variable: log_(intra-FDIs)
- Regressors: log_distance, border, log_GDPsum

Table 4.6 - Output of the fourth preliminary regression

	coefficient	**standard error**	**t ratio**	**p-value**	
Const	23,55	0,45	51,77	<0,0001	***
log_distance	−1,04	0,06	−17,37	<0,0001	***
border	0,51	0,11	4,61	<0,0001	***
log_GDPsum	0,28	0,014	20,26	<0,0001	***
Squared R = 0,141					

The elasticity of intra-FDIs to distance is equal to -1,04. This means that a decrease of about 1,04% in the intra-FDI volumes between two countries is expected whenever the distance increases of 1%.
The elasticity of intra-FDIs to the sum of the two GDPs is instead equal to 0,28. This means that an increase of about 0,28% in the intra-trade volumes between two countries is expected whenever the sum of the two GDPs increases of 1%.

The log_(intra-FDI) is instead expected to be higher of an amount equal to 0,51 when there is a common border.

The high significance of all the independent variables is still verified in this regression.

Let's now make the comparison between the elasticities of intra-trade and intra-FDIs to variables "distance" and "GDPsum".

The elasticity to the distance is equal to 0,73 for intra-trade and to 1,04 for intra-FDIs. This means that intra-FDI flows are more sensitive to the distance than intra-trade volumes. In other words, when the distance increases, the decrease in intra-FDIs is stronger than the decrease in intra-trade. If the ratio between intra-trade and intra-FDIs were considered, we would obtain that a change in the distance has a significant effect on the ratio itself. This is due to the strong difference between the two coefficients.

The elasticity to the sum of the GDPs is instead equal to 0,26 for intra-trade and to 0,28 for intra-FDIs. This means that, even if intra-FDIs are more sensitive to the sum of the GDPs than intra-trade, the differences are not so huge. If the ratio between intra-trade and intra-FDIs were considered, we would obtain that a change in the sum of the GDPs has a negligible effect on the ratio itself. This is the reason why the sum of the GDPs will be not a variable in the regressions of the next section, which will investigate the behaviour of the ratio instead of the two separated components.

Since it is not possible to compare elasticities when the regressor "border" is considered, this independent variable will be kept in the regressions of the next section. This is even justified by the fact that the presence of a border implies an increase in the log_(intra-trade) equal to 0,97, but an increase in the log_(intra-FDI) just equal to 0,51. This means that the presence of a border should favour more the volumes of intra-trade between two countries than the intra-FDI flows between them. This result is even coherent with what we had already observed after comparing second and third regressions.

4.7. The Final version of the econometric model

The existing literature and the preliminary regressions allow us to build the first regression model. Both chapter 3 and section 4.6 underline the importance of the two control variables "distance" and "border", which cannot be excluded from our first regression. There is however a huge difference between the existing literature and the preliminary regressions. Section 3.3.1, which belongs to the existing literature, suggests that the regressors which

signal the various steps of the European economic integration should not be treated as dummies, because of the gradual effects and causes. Section 4.6 suggests the opposite, since the results of the first preliminary regression and the first adjusted preliminary regression do not significantly differ, if we refer to the three regressors, which are dummies and pseudo-dummies respectively. This is the reason why both alternatives (regression with dummies and regression with pseudo-dummies) will be implemented even for the first regression.

The first regression will be the following:

$(trade/FDI)_{ijt} = \alpha + \beta_1 * D_{ij} + \beta_2 * d1_{ij} + \beta_3 * FTA_t + \beta_4 * ESM_t + \beta_5 * EMU_t$ where

- $(trade/FDI)_{ijt}$ = ratio between level of export from country i to country j and level of outward FDI stock of country i in country j at time t.
- D_{ij} = distance between countries i and j
- $d1_{ij}$ = dummy variable which signals whether the two countries have a common border (1) or not (0).
- FTA_dummy_t = dummy variable which signals whether both countries belong to the EEC (1) or not (0).
- ESM_dummy_t = dummy variable which signals whether both countries belong to the European Single Market (1) or not (0).
- EMU_dummy_t = dummy variable which signals whether both countries belong to the Eurozone (1) or not (0).

While the first adjusted regression will be the following:

$(trade/FDI)_{ijt} = \alpha + \beta_1 * D_{ij} + \beta_2 * d1_{ij} + \beta_3 * FTA_t + \beta_4 * ESM_t + \beta_5 * EMU_t$ where

- $(trade/FDI)_{ijt}$ = ratio between level of export from country i to country j and level of outward FDI stock of country i in country j at time t.
- D_{ij} = distance between countries i and j
- $d1_{ij}$ = dummy variable which signal whether the two countries have a common border (1) or not (0).
- FTA_t = variable which signals the years passed since the second country joined EEC Custom Union
- ESM_t = variable which signals the years passed since the second country joined the European Single Market
- EMU_t = variable which signals the years passed since the second country joined the Eurozone

The difference between the first and the first adjusted regression model is related to the last three regressors: dummy variables (FTA_dummy, ESM_dummy and EMU_dummy) are used in the first model, while continuous variables (FTA, ESM and EMU) are used in the first adjusted model. These continuous variables, however, can assume a maximum value equal to 5 and this means that they behave as "pseudo-dummies": most values will be 0 and 5, while intermediate values will be verified only in the transition phase.

Given the results of these two models, some adjustments and improvements will be implemented. Even variable "time" will be later introduced in the following models. Not considering this variable in the first models allow to better understand the difference between endogenous and exogenous causes, which will be explained after the regressions.

4.8. Data regression

The aim of this section is to provide some regressions, whose results will be useful to answer our research question. The analysis of the results is provided in chapter 5.

This chapter contains five essential regressions.

The first regression is based on the already provided model in section 4.7. The adjusted version with pseudo-dummies instead of pure dummies is reported in the appendix to chapter 4.

The second regression is based on normalized data. The normalization process allows to obtain a significant improvement in the squared R. All the following regressions, when not specified, are based on normalized data.

The third regression is based on a lower number of observations: to obtain a higher squared R it is in fact sufficient to centre the analysis on a narrower and more internally homogeneous dataset.

The control variable "time" is introduced in the fourth regression. Thanks to this new variable, it is possible to distinguish between endogenous and exogenous causes. All the following regressions, when not specified, even contain this control variable. An adjusted fourth regression is created by substituting the control variable "time" with a dummy control variable "period", which subdivides the observations in two subperiods. The regression is reported in the appendix to chapter 4.

The fifth regression is centred on the bilateral relations between a single country (Italy at the beginning) and the others. Since this regression is implemented different times, centring the

analysis on different countries, it is possible to make the comparison among the results, to perceive the differences in the "magnitude of reaction" to the various steps of the economic integration by the various countries. An adjusted fifth regression is created by centring the analysis only on "outflow" relations. This regression is reported in the appendix to chapter 4.

The results of each of these regressions are confronted with the results of the existing literature.

First regression:

- Ordinary least squares (OLS)
- 6034 observations
- 343 cross sectional units
- Length of time series: min 3, max 28 (from 1985 to 2012)
- Dependent variable: ratio
- Regressors: FTA_dummy, ESM_dummy, EMU_dummy
- Control variables: "distance", "border"

Table 4.7 - Output of the first regression

		coefficient	stnd error	t ratio	p-value	
Const	α	107,98	14,56	7,416	<0,0001	***
distance	β_1	− 0,020	0,008	−2,480	0,0132	**
border	β_2	− 30,82	14,90	−2,068	0,0387	**
FTA_dummy	β_3	− 73,94	30,01	−2,464	0,0138	**
ESM_dummy	β_4	19,08	29,22	0,653	0,5138	
EMU_dummy	β_5	− 16,10	12,83	−1,255	0,2096	
Squared R = 0,0067						

As it is possible to observe, the control variables "distance" and "border" are negatively correlated with the ratio trade / FDI, since the coefficients β_1 and β_2 are negative. The sign of these two coefficients is however unexpected. When we analysed the sensitiveness of the

two separated variables (intra-trade and intra-FDIs) to “distance” and “border”, we observed that intra-FDIs are more influenced by distance than intra-trade, but the presence of a border seems not to be correlated with bilateral FDI levels. We even noticed that borders have a huge impact on bilateral trade volumes. This was first sentenced in the literature review and later confirmed by the preliminary regressions. These observations would imply a positive sign for both β_1 and β_2 which is instead not verified.

The coefficient β_3, which correlates the membership to the free trade area with the ratio trade / FDI is negative and this means that it also behaves in an unexpected way, which does not fit well with the results of the literature review.

The coefficient β_4 and β_5, which are associated with the regressors ESM_dummy and EMU_dummy, are positive and negative respectively. This means that the membership to the common market increases intra-trade more than intra-FDIs, while the membership to the currency union increases intra-FDIs more than intra-trade.

It is possible to affirm that this model is not well-built, because of three aspects:

- The p-values of the regressors ESM_dummy and EMU_dummy are high and this means that the significance of these two variables is low. In other words, being part of the single market and the currency union seems not to be correlated with a change in the dependent variable.
- The coefficients β_2 and β_3, associated with variables “border” and FTA_dummy behaves in the opposite way of what it was suggested by the literature review. This problem is exacerbated by the high significance of these two variables.
- Squared R is very low, and this means that there is no way to predict the dependent variables through the regressors in a satisfactory way (lack of predictive power). In this case, more than 99% of the variability is not explained by the model.

It is necessary to introduce significant improvements to this model. Before doing that, it is interesting to observe that when FTA, ESM and EMU instead of FTA_dummy, ESM_dummy and EMU_dummy are used, no significant changes occur. The output of the first adjusted regression is reported in the appendix to this chapter.

The only difference between the first regression and the first adjusted regression is represented by the last three independent variables (the regressors signalling the belongingness to the various steps of the economic integration). These variables are dummies in the first regression, while they can assume values between 0 and 5 in the second

model, where values equal to 1, 2, 3 and 4 represent the transitory phase, in which the new step is introduced but not yet completed. The first adjusted model fits better with all the literature review, since it is possible to consider, gradual effects and gradual causes by using non-dummy variables.

By comparing the results of the two regressions, there are no important changes: the magnitude of the coefficients α, β_1 and β_2 and the p-values of "const", "distance" and "border" are the same if these are rounded, while the magnitude of the coefficients β_3, β_4 and β_5 are 4-5 times lower in the second model, since many values equal to 1 in the first model have been substituted with 5 in the second one. The significance is higher for ESM than ESM_dummy and the value of squared R increases a little. It is possible to conclude that the introduction of continuous variables instead of dummies "goes in the right direction", since it is possible to increase both the significance of the independent variables and the value of squared R.

The three main problems of the first regression, however, are still verified in the first adjusted regression. It is now necessary to introduce huge improvements, to obtain a sufficiently high squared R, the expected sign of the coefficient β_3 associated with variable FTA and a sufficiently high significance for ESM and EMU.

The low value of squared R is due to two main reasons:

- The variables used in the model are macroeconomic: it is typical when working on data from the macroeconomic environment to obtain low values of squared R. (Even Valeriano Martinez uses a squared R lower than 0.5 in his research of 2012). This is particularly true when a very complex economic trend, as the ratio trade / FDI, is explained through few independent variables.
- There are 343 observations taken from a very heterogeneous dataset. Many countries and so many couples of countries have their own peculiarities.

It is possible to say that the low value of squared R is partially due to structural reasons, which cannot be removed (macroeconomic environment) and partially due to the high heterogeneity of the dataset, which can be reduced. To obtain a higher value of squared R by decreasing the heterogeneity, it is possible to proceed in three different ways.

Alternative A is to better understand peculiarities and anomalies and remove them from the dataset. In this case, it is necessary to keep in mind that if anomalies are correlated among them (they are for example verified when a certain country is involved), the focus of the

research question shifts: it would be possible to understand the effects of economic integration not in Europe but in Europe minus that country, if it is one. If many countries are delated from the dataset or if they are few represented, the holistic approach is not verified anymore. This is the reason why this approach has sense, when anomalies are not correlated among them.

Alternative B is to use independent dummy variables, which signal each peculiarity in the model. The problem of this method is represented by the risk of having too many independent variables (no parsimony).

Alternative C is represented by the normalization approach.

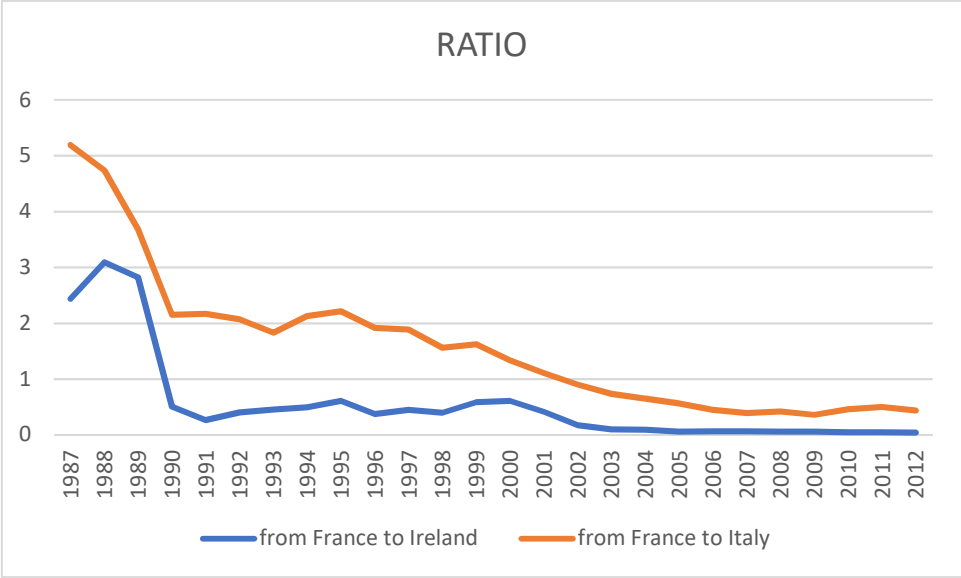
It is important to observe that these three alternatives are not exclusive methods and can be used together, to get better results.

To better understand the second and the third alternatives (B and C), let's consider the bilateral relations of France with Italy and Ireland in the twenty-five years period from 1987 to 2012.

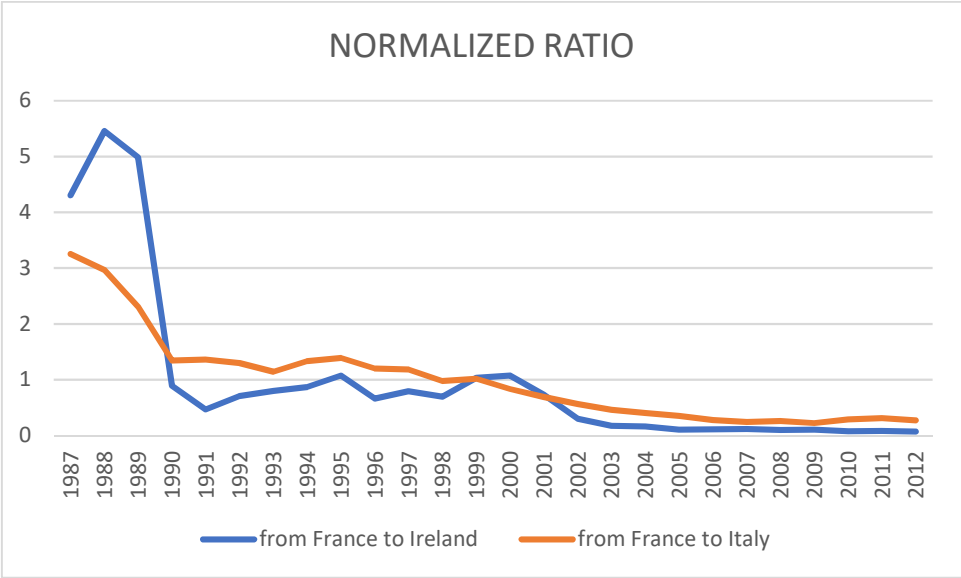
Let's focus on graph 4.6, where the trend of the ratio is shown: thanks to the introduction of the common market, it is possible to observe a significant decrease of the ratio (mainly due to a huge increase of the denominator) between 1988 and 1990 for both bilateral relations. But even if trends are very similar, absolute values differ a lot and the ratio is twice higher for bilateral relations with Italy in 1987. This behaviour is partly explained by the low distance and the presence of a border between France and Italy but most of this behaviour remains unexplained in the model.

Alternative B is to put in the model all the independent variables which can help to interpret the economic phenomenon: in this case, we can suppose that the higher values of the ratio for the bilateral relations France-Italy are due to a lower cultural distance which allows lower needs of cultural adaptation and so implies the possibility to serve foreign market through trade when it is better to use foreign production for Ireland.

Alternative C is instead the substitution of our dependent variable trade/FDI with a new dependent variable which we call normalized trade/FDI. This new variable is obtained by dividing the old values of the ratio trade/FDI for the mean of all values assumed by a certain couple of countries in all the considered years, so that data are normalized four couple of countries and the mean is related to each time-series. Graph 4.7 provides an example.



Graph 4.6: The absolute value of the ratio intra-trade / intra-FDI is persistently higher for France-Italy relations.

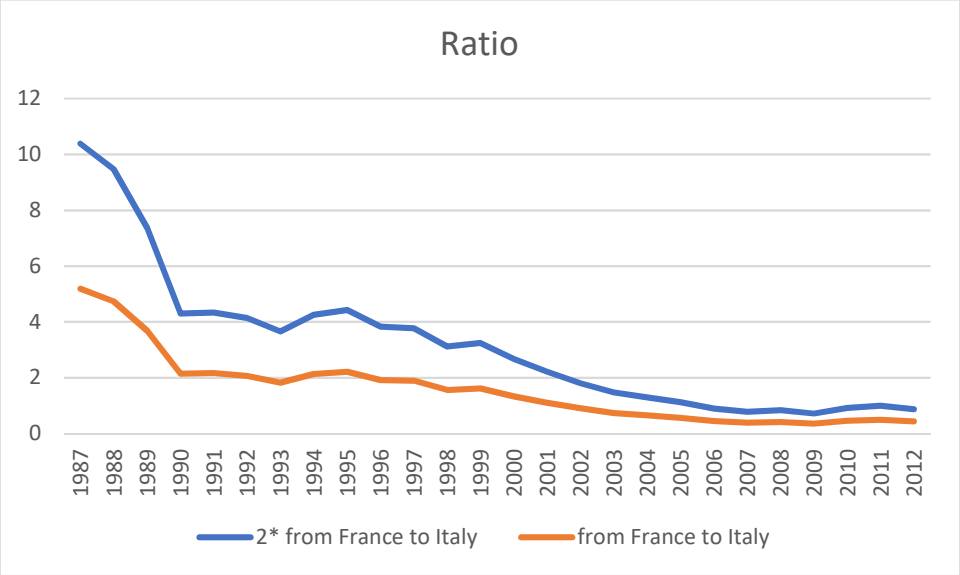


Graph 4.7: The ratio intra-trade / intra-FDI is here normalized. No couple of countries has a chronically higher or lower curve. The mean of all values on each curve is equal to 1.

As it is possible to observe by comparing the two graphs 4.6 and 4.7, the differences of the values of the two curves in each year are lower in absolute terms in the normalized ratio. Thanks to this normalization process, the value of squared R increases so that the predictive power of the model increases as well. It is necessary to consider that the meaning of the dependent variable has changed a little. It is in fact possible to predict how many times the

ratio trade/FDI was higher (if the new dependent variable assumes values higher than 1) or lower (if the new dependent variables assumes values lower than 1) than the mean value. In graph 4.7, it is even possible to observe that the mean (normalized ratio = 1) is reached in the same year (1999) for the two couples of countries.

To further appreciate the normalization process, one can notice that if there were two couples of countries and one of these two couples had exactly n times the value of the ratio of the other couple in each year, as graph 4.8 shows, their normalized curves would coincide.



Graph 4.8: a theoretical couple of countries has two times the value of the ratio of the couple France-Italy in each year. The normalized curves coincide.

Thanks to the normalization process, it is possible to ignore many variables which can chronically affect the value of the ratio. As it is noticed by Ghemawat (2001) [50] in his research "the World is really flat?", there are many causes thanks to which the values of trade between some couples of countries are persistently higher or lower than those between other couples. Table 4.8 shows these causes, which are called distance attributes.

[50] P. Ghemawat, *Distance Still Matters: the Hard Reality of Global Expansion*, Harvard Business Review, September 2001

Table 4.8 [51]

Distance attribute	**Change in International Trade (%)**
income level: GDP per capita (1% increase)	+ 0.7
economic size: GDP (1% increase)	+ 0.8
physical distance (1% increase)	- 1.1
physical size (1% increase)	- 0.2
access to ocean	+ 50
common border	+ 80
common language	+ 200
colony-colonizer relationship	+ 900
common colonizer	+ 190
common polity	+ 300
common currency	*+ 340*
common regional trading bloc	*+ 330*

The common aspect of all these distance attributes (except common currency and common regional trading bloc) is related to their fixed or quite fixed value in a time-series logic. In other words, physical distance, physical size, access to ocean, common border, common language, colony-colonizer relationship and common colonizer are attributes which cannot change for a given country or couple of countries in different considered periods, at least after 1985, which is the starting year of the dataset. The income level and the economic size can instead change a little, even if these changes are not so huge, especially on relatively short periods.

[51] Source: Frankel & Rose, *An estimate of the effects of currency unions on growth*, unpublished paper, 2001, cited in Ghemawat, *Distance still matters*, Harvard Business Review, September 2001

Let's now run the regression with the new dependent variable to see what happens.

Second regression:

- Ordinary least squares (OLS)
- 5996 observations
- 343 cross sectional units
- Length of time series: min 3, max 28 (from 1985 to 2012)
- Dependent variable: normalized_ratio
- Regressors: FTA_dummy, ESM_dummy, EMU_dummy
- Control variables: "distance", "border"

Table 4.9 - Output of the second regression

	coefficient		stnd error	t ratio	p-value	
Const	α	1,33	0,033	39,81	<0,0001	***
distance	β_1	3,15e-05	1,83e-05	1,72	0,0350	*
border	β_2	0,07	0,034	2,11	0,0849	**
FTA_dummy	β_3	0,77	0,069	11,23	<0,0001	***
ESM_dummy	β_4	−1,35	0,067	−20,17	<0,0001	***
EMU_dummy	β_5	−0,22	0,029	−7,48	<0,0001	***
Squared R = 0,1477						

By comparing the first and the second regressions, it is possible to observe that many improvements have occurred. The sign of the coefficients β_1 and β_2 associated with variables "distance" and "border" are now coherent we our expectations, even if their significance is not so high. This means that the distance and the presence of borders between couple of countries are not so able to explain the value of the normalized ratio trade/FDI: this is due to the normalization process, which realigns the values of the dependent variables in the middle between structurally high trade/FDI ratios (e.g. France-Italy relationship) and structurally low trade/FDI ratios (e.g. France-Ireland relationship).

The most important changes involve the three variables FTA, ESM and EMU.

The coefficients β_3, associated with variable FTA has become positive and the p-value is very low. This means that it is very likely that the FTA has an impact on the dependent variable, but the sign is here positive and so more coherent with what it would be forecasted by reading the literature review.

The coefficient β_4 associated with variable ESM has become negative, while the coefficient β_5 associated with variable EMU is still negative. The p-values of these two variables are now very low if compared to the previous model, and this means that ESM and EMU can now explain part of the behaviour of the ratio.

The squared R has improved a lot, even if its value is still low and this huge increase is mainly due to the initial situation, which was very critical, being the squared R equal to 0.007 in the first regression model.

It is possible to conclude that the normalization process, which was introduced to increase the squared R of the model, has partially reached its aim, but its main implication has been the improvement of the coefficients and the p-values of variables FTA_dummy, ESM_dummy and EMU_dummy.

Even if the squared R has improved after having implemented the normalization, it remains low. To understand why, it is necessary to consider the following aspects:

- The Dataset is still made up of very heterogeneous behaviours of couples of countries. There are in fact significant and visible "outliers": in some time-series, it is possible to observe some values which differ a lot from the mean of all the values of the time-series itself. This problem cannot be solved through the normalization, since this process can help only when all the values of the time-series are chronically different from the mean. To solve this issue, it is possible to implement alternative A.
- Explanatory variables are dummies: FTA_dummy, ESM_dummy and EMU_dummy can be equal to 0 or 1, while the dependent variable is a continuous variable which has a huge variability. This variability cannot be explained by using just dummies. As we have already seen, pseudo-dummies would not improve the squared R so much. To solve this issue, it is possible to implement alternative B.

The new step is the decrease in the number of observations, through a reduction of the time-series involved in dataset, and so through the implementation of alternative A. The delated time-series will be the ones showing too high variability and too low short observed period.

This second criteria is used, since it is difficult to catch outliers in short series and so they are discarded a priori.

In this way, it will be possible to increase the squared R thanks both to a decrease in the number of observations and to a decrease in the number of unreliable data or at least expected to be unreliable data. It is necessary to say that this reduction will be done by sight, and this means that there would not be a strong criterion which can establish whether a time-series should be selected or not. The only criteria will be the observation of each time-series and the selection of those which seem to respect both a sufficiently high number of observations and a sufficiently low variability, where the threshold between being sufficient or not is a totally an arbitrage. In any case, the minimum length of the time series was 3 in the already run regressions, while it will be 6 in the next ones.

Thanks to this process, the dataset has been reduced from 343 to 205 observations. As it is possible to observe in table 4.10, this process has led toward further centralization on "West Europe", since most of the delated observations are those involving at least a country of the "East Europe". This means that the new regression model will be more able to answer to the research question but focusing the analysis on the first entered countries (oldest members).

Table 4.10 shows all the bilateral relations considered in the dataset made up of 205 time-series and the delated time-series which were instead part of the dataset made up of 343 time-series. As it is possible to see, the countries who "suffered" the highest number of deleted observations according to the outflow logic are the relatively poorer if compared to the average. This implies that the focus shifts and the analysis becomes more centred on more developed countries.

Table 4.11 shows all the bilateral relations considered in the new sample. A red cross is instead used to signal those observations which were available in the 343 observations dataset, but which are not available in the new one, which is made up of 205 observation.

Table 4.10

	dataset made up of 343 time-series		dataset made up of 205 time-series		difference (dataset made up of 343 time-series as base)	
	outflows	inflows	outflows	inflows	outflows	inflows
AUT	26	13	21	5	-19%	-62%
BEL	0	12	0	7	/	-42%
BGR	0	14	0	7	/	-50%
CYP	0	14	0	8	/	-43%
CZE	13	15	5	7	**-62%**	-53%
DNK	25	13	15	7	-40%	-46%
EST	0	9	0	7	/	-22%
FIN	21	9	15	8	-29%	-11%
FRA	26	18	19	11	-27%	-39%
DEU	25	17	18	12	-28%	-29%
GRC	16	10	0	8	**-100%**	-20%
HUN	16	14	8	7	**-50%**	-50%
IRL	5	12	4	5	-20%	-58%
ITA	25	16	24	10	-4%	-38%
LVA	0	10	0	5	/	-50%
LTU	0	11	0	6	/	-45%
LUX	4	5	4	2	/	-60%
MLT	0	11	0	5	/	-55%
NLD	25	16	19	10	-24%	-38%
POL	21	14	11	11	-48%	-21%
PRT	17	10	4	5	**-76%**	-50%
ROU	0	14	0	10	/	-29%
SVK	10	12	2	10	**-80%**	-17%
SVN	16	11	2	7	**-88%**	-36%
ESP	8	15	3	6	**-63%**	-60%
SWE	22	12	17	10	-23%	-17%
GBR	22	16	14	9	-27%	-44%

Table 4.11

	AUT	CZE	DNK	FIN	FRA	DEU	GRC	HUN	IRL	ITA	LUX	NLD	POL	PRT	SVK	SVN	ESP	SWE	GBR
AUT		X	✓	✓	✓	✓	X	X		✓		X	X		X	X			X
BEL	X		X	✓	✓	X				✓	✓	✓	X	X				✓	✓
BGR	✓	X	✓		✓	✓	X	X		✓		X	X	X		X		✓	X
CYP	✓	X	✓	X	✓	X	X	✓		✓		✓	✓	X				✓	X
CZE	✓		X	X	✓	✓	X	✓		✓		✓	✓	X	X	X		X	X
DNK	✓			X	X	✓		X		✓		✓	✓	X		X	X	✓	✓
EST	✓		✓	✓	✓	✓				✓		X	✓					X	
FIN	X		✓		✓	✓				✓		✓	✓					✓	✓
FRA	✓	X	✓	X		✓	X	✓	✓	✓	✓	✓	✓	X	X	X	X	✓	✓
DEU	✓	✓	✓	✓	✓		X	✓	✓	✓	✓	✓	X	X		X	X	✓	✓
GRC	X		✓	✓	✓	✓				✓		✓		X				✓	✓
HUN	✓		✓	✓	X	✓	X			✓		✓	X	X	X	X		X	✓
IRL	✓	X	X		✓	X	X	X		✓		✓	X	X					✓
ITA	✓	✓	✓	✓	✓	✓	X	✓	X			✓	X	✓	X	X		X	✓
LVA	✓		X	✓	X	✓				✓		X			X			✓	X
LTU	✓		X	✓	X	✓		X		✓		X	✓					✓	X
LUX	X				✓								✓		X	X			
MLT	✓		X		✓	X	X	X		X		X	✓		✓				✓
NLD	✓	✓	✓	✓	✓	✓	X	X	✓	✓			X	X		X	X	✓	✓
POL	✓	✓	✓	✓	X	✓		✓		✓		✓		X	✓	X		✓	✓
PRT	✓		✓		✓	X	X			✓		✓					X	X	X
ROU	✓		✓	✓	X	✓	X			✓		✓	✓	X		X	✓	✓	✓
SVK	✓	✓	✓	X	✓	✓		✓		✓		✓	✓			X		✓	
SVN	✓	X	X	X	✓	✓	X	✓		✓		✓						✓	
ESP	X	X	X	✓	X	X	X			✓	✓	✓	X	X		✓		✓	X
SWE	✓		X	✓	✓	✓	X			✓		✓		X		✓	✓		✓
GBR	✓	X	X	✓	✓	X		X	✓	✓		✓	X	✓	X	X	✓	✓	

Let's now run the regression on the new dataset to see what happens.

Third regression:

- Ordinary least squares (OLS)
- 3957 observations
- 205 cross sectional units
- Length of time series: min 6, max 27 (from 1985 to 2012)
- Dependent variable: normalized_ratio
- Regressors: FTA, ESM, EMU
- Control variables: "distance", "border"

Table 4.12 - Output of the third regression

	coefficient		stnd error	t ratio	p-value	
Const	α	1,45	0,040	36,51	<0,0001	***
distance	β_1	3,51e-05	2,31e-05	1,52	0,1279	
border	β_2	0,09	0,038	2,42	0,0154	**
FTA_dummy	β_3	0,74	0,070	10,66	<0,0001	***
ESM_dummy	β_4	−1,49	0,067	−22,14	<0,0001	***
EMU_dummy	β_5	−0,29	0,035	−8,29	<0,0001	***
Squared R = 0,2394						

Even in this case the significance of the control variables is low, and this is due to the normalization process. The three regressors have instead a very low p-value and so it is very likely that the introduction of the free trade area has a positive impact on the ratio, while the introduction of the common market and the currency union has a negative impact on the ratio.

Table 4.13 shows the comparison between second and third regression.

Table 4.13

	second regression	**third regression**	**percentage difference (from second to third)**
# observations	5996	3957	- 34.0%
# time-series	343	205	- 40.2%
min length of time series	3	6	+ 100%
FTA_dummy (β_3)	0,77	0,74	-3.9%
ESM_dummy (β_4)	−1,35	−1,49	-10.4%
EMU_dummy (β_5)	−0,22	−0,29	-31.8%
Squared R	0,1477	0,2394	+ 62.1%

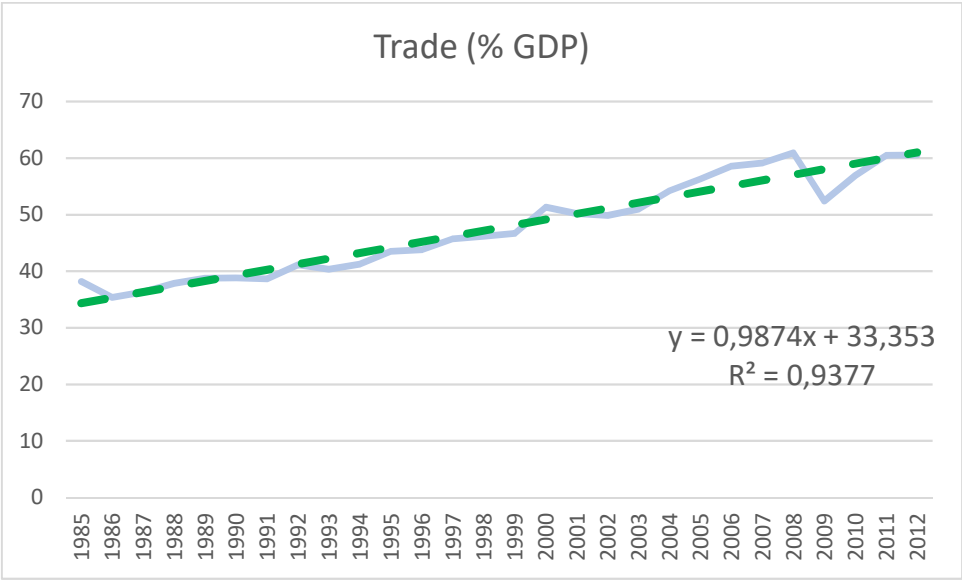
As it is possible to see in table 4.13, the coefficient associated with variables FTA_dummy, ESM_dummy and EMU_dummy have not significantly changed if compared to the huge changes in the number of observations. This is interesting, since it means that the same effects of these three regressors are verified, regardless of the dataset used and its dimension and heterogeneity.

The most important result is the huge increase in the squared R: we can observe that a decrease in the number of time-series (from 343 to 205) equal to 40.2% implies an increase in squared R equal to 62.1% (from 0.1477 to 0.2394). If we consider the number of observations instead of the number of time-series, we obtain that a decrease in the number of observations (from 5996 to 3957) equal to 34% implies an increase in squared R equal to 62.1%. This disalignment between decrease in the number of time-series and decrease in the number of observations is due to the fact that many delated time-series had few observations (the new minimum length of the time-series is in fact 6 years instead of 3).

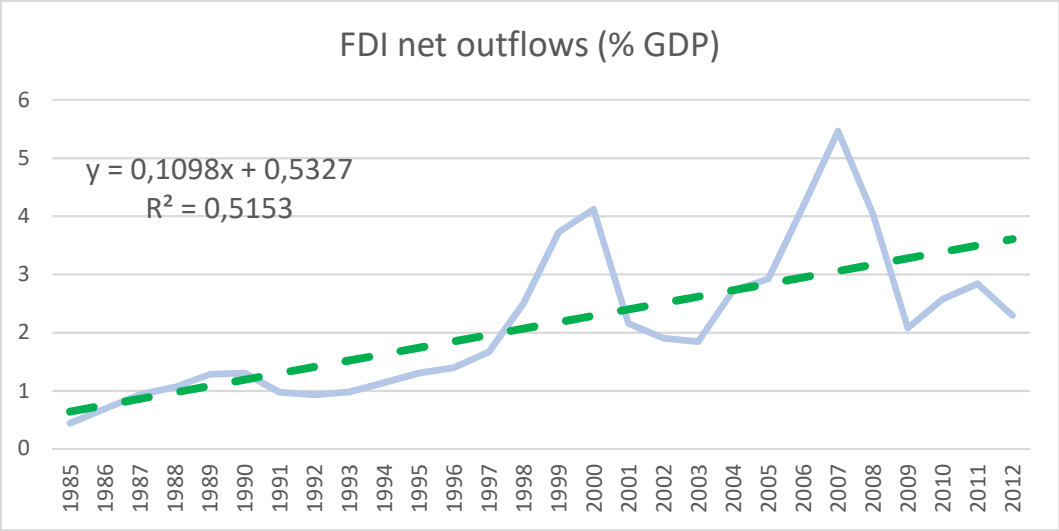
A significant improvement to our econometric model can occur even through the introduction of some typical "time-series" variables. By looking at the previous models, it is in fact possible to notice that despite we have panel data, the approach is not far from what we would call cross-sectional. The control variables "distance" and "border" do not change in a time-series perspective. In the period considered, there are not in fact changes in the barycentre of the various countries so that distances remain always the same between couples

of countries. The same reasoning can be done for the variable "border". These two control variables change in a cross-sectional perspective. The other three variables which signal the various steps of the economic integration (FTA, ESM, EMU or their dummy forms) change instead both in the cross-sectional perspective and in the time-series perspective. This means that these three regressors perceive two "events". On one side, they signal that countries who belong to a certain step of the economic integration have a higher or lower value of the ratio in a given year. On the other side, they signal that the ratio of a certain country changes along with its economic integration. While there are no problems in the cross-sectional dimension (this is even due to the normalization), the time-series perspective can return some distorted results.

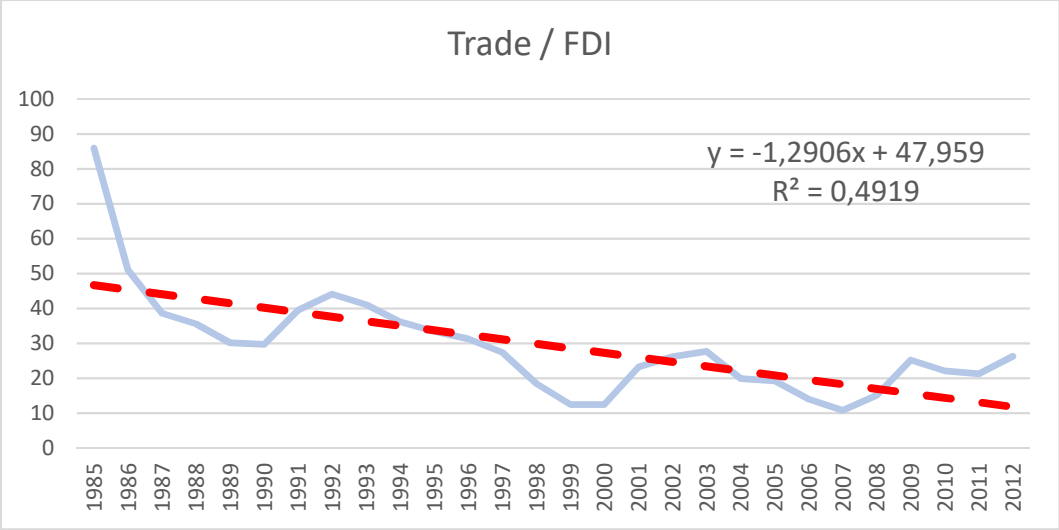
These are due to the absence of a variable which considers the time. As we have already observed in the introduction in graphs 1.1 and 1.2, both the incidence of trade on GDP the incidence of FDIs on GDP have increase a lot in the 1985 - 2012 period at global level. The European countries were not exempted from this phenomenon. We have even observed that these two incidences have increased at two different paces. It is necessary to understand the joint effect on the ratio. Let's now analyse the trends through graphs 4.9, 4.10 and 4.11.



*Graph 4.9: the global trend of the incidence of trade on GDP between 1985 and 2012 is increasing. The green line is the trend, whose equation is y = 33.353 + 0.9874 x. Without considering variability, we can assume that if this incidence was about 33% in 1985, it is higher than 60% in 2012 (60.0128 = 33.353 + 0.9874 * 27). This means that there was an increase of about 80% in the incidence taking 33 as base (0.818 = 60-33 / 33).*



*Graph 4.10: the global trend of the incidence of FDIs on GDP between 1985 and 2012 is increasing. The green line is the trend, whose equation is y = 0.5327 + 0.1098 x. Without considering variability, we can assume that if this incidence was about 0.5% in 1895, it is about 3.5% in 2012 (3.4973 = 0.5327 + 0.1098 * 27). This means that there was an increase of about 600% in the incidence taking 0.5 as base (6 = 3.5-0.5 / 0.5).*



*Graph 4.11: the global trend of the trade / FDI between 1985 and 2012 is decreasing . The red line is the trend, whose equation is y = 47.959 - 1.2906 x. Without considering variability, we can assume that if this ratio was about 48% in 1995, it is about 13% in 2012 (13.1128 = 47.959 - 1.2906 * 27). This means that there was a decrease of about 73% in the incidence taking 25 as base (0.729 = 48-13 / 48). The negative trend of the ratio is due to the higher than proportional increase in the incidence of FDIs compared to the increase in the incidence of trade.*

By looking at the three graphs 4.9, 4.10 and 4.11, it is possible to conclude that the positive trends of the incidence of the two variables did not off-set each other. This is due to the huger increase in the incidence of FDIs, which is the denominator of the ratio, thus determining a negative trend of the ratio itself. This implies that considering a constant level of the ratio intra-trade / intra-FDI as base case could be wrong. The ratio between the incidence of trade and the incidence of FDIs is in fact decreasing at global and so even at European level. It is necessary to "internalize" in the model a variable which catches this global phenomenon. In other words, it is necessary to transform an exogenous variable into an endogenous one. In order not to misinterpret the results, it is in fact necessary to consider the distinction between two macro categories of causes of changes in the level of intra-trade and intra-FDIs. Considering our econometric model, it is possible to distinguish between endogenous causes and exogenous causes.

Endogenous causes are those explicitly modelled in the regression. In our case, they coincide with the three main regressors FTA_dummy, ESM_dummy and EMU_dummy. Even the control variables "distance" and "border" are endogenous causes, but their significance is so low that they can be made exogenous without altering the results or losing some important pieces of information.

Exogenous causes are instead all the other possible factors which determine a change in the level of intra-trade and intra-FDIs. The variable which considers the global decrease of the ratio is an example of exogenous cause. We can call this variable "time", keeping in mind that it should provide pieces of information on the level of markets interdependencies due to the process of markets globalization.

The variable "time" is correlated with the three regressors FTA_dummy, ESM_dummy and EMU_dummy, while no correlation exists between "time" and "border" or "distance". While "time" changes only in the time series perspective, "border" and "distance" are cross sectional variables, and this means that they change their value from a time series to the other. This imply that after the introduction of the variable "time", the most significant changes should be recorded for the magnitude of the coefficients β_3, β_4 and β_5 associated with the regressors FTA_dummy, ESM_dummy and EMU_dummy. The coefficients β_1 and β_2 should not vary a lot.

Let's now run the regression with the new control variable "time".

Fourth regression:

- Ordinary least squares (OLS)
- 5996 observations
- 343 cross sectional units
- Length of time series: min 3, max 28 (from 1985 to 2012)
- Dependent variable: normalized_ratio
- Regressors: FTA_dummy, ESM_dummy, EMU_dummy
- Control variables: "distance", "border", "time"

Table 4.14 - output of the fourth regression

	coefficient		stnd error	t ratio	p-value	
Const	α	2,14	0,042	50,56	<0,0001	***
distance	β_1	2,68e-05	1,72e-05	1,56	0,1188	
border	β_2	0,017	0,032	0,52	0,6001	
FTA_dummy	β_3	0,20	0,067	3,02	0,0025	***
ESM_dummy	β_4	−0,43	0,070	−6,18	<0,0001	***
EMU_dummy	β_5	−0,009	0,028	−0,31	0,7539	
time	β_6	−0,057	0,002	−28,51	<0,0001	***
Squared R = 0,250						

Through the introduction of variable "time", there have been some important changes. The magnitudes of the coefficients β_3, β_4 and β_5 associated with the regressors FTA_dummy, ESM_dummy and EMU_dummy have in fact decreased a lot, while their signs have not changed. The huge decrease of β_5 together with a relatively stable standard error has determined a huge decrease in the significance of the variable EMU_dummy. This means that, according to this model, being part of the Eurozone or not seems to be not significantly correlated with the ratio between intra-trade and intra-FDIs. This result is positive, since it fits better with the results of the literature review. Another positive aspect of this model is

the increased value of squared R. The variable "time" has added a 10% in the explanation of the model.

Let's now define a new dummy variable which is equal to 1 if the observation belongs to the 1985 - 1997 period and equal to 0 if the observation belongs to the 1998 - 2012 period. This variable, which we call "period", is a substitute of the variable "time". It is important to underline the subdivision of the dataset in these two subperiods is the result of a clustering process, which is well described in section 7.1. It is interesting to observe that when dummy variable "period" instead of discrete variable "time" is used, it is possible to obtain a significant increase in the squared R without losing excess significance of the three main regressors. The output of the fourth adjusted regression, in which "period" instead of "time" is used, is shown in the appendix to this chapter.

The results of the fourth adjusted regression are interesting if compared to those of the second and fourth regressions. This comparison is reported in table 4.15.

Table 4.15

		second regression	**fourth adj. regression (subperiods)**	**fourth regression (time)**
FTA_dummy	β_3	0,77 (***)	0,36 (***)	0,20 (***)
ESM_dummy	β_4	−1,35 (***)	−0,80 (***)	−0,43 (***)
EMU_dummy	β_5	−0,22 (***)	−0,09 (***)	−0,009 ( )
Squared R		0,148	0,226	0,250

These three regressions are essentially based on the same data. The huge difference is instead that the second regression is not divided in subperiods, the fourth adjusted regression is divided in two subperiods and the fourth regression is divided in twenty-eight periods. As it is possible to see in table 4.15, the most significant changes seem to occur when passing from the second regression to the fourth adjusted regression. Changes from the fourth adjusted regression to the fourth regression seem to be of lower entity if compared to the previous ones. This means that the introduction of a dummy variable which subdivides the observations in two subperiods can be enough to obtain improvements in the regression. The

most correct results, however, should be provided by the fourth regression. After the introduction of variable "time", the magnitude of the variable EMU_dummy has decreased a lot, so that its p-value is now high. According to the fourth regression, the negative impact of the introduction of the currency union on the ratio is less evident. Even the magnitude of the coefficients associated to the other two regressors decreases. This is due to the fact that part of what it was explained by FTA_dummy and ESM_dummy in the second regression is explained by variable "time" in the fourth regression. This behaviour is due to the correlation between the three regressors and the variable "time". This correlation is instead less strong or even not verified in the fourth adjusted regression.

The squared R of the fourth adjusted regression is very close to the squared R of the fourth regression. Even in this case, the introduction of a dummy variable which subdivides the dataset in two subperiods can generate a huge improvement, which is very similar in entity to the improvement generated by the introduction of a continuous variable as "time".

Let's see now what happens if the process of centralization is exacerbated to the limit of a single country. We will take Italy as reference country. It is possible to run this regression in two ways. It is in fact possible to include all the bilateral relations involving Italy and so taking both relations from Italy and to Italy. We have 41 time series in this case. It is however possible to regress data even taking only the "from Italy to abroad" perspective. We have 25 time series in this case. The fifth regression includes both "outflows" and "inflows" relations, while the fifth adjusted regression includes only the "outflows" relations involving Italy. In both cases, these relations will be taken from the dataset having 343 bilateral relations, so that data used will be a subset of the second regression model and not of the third one. The fifth adjusted regression is reported in the appendix to this chapter.

Fifth regression:

- Ordinary least squares (OLS)
- 827 observations
- 41 cross sectional units
- Length of time series: min 7, max 28 (from 1985 to 2012)
- Dependent variable: normalized_ratio
- Regressors: FTA_dummy, ESM_dummy, EMU_dummy
- Control variables: "distance", "border", "time"

Table 4.16 - Output of the fifth regression

		coefficient	stnd error	t ratio	p-value	
Const	α	2,55	0,14	18,90	<0,0001	***
distance	β_1	−1,85e-05	6,76e-05	−0,27	0,7846	
border	β_2	−0,088	0,084	−1,05	0,2954	
FTA_dummy	β_3	0,15	0,13	1,22	0,2242	
ESM_dummy	β_4	−0,55	0,13	−4,20	<0,0001	***
EMU_dummy	β_5	0,13	0,07	1,80	0,0730	*
time	β_6	−0,076	0,005	−14,21	<0,0001	***
Squared R = 0,431						

Regardless of the used econometric model, it is possible to conclude that the introduction of the free trade area had a positive impact on the ratio, while the introduction of the European Single Market had a negative impact on the ratio. Because of the huge increase of both trade levels and FDI flows across countries in the considered period, the positive impact means that the free trade area favours intra-trade in a more than proportional way than intra-FDIs, while the negative impact means that the European Single market favours intra-FDIs in a more than proportional way than intra-trade.

These results are confirmed both by models involving many bilateral relations (second and third regression, which do not consider time and fourth and fourth adjusted regression, which include time as control variable) and by models centred on the bilateral relations of a country with the other countries (fifth and fifth adjusted regression). There are some changes in the magnitude of the coefficients when the regression is centred on a single country, as it is possible to see in table 4.17. The comparison between the regression based on the complete dataset (fourth regression) and the regression centred on a single country (fifth regression) can be interesting: one could try to understand the reason why the impact of the free trade area is lower for Italy than for the mean of the EU.

Table 4.17

		Fourth regression (343 bilateral relations)		**Fifth regression** (41 relations with Italy)	
FTA_dummy	β_3	0,20	***	0,15	
ESM_dummy	β_4	−0,43	***	−0,55	***
EMU_dummy	β_5	0,009		0,13	*
time	β_6	−0,057	***	−0,076	***
Squared R		0,250		0,431	

As it is possible to observe in table 4.17, there are some important changes even in the level of significance of the three regressors. This is particularly true for regressor FTA_dummy, whose significance drops from being very high to a low value. The significance of this regressor increases however when the analysis is centred only on the "outflow" relations from Italy, as table 4.18 shows.

Table 4.18

		Fifth regression (41 relations with Italy)		**Fifth adjusted regression** (25 relations to Italy)	
FTA_dummy	β_3	0,15		0,33	**
ESM_dummy	β_4	−0,55	***	−0,84	***
EMU_dummy	β_5	0,13	*	0,15	
time	β_6	−0,076	***	−0,074	***
Squared R		0,431		0,476	

It is possible to conclude that the low significance of regressors FTA_dummy is due to a contingency and not to structural reasons.

By comparing the fifth and the fifth adjusted regressions, it is possible to observe that the magnitudes of the thee regressors FTA_dummy, ESM_dummy and EMU_dummy are significantly different. The sign and so the "direction" of the impact is however the same.

If we apply the fifth regression to other countries, we obtain different results. The analysis of the differences allows to make important observations. This implementation, however, cannot easily be done for every country. This is due to three reasons:

- The time-series is not long enough, because of the unreported observations of the dependent variable. This implies collinearity for regressors FTA_dummy and ESM_dummy in the model, even if they are not correlated in the reality. An example is given by Greece: observations involving this country start in 2001, while it was a member of the ECC Custom union and of the European Single Market since 1981 and 1994 respectively. This implies that, since 1991, FTA_dummy = 1 only when ESM_dummy = 1 and FTA_dummy = 0 only when ESM_dummy = 0.
- There is collinearity in the reality between FTA_dummy and ESM_dummy. This situation is verified for all those countries which entered the community after the introduction of the common market (1991 in the model). These countries are those of the fourth enlargement and of the first and second Eastern enlargement.
- There are few bilateral observations involving some countries, because of lack of observations or unreliability of data. This is the case of Belgium and Luxemburg.

The only three countries with which it is possible to implement the fifth regression are Italy, France and The Netherlands, which are not involved in the three previous mentioned problems. Table 4.19 shows the magnitude of the coefficients associated with variables FTA_dummy, ESM_dummy, EMU_dummy and "time" and the squared R for the fifth adjusted regression applied to Italy, France and the Netherland respectively. It is important to underline that these regressions are made considering even the control variables "distance" and "border", whose values are not reported in table 4.19. The value of the squared R is increased thanks to these control variables.

Table 4.19

		25 relations from ITA (528 observations)		26 relations from FRA (592 observations)		25 relations from NLD (537 observations)	
FTA_dummy	β_3	0,33	**	0,40	***	0,45	***
ESM_dummy	β_4	−0,84	***	−0,87	***	−0,47	***
EMU_dummy	β_5	0,15		0,10		−0,16	**
time	β_6	−0,074	***	−0,072	***	−0,034	***
Squared R		0,476		0,449		0,311	

As it is possible to notice in table 4.19, there are no changes in the signs and so the introductions of the three considered stages of the economic integration have no different effects on the three different countries. While there is no change in the sing, the magnitude of the coefficients changes and even in this case it is possible to make comparisons to get interesting observations.

The significance remains always high for FTA_dummy and ESM_dummy, while it tends to be low for EMU_dummy, even if it is relatively high for the analysis centred on The Netherlands.

The fifth or fifth adjusted regression can be centred even on other countries, by introducing some little adjustments. It is for example possible to run the same regression without introducing the regressor EMU_dummy for those countries which did not adopt the common currency, but which have been members of the free trade area and the single market for an enough long period, to further analyse the impact of the regressors FTA_dummy and ESM_dummy. The coefficients associated to these two regressors, however, are not influenced by the presence of the regressor EMU_dummy.

A significant change would occur when centring the fifth regression on countries who entered the common institutions relatively late. The fifth regression can be in fact even centred on those countries which entered the trade bloc after 1994, so that they joined the free trade area together with the single market. Even in this case it is possible to centre the analysis on countries who later adopted the common currency and who did not. The regressors FTA_dummy and ESM_dummy are jointly considered in a single regressor,

which is called ESM_dummy but considers even the free trade area, because of the perfect collinearity between them. There are two countries with which it is possible to perform such a regression: Austria and Finland.

Table 4.20 shows the magnitude of the coefficients associated with variables FTA_dummy, ESM_dummy, EMU_dummy and time and the squared R for the regression applied to Austria and Finland respectively.

Table 4.20

		26 relations from AUT (558 observations)		21 relations from FIN (357 observations)	
ESM_dummy	β_4	−0,36	***	−0,42	***
EMU_dummy	β_5	0,21	*	0,025	
time		−0,079	***	−0,062	***
Squared R		0,350		0,284	

As it is possible to observe in table 4.20, the impact of the ESM_dummy, which includes even the previously used FTA_dummy, is negative. This was an expected result not from the literature review but from the previous regressions: the magnitude of the coefficient β_4 associated with variable ESM_dummy is always higher than the magnitude of the coefficient β_3 associated with variable FTA_dummy. Because of the opposite signs of the two coefficients β_3 (positive) and β_4 (negative), the net effect of these regressors jointly considered is negative.

4.8.1. Summing up and conclusion

The first regression was not well-built, because of the low significance of many regressors, the very low squared R and the unexpected sign of the coefficients. The first adjusted regression, however, shows some little improvements due to the introduction of "pseudo-dummies" FTA, ESM and EMU instead of pure dummies FTA_dummy, ESM_dummy and EMU_dummy. These "pseudo-dummies" are more able to catch the distribution of effects and causes. The drawback is represented by the lower easiness in reading the coefficients. It

is possible to conclude that there is no a best alternative between dummies and pseudo-dummies.

Normalized data has been introduced in the second regression for the dependent variable. Thanks to this process, the squared R has increased a lot, even if it can be still defined low. The normalization has even improved the significance of the three regressors FTA_dummy, ESM_dummy and EMU_dummy and modified the unexpected sign of the coefficient β_3, associated with variable FTA_dummy.

A lower number of relations have been considered in the third regression. Delated time-series are those which show too high variability or those which are too short, involving few years. Thanks to this change, the squared R could further increase, while the magnitude of the coefficients β_3, β_4 and β_5 have not changed a lot. The significance of the three regressors FTA_dummy, ESM_dummy and EMU_dummy remains very high.

The variable "time" has been introduced in the fourth regression. This variable represents an endogenous cause which has a huge impact on the ratio. The trend of the ratio between the incidence of trade and the incidence of FDIs is in fact negative at both global and European level. The new variable considers this negative trend. The main effects due to the presence of the variable "time" is the decrease in the magnitude of the coefficients associated with the regressors FTA_dummy, ESM_dummy and EMU_dummy. It also implies a decrease in the significance of EMU_dummy, which is now very low.

A dummy variable has been instead introduced in the fourth adjusted regression. This dummy is equal to 1 if the observation belongs to the 1985 - 1997 period, while it is equal to 0 if the observation belongs to the 1998 - 2012 period. This regression is a sort of "compromise" between the second one and the fourth one.

The fifth and the fifth adjusted regressions have been run limiting the research to the bilateral relations with Italy and from Italy respectively. Their results are not so different from those of the fourth regression, but squared R becomes higher.

The fifth adjusted regression has been later centred on other countries, confirming the results.

4.9. The panel approach as the best approach

Because of the obliged use of the normalization process, one could ask whether the panel analysis is the most appropriate one or not. By using a time-series analysis, there would not be the problem of the persistently higher or lower ratios of some couples of countries, so that

the squared R of the model based on the ratio would be the same of the model based on the normalized ratio. Let's for example regress data about bilateral relations from Italy to Spain between 1985 and 2012 by using a time-series approach both through non-normalized ratio (first "time-series" regression) and normalized ratio (second "time-series" regression). The normalization process is in fact superfluous when a time series approach is used: normalized observations are in fact equal to the original observations divided by the sum of these observations. The "time-series" regression with the simple ratio is reported below, while the adjusted "time-series" regression with the normalized ratio is reported in the appendix to this chapter.

"Time-series" regression

- Ordinary least squares (OLS)
- 28 observations from 1985 to 2012
- Dependent variable: ratio
- Regressors: FTA_dummy, ESM_dummy, EMU_dummy
- Control variable: "time"

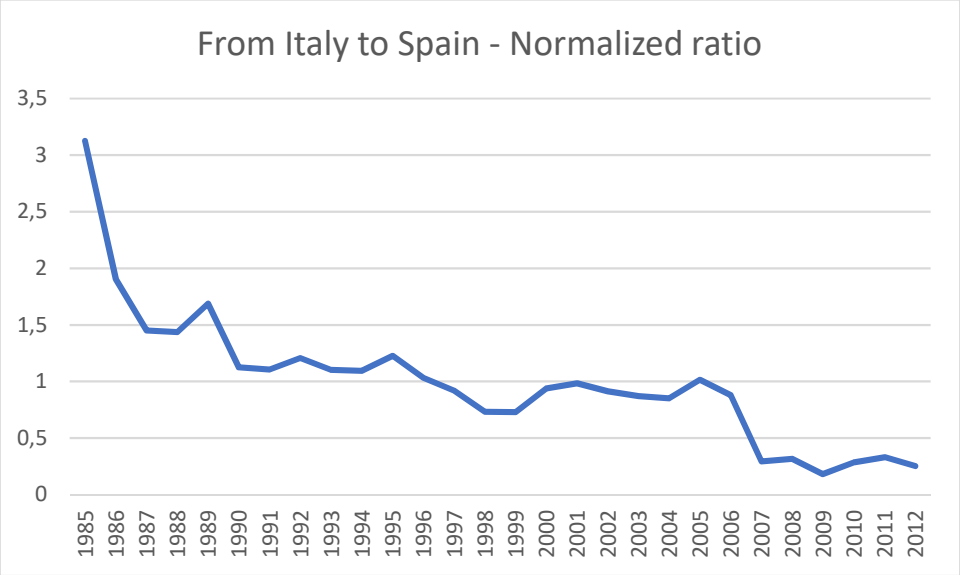
Table 4.21 - Output of the "time-series" regression

	coefficient		**stnd error**	**t ratio**	**p-value**	
Const	α	3,19	0,189	16,88	<0,0001	***
FTA_dummy	β_3	−1,42	0,210	−6,75	<0,0001	***
ESM_dummy	β_4	−0,007	0,142	−0,05	0,9594	
EMU_dummy	β_5	0,25	0,159	1,59	0,1251	
time	β_6	−0,063	0,012	−5,09	<0,0001	***
Squared R = 0,916						

An interesting but tricky point is related to the high value of the squared R, which has never been observed in the previous regressions. The predictive power of the model is high (and this is positive) but what the model predicts is wrong (and this is the tricky point). By looking at the sign of the coefficient β_3, which is associated with variable FTA_dummy, we can

observe that it is negative. This problem is exacerbated by the high significance of variable FTA_dummy. This means that, according to the "time-series" regressions, a free trade area has a negative impact on the ratio, but this is totally in contrast with what the literature review suggests and even with what the panel approach confirms.

To understand the reason of this negative sign, it is necessary to have a look to the time-series in a graphical way: graphs 4.12 and 4.13 show that the trend of the ratio for bilateral economic relations between Italy and Spain is very similar to the trend at global level.



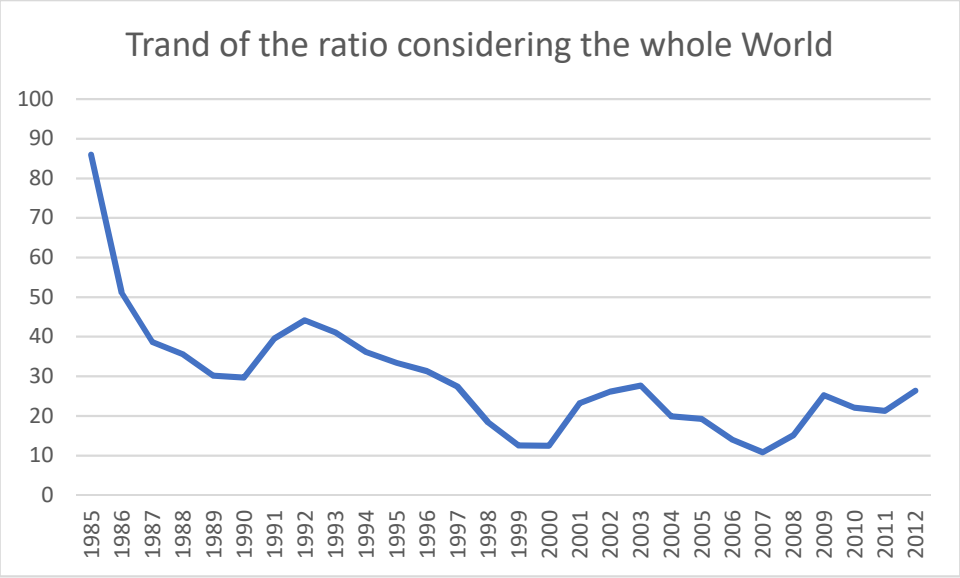
Graph 4.12: the value of the normalized ratio between Italian export to Spain and Italian investments in Spain is showed in the 1985 - 2012 period.

By looking at graph 4.12, it is possible to observe that there is a persistent decreasing trend of the ratio. In such context, the coefficient associated to variable "time" is negative. Because of no counterfactual in a cross-sectional perspective, it is unlikely that the coefficients associated with the regressors FTA_dummy, ESM_dummy and EMU_dummy assume positive values. This happens only for the coefficient associated with EMU_dummy, while in the other two cases the coefficient is negative. The further problem for variable FTA_dummy is its high level of significance, which means that, according to this regression, it is very likely that the introduction of the free trade area has a negative impact on the ratio. But this is totally in contrast with both the literature review and the previous results suggest. If we better analyse graph 4.12, we can observe a steeper negative trend in the first years of the considered period. Since the free trade area between Italy and Spain has been introduced

in 1986, FTA_dummy = 0 is associated with periods in which the ratio is high, while FTA_dummy = 1 is associated with periods in which the ratio is low. This is the reason why FTA_dummy has a negative impact on the ratio.

Even if there is the same problem for each time-series which is part of a panel, it is not possible to affirm that the panel approach lacks in counterfactual: the "what would have happened if…" for each time-series is in fact represented by the other time-series of the panel.

The counterfactual is what makes a positive sign of the coefficient associated with variable FTA_dummy possible. The presence of many bilateral relations which have the same persistent negative trend, especially in the 1985-1990 period, of graph 4.12 makes this positive sign something surprising at first sight. But this is due to the fact that couples of countries which were not part of the free trade area had a huger decrease in the ratio. As it is possible to see in graph 4.13, the trend of the ratio for the whole globe is in fact very similar to the one related to Italy-Spain (and other couples of countries) bilateral relations.



Graph 4.13: The ratio between the incidence of trade (export + import) on GDP and the incidence of foreign direct investments net outflows on GDP has decreased a lot between 1985 and 1990: its value in 1990 is about 1/3 of the value recorded in 1985.

Once we have shown that a time-series approach cannot be used, we can try to understand whether a cross-sectional approach is appropriate or not. This approach implies that a certain year is selected and the regression is then implemented through all the bilateral observations

which are available in the selected year. The problem of using such an approach is the perfect collinearity between FTA_dummy and ESM_dummy which occurs since 1991 and the presence of a full of "zeros" list associated with the variables ESM_dummy and EMU_dummy until 1990 and 2001 respectively.

Table 4.22 summarizes the problems which can arise in the regression for the three variables in three different periods between 1985 and 2012.

Table 4.22

	FTA	EMU	EMU
1985 - 1990	-	all observations are 0	all observations are 0
1991 - 2001	collinearity with ESM_dummy	collinearity with FTA_dummy	all observations are 0
2002 - 2012	collinearity with ESM_dummy	collinearity with FTA_dummy	-

If a cross-sectional analysis is performed in a certain year between 1985 and 1990, it is just possible to use FTA_dummy as explanatory variable.

In the 1991 - 2001 period, it is instead possible to use FTA_dummy or ESM_dummy as regressor but paying attention to the changed meaning of the used independent variable: regardless of the selection between FTA_dummy and ESM_dummy, the result of the regression would show the impact of the free trade area together with the single market on the ratio. In other terms, it is not possible to disentangle the effects of the FTA_dummy on one side and the ESM_dummy on the other.

Even in the 2002 - 2012 period it is possible to use FTA_dummy or ESM_dummy as regressor, keeping in mind that the perfect collinearity between them is still verified. In this decade, however, it is possible to add EMU_dummy as regressor.

Even when the regression is performed considering those problems, results may be altered for two reasons.

The first reason is the already mentioned issue of the chronically higher or lower ratios which are verified between some couples of countries. Even in this case, as it was done in the panel approach, it is possible to normalize data. The problem is here due to the fact that

normalization requires data related to the dependent variable of all the other years of the time-series, so that the performed analysis would not be strictly cross-sectional anymore.
The second reason is instead represented by differences in the reactiveness to the economic integration of different couples of countries. This issue was not so significant both in the time-series and in the panel, since these differences in the reactiveness tend to have a lower impact when longer periods are considered.
Let's now regress data, using a cross-sectional approach for three different years (1989, 1999 and 2009) belonging to the three different clusters of years of table 4.22. Pseudo-dummies instead of pure dummies are here used. FTA, ESM and EMU can in fact better differentiate between couples of countries who belong to the trade bloc for many years and couples of countries who belong to the trade bloc for few years. Using pseudo dummies instead of pure dummies is even justified by the absence of variable "time". The first "cross sectional" regression, based on year 1989, is reported below, while the second and the third "cross sectional" regressions are reported in the appendix to this chapter.

First "cross sectional" regression

- Ordinary least squares (OLS)
- 343 potential observations (63 actual, 280 missing or incomplete)
- Year: 1989
- Dependent variable: ratio
- Regressors: FTA
- Control variables: "distance", "border"

Table 4.23 - Output of the first "cross sectional" regression

	coefficient	**stnd error**	**t ratio**	**p-value**	
Const	21,93	7,43	2,95	0,0045	***
distance	−0,0024	0,0047	−0,50	0,6179	
border	−5,18	7,36	−0,70	0,4843	
FTA	−2,99	1,06	−2,82	0,0065	***
Squared R = 0,131					

This regression does not perform well at all. The coefficient β_3 associated with the only regressor (FTA) has the wrong sign and this problem is exacerbated by the high significance of FTA. This means that, according to the regression, the free trade area should have a negative impact on the ratio and even in this case, this is does not fit at all with what the literature review and the previous regressions suggest. The negative sign of the coefficient β_3 could be due to the low number of available meaningful data. There are in fact just 63 actual observations out of the 343 potential ones. This means that only about 18% of potential observations are included in the model and so that it is more likely to obtain wrong results due to some possible outliers in the model.

The last problem related to this regression is the very low squared R, which imply lack of predictive power of the model.

The model does not improve in the second and third "cross sectional" regressions where 89 out of 343 and 339 out of 343 observations are respectively available.

4.10. Appendix to chapter 4

First adjusted preliminary regression

- Ordinary least squares (OLS)
- 7836 observations
- 343 cross sectional units
- Length of time series: min 13, max 28 (from 1985 to 2012)
- Dependent variable: intra-trade
- Regressors: FTA, ESM, EMU
- Control variables: “distance”, “border”, “GDP_sum”, “time”,

Table 4.24 - Output of the first adjusted preliminary regressions

	coefficient	**standard error**	**t ratio**	**p-value**	
Const	5,59e+07	2,09e+08	0,27	0,7889	
distance	−1,45e+06	92158,6	−15,71	<0,0001	***
border	4,39e+09	1,80e+08	24,39	<0,0001	***
GDP_sum	3914,50	60,74	64,45	<0,0001	***
time	−1,14e+08	1,17e+07	−9,80	<0,0001	***
FTA	1,11e+08	5,48e+07	2,03	0,0426	**
ESM	1,90e+08	6,65e+07	2,86	0,0043	***
EMU	5,70e+08	4,34e+07	13,13	<0,0001	***
Squared R = 0,531					

First adjusted regression:

- Ordinary least squares (OLS)
- 6034 observations
- 343 cross sectional units
- Length of time series: min 3, max 28 (from 1985 to 2012)
- Dependent variable: ratio
- Regressors: FTA, ESM, EMU
- Control variables: “distance”, “border”

Table 4.25 - Output of the first adjusted regression

		coefficient	**stnd error**	**t ratio**	**p-value**	
Const	α	106,40	14,13	7,530	<0,0001	***
distance	β_1	−0,020	0,008	−2,552	0,0107	**
border	β_2	−30,33	14,90	−2,036	0,0418	**
FTA	β_3	−15,68	5,32	−2,951	0,0032	***
ESM	β_4	3,72	5,31	0,7000	0,4840	
EMU	β_5	−2,11	3,15	−0,6707	0,5025	
Squared R = 0,0072						

Fourth adjusted regression:

- Ordinary least squares (OLS)
- 5996 observations
- 343 cross sectional units
- Length of time series: min 3, max 28 (from 1985 to 2012)
- Dependent variable: normalized_ratio
- Regressors: FTA_dummy, ESM_dummy, EMU_dummy
- Control variables: “distance”, “border”, “period”

Table 4.26 - Output of the fourth adjusted regression

	coefficient		stnd error	t ratio	p-value	
Const	α	1,06	0,034	31,67	<0,0001	***
distance	β_1	3,28e-05	1,74e-05	1,88	0,0604	*
border	β_2	0,046	0,032	1,42	0,1544	
FTA_dummy	β_3	0,36	0,068	5,34	<0,0001	***
ESM_dummy	β_4	−0,80	0,068	−11,81	<0,0001	***
EMU_dummy	β_5	−0,09	0,028	−3,17	0,0015	***
period	β_6	0,68	0,028	24,59	<0,0001	***
Squared R = 0,226						

Fifth adjusted regression:

- Ordinary least squares (OLS)
- 528 observations
- 25 cross sectional units
- Length of time series: min 10, max 28 (from 1985 to 2012)
- Dependent variable: normalized_ratio
- Regressors: FTA_dummy, ESM_dummy, EMU_dummy
- Control variables: “distance”, “border”, “time”

Table 4.27 - Output of the fifth adjusted regression

	coefficient		**stnd error**	**t ratio**	**p-value**	
Const	α	2,57	0,166	15,55	<0,0001	***
distance	β_1	−5,05e-05	8,31e-05	−0,61	0,5435	
border	β_2	−0,082	0,113	−0,73	0,4686	
FTA_dummy	β_3	0,33	0,153	2,17	0,0303	**
ESM_dummy	β_4	−0,84	0,162	−5,19	<0,0001	***
EMU_dummy	β_5	0,15	0,094	1,63	0,1030	
time	β_6	−0,074	0,0067	−11,06	<0,0001	***
Squared R = 0,476						

Adjusted "time-series" regression

- Ordinary least squares (OLS)
- 28 observations from 1985 to 2012
- Dependent variable: normalized ratio
- Regressors: FTA_dummy, ESM_dummy, EMU_dummy
- Control variable: "time"

Table 4.28 - Output of the adjusted "time-series" regression

	coefficient		stnd error	t ratio	p-value	
Const	α	4,01	0,238	16,88	<0,0001	***
FTA_dummy	β_3	−1,78	0,264	−6,75	<0,0001	***
ESM_dummy	β_4	−0,009	0,179	−0,05	0,9594	
EMU_dummy	β_5	0,32	0,200	1,59	0,1251	
time	β_6	−0,080	0,016	−5,09	<0,0001	***
Squared R = 0,916						

Second "cross sectional" regression

- Ordinary least squares (OLS)
- 343 potential observations (89 actual, 254 missing or incomplete)
- Year: 1999
- Dependent variable: normalized_ratio
- Regressors: ESM
- Control variables: "distance", "border"

Table 4.29 - Output of the second "cross sectional" regression

	coefficient	**stnd error**	**t ratio**	**p-value**	
Const	236,25	98,03	2,410	0,0167	**
distance	−0,064	0,061	−1,047	0,2962	
border	−118,91	113,98	−1,043	0,2978	
ESM	−24,16	14,98	−1,614	0,1079	
Squared R = 0,0175					

Third "cross sectional" regression

- Ordinary least squares (OLS)
- 343 potential observations (339 actual, 4 missing or incomplete)
- Year: 2009
- Dependent variable: normalized_ratio
- Regressors: ESM, EMU
- Control variables: "distance", "border"

Table 4.30 - Output of the third "cross sectional" regression

	coefficient	**stnd error**	**t ratio**	**p-value**	
Const	−14,80	100,32	−0,148	0,8828	
distance	0,0205	0,0176	−1,162	0,2460	
border	−32,68	34,34	−0,950	0,3428	
ESM	15,86	19,92	0,796	0,4266	
EMU	−5,87	5,14	−1,143	0,2537	
Squared R = 0,011					

5. Analysis of results.

The results of the fifth regression can be interpreted and used in both a qualitative and a quantitative way. Qualitatively, it is possible to conclude that the free trade area has a positive impact on the (normalized) ratio, while the common market has a negative impact on the (normalized) ratio. This conclusion does not consider the magnitude of the coefficients β_3, and β_4, but takes as result their sign and the high significance of the regressors FTA_dummy and ESM_dummy associated with the two coefficients. To answer to research question, the qualitative approach is sufficient: we now know that the ratio between intra-trade and intra-FDI reacts in different ways along with the economic integration in the EEC / EU. The impact of the introduction of the currency union is instead less clear. This is due both to the low significance of variable EMU_dummy, which is verified in many regressions, and to the contrasting findings of the various regressions, especially those centred on a specific country. Thanks to our research we have shown that:

- The introduction of the free trade area has a positive impact on the ratio. This means that this step of the economic integration favours intra-trade more than intra-FDIs.
- The introduction of the common market has a negative impact on the ratio. This means that this step of the economic integration favours intra-FDIs more than intra-trade
- It is difficult to predict the impact of the introduction of the currency union on the ratio. In other terms, it is not clear whether this step of the economic integration favours intra-trade more than intra-FDIs or vice versa.

The quantitative approach, however, is useful to compare the results with what the already existing literature says. Section 5.3 is dedicated to the meaning of the coefficients, while sections 5.4.1, 5.4.2 and 5.4.3 are dedicated to the conclusions on the three steps of the economic integration.

Even when trying to forecast the future and the consequences of the increase / decrease in the level of the economic integration, it is possible to use both a qualitative and a quantitative approach. The difference is represented by the precision of the forecasts: when using a qualitative approach, it is just possible to forecast that the (normalized) ratio increases or decreases, while when using a quantitative approach, it is even possible to make the magnitude of the change explicit. The normalization approach, however, has created a huge

complication: if we want to forecast what would happen if a new country joins the trade bloc, we are not able to answer to this question through numbers and so in a quantitative way. We can only forecast that if the country enters the EU, there should be a negative impact on the ratio, since there would be an increase in trade due to the free trade area, but this would be counterbalanced by a huge increase in FDIs due to the common market.

5.1. Endogenous and exogenous causes

When making the analysis of a trend through a panel approach, it is necessary to use a variable which signals the time passing. Thanks to the introduction of this variable, it is possible to disentangle the effects of endogenous and exogenous causes. The variable "time" can be avoided only if there is evidence of no trend due to exogenous causes, but to know whether this trend exists or not, it is necessary to consider it as a regressor and ignore it only if the significance is low. Since the aim of our research question is to understand the impact of the various steps of the economic integration on the relative incidence of intra-trade and intra-FDIs, it is possible to use "time" as a control variable, through which it is possible to do a better estimation of the coefficients associated with the regressors FTA_dummy, ESM_dummy and EMU_dummy.

The following example should better clarify the importance of the variable "time". Let's consider the introduction of a free trade area among some countries in a World characterized by a continuous increase in the level of markets interdependencies. The free trade area should have a positive impact on intra-trade, but it is huge mistake to assume that the whole increase is attributable to the new step of the economic integration. Part of this increase is due to the exogenous cause. To better explain this issue, we must distinguish between change in the absolute value of intra-trade and change in the trend of intra-trade. The introduction of the free trade area when markets interdependencies increase has a positive impact on both the absolute value and on the trend. This means that if we plot the trend, we should see both a positive first derivative and a positive second derivative: intra-trade should increase at an increasing rate. The risk related to the misunderstanding of the results is high if no control variable as "time" is used. The magnitude of the variable which signals the membership to the free trade area (FTA_dummy) would be here very high, since it would consider both the positive first derivative and the positive second derivative. If a control variable as "time" were instead used, FTA_dummy would signal the positive second derivative while "time"

would signal the positive first derivative. It is necessary to consider this aspect especially when the aim is to use the model to predict the future: having the correct magnitudes of the various causes allows to better forecast future scenarios. This issue is instead a little bit mitigated when the aim is to know the impact more in a qualitative than in a quantitative way.

Let's consider instead the situation in which a country leaves a free trade area in a World characterized by a continuous increase in the level of markets interdependencies. This should have a negative impact on the intra-trade level, but it would be a huge mistake to think that, because of this, intra-trade decreases. If exogenous causes are stronger than endogenous causes, intra-trade continues to increase but a decreasing rate.

This reasoning can be even applied to other regressors, as for example ESM_dummy and EMU_dummy but even to the ratio as dependent variable.

Table 5.1 shows the effects on the ratio between trade and FDI by considering both exogenous causes and endogenous causes. Six different scenarios are generated by matching the exogenous cause which can be an increasing trend, a decreasing trend and a "no trend" together with endogenous cause which can be a positive impact or a negative impact

Table 5.1

	exogenous causes	endogenous causes	effect due to both causes
scenario A	increasing trend	positive impact	increase
scenario B	increasing trend	negative impact	depends
scenario C	decreasing trend	positive impact	depends
scenario D	decreasing trend	negative impact	decrease
scenario E	no trend	positive impact	increase
scenario F	no trend	negative impact	decrease

Let's focus on scenario C. It represents the joint impact on the ratio of the exogenous cause together with the introduction of the free trade area. The joint impact cannot be easily determined, since the two causes push in the two opposite directions.

Let's focus instead on scenario D. It represents the joint impact on the ratio of the exogenous cause together with the introduction of the common market. The joint impact is known, since the two causes push in the same direction.

Table 5.1. has even a huge implication on the terminologies that it is better to use when doing this kind of research. While it is better to talk about positive or negative impact when referring to the effects of the endogenous causes, positive and negative trend are to be preferred when referring to the exogenous ones. This allows to avoid confusion between positive or negative first derivative and positive or negative second derivative. Table 5.2 better explains this issue.

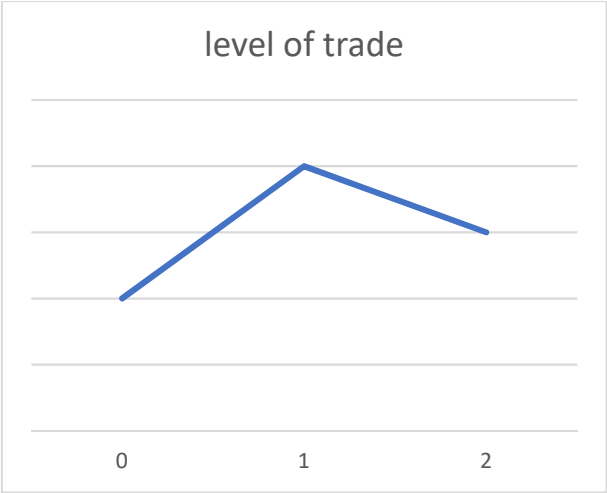
Table 5.2

	positive trend (positive first derivative)	negative trend (negative first derivative)
positive impact (positive second derivative)	ratio increases	?
negative impact (negative second derivative)	?	ratio decreases

As it is possible to see in table 5.2, to understand whether there would be an increase or a decrease in the ratio, it is necessary to consider and to forecast even other macroeconomic variables, which we have called exogenous causes in the previous chapters. If endogenous causes are huger, an increase in the ratio should be registered, while if exogenous causes off-set the endogenous ones, a decrease in the ratio should be the most likely scenario. This is the reason way from now on we will not talk about decrease or increase of the dependent variable due to the endogenous causes, but we will refer to the negative or positive impact of the endogenous causes on the dependent variable.

The following three graphs (graph 5.1, 5.2 and 5.3) allows to better understand this issue related to exogenous and endogenous causes.

Graph 5.1: two countries enter the free trade area in year 1. The endogenous cause has a positive impact on the intra-trade level between them. The trend of intra-trade level is already increasing because of the exogenous causes. Both causes push the trend in the same direction so that a very huge increase is verified starting from year 1.



Graph 5.2: One out of the two countries leave the free trade area in year 1. The endogenous cause has a negative impact on intra-trade level between the two countries. The trend of intra-trade level is increasing because of the exogenous causes. The two causes have an opposite effect on intra-trade, but endogenous causes are stronger than exogenous causes, so that a negative impact of endogenous causes make the trend decrease.

Graph 5.3: One out of the two countries leave the free trade area in year 1. The endogenous cause has a negative impact on intra-trade level between the two countries. The trend of intra-trade level is increasing because of the exogenous causes. The two causes have an opposite effect on intra-trade, but exogenous causes are stronger than endogenous causes, so that a negative impact of endogenous causes make is compatible with a still increasing trend of the intra-trade level.

Graph 5.3 is the one which may lead to misinterpret the results. If we used a time-series approach instead of a panel approach, we would obtain a positive impact of the exit from the free trade area on the level of intra-trade. But this is not logical and goes against the result of the literature review. If a panel with many cross-sectional units is used, a negative impact is verified in graph 5.3. This is due to the higher incidence of the cross-sections on the time series. Table 5.3 summarises these results, reporting the expected impact in the three graphs for the three different approaches. As it is possible to observe, an ambiguous impact is verified only for graph 5.3 when using a panel approach. This is due to the fact that the time-series approach and the cross-sectional approach would imply opposite impacts, so that it is necessary to understand which of them has the higher "weight" when using the panel approach.

Table 5.3

	time-series approach	**panel approach**	**cross-sectional approach**
Graph 5.1	positive	positive	positive
Graph 5.2	negative	negative	negative
Graph 5.3	positive	depends	negative

5.2. Disadvantages of the ratio as dependent variable

Let's now see the disadvantage of using the ratio instead of the two dependent variables separately. At first sight, using the ratio between intra-trade and intra-FDIs could be more perceived as a complication of the research, rather than a simplification. This is due to the fact that the behaviour of the ratio when a new step in the economic integration is reached depends on both the reaction of intra-trade and the reaction of intra-FDI. But different behaviours of these two variables could lead to the same result on the ratio.

An increase in the ratio can be due to:

- Increase in intra-FDIs and more than proportional increase in intra-trade
- Increase in intra-trade and stable or quite stable intra-FDIs
- Increase in intra-trade and decrease in intra-FDIs
- Decrease in intra-FDIs and sable or quite stable intra-trade
- Decrease in intra-trade and more than proportional decrease in intra-FDIs

In the same way, a decrease in the ratio can be due to:

- Decrease in intra-FDIs and more than proportional decrease in intra-trade
- Decrease in intra-trade and stable or quite stable intra-FDIs
- Decrease in intra-trade and increase in intra-FDIs
- Increase in intra-FDIs and sable or quite stable intra-trade
- Increase in intra-trade and more than proportional increase in intra-FDIs

Despite of this, there is a common element which characterizes these behaviours: when there is an increase in the ratio, the relative importance of intra-trade against intra-FDIs increases,

while when there is a decrease in the ratio, the relative importance of intra-trade against intra-FDIs decreases.

Just some out of the five previous mentioned hypothetical behaviours, which determine an increase or a decrease of the ratio, are verified in the reality. The trends of the incidence of trade on GDP and of the incidence of FDIs on GDP at global level are in fact positive, and this means that it is not likely to have a decrease in trade or FDI, and this is especially true when a trade bloc is created or there is an increase in the level of integration within the already-existing trade bloc.

5.3. Meaning of the coefficients and possible misinterpretations

Before starting with the conclusions related to the impact of the various steps of the economic integration on the ratio between intra-trade and intra-FDIs, it is better to understand the meaning of the coefficients β_3, β_4 and β_5. This will allow to make a better comparison of results where numerical forecasts are reported in the previous researches.

The coefficient β_3 associated with variable FTA_dummy in the fourth regression is equal to 0.20. This means that, in a cross-sectional perspective, couples of countries who belong to the free trade area are expected to have a ratio which is 0.20 higher than couples of countries who do not belong. In a time-series perspective, it is instead possible to say that when two countries join the free trade area, their level of normalized ratio is expected to be 0.20 higher than before. To understand the meaning of 0.20, it is necessary to consider that we are working on normalized data, so that the mean of the dependent variable (the normalized ratio) is equal to 1. It is approximately as if the ratio between couples of countries who belong to the free trade area were on average equal to 1.1, while the ratio between non-members or between a member and a non-member were equal to 0.9. The huge approximation is represented by the assumption of having half of the observations in which a country does belong and the other half in which a country does not. Given this assumption, the introduction of the free trade area should have a positive impact of 22% on the ratio (0.22 = 1.1-0.9 / 0.9). Without considering exogenous causes, couples of countries who enter the free trade area have on average a 22% higher value of the ratio than before (time-series perspective) or than couples of countries which do not belong to the free trade area (cross-sectional perspective).

As we said in the previous section, through a pure mathematical approach, this increase in the normalized ratio trade / FDI of about 0.20 can be due to five main different scenarios:

- Increase in the denominator and more than proportional increase in the numerator
- Increase in the numerator and stable or quite stable denominator
- Increase in the numerator and decrease in the denominator
- Decrease in the denominator and sable or quite stable numerator
- Decrease in the numerator and more than proportional decrease in the denominator

Thanks to the previous analysis, however, it is possible to discard the last three scenarios, in which there is a decrease of at least one of the two components of the normalized ratio, while both the numerator and the denominator had a positive trend.

The same reasoning can be applied for the coefficient β_4 associated with variable ESM_dummy. This coefficient is equal to -0.45: couples of countries who belong to the common market are expected to have a normalized ratio 0.45 lower than before (time-series perspective) or than countries which do not belong to the common market (cross-sectional perspective). Since we are still working with normalized data, the average value of the dependent variable is equal to 1. Assuming that ESM_dummy is equal to 1 in the half of the observations and equal to 0 in the other half, it is as if the normalized ratio between member countries were equal to 1 - 0.45/2, while the normalized ratio between two non-members or a member and a non-member were equal to 1 + 0.45/2. We would obtain 0.775 for couples of member countries and 1.225 for couples in which at least a country is non-member. This is equivalent to about a 37% decrease of the ratio when the common market is introduced (0.367 = 1.225-0.775 / 1.225).

Even in the cases, through a pure mathematical approach, this decrease in the normalized ratio trade / FDI of about 0.45 can be due to five main different scenarios:

- Decrease in the denominator and more than proportional decrease in the numerator
- Decrease in the numerator and stable or quite stable denominator
- Decrease in the numerator and increase in the denominator
- Increase in the denominator and sable or quite stable numerator
- Increase in the numerator and more than proportional increase in the denominator

The exogenous causes, however, suggest that the last two scenarios are the most likely.

There are two possible mistakes when interpreting these results.

The first possible error is to consider these changes in percentage terms: an increase equal to 0.20 is not an increase of 20% and a decrease equal to 0.45 is not a decrease of 45%. The coefficients β_3 represents the difference in the normalized ratio between the two situations in which FTA_dummy 0 and FTA_dummy = 1. To know the percentage increase, it is necessary to estimate the two average values of the normalized ratio. The same reasoning can be done for the coefficients β_4, which represents the difference in the normalized ratio between the two situations in which ESM_dummy 0 and ESM_dummy = 1.

The second possible error is instead to make a direct comparison between the magnitudes of the two coefficients associated with the regressors FTA_dummy and ESM_dummy. This is always due to the fact that changes are not percentages.

5.4. Conclusions on the three steps of the economic integration

5.4.1. Conclusions on the free trade area

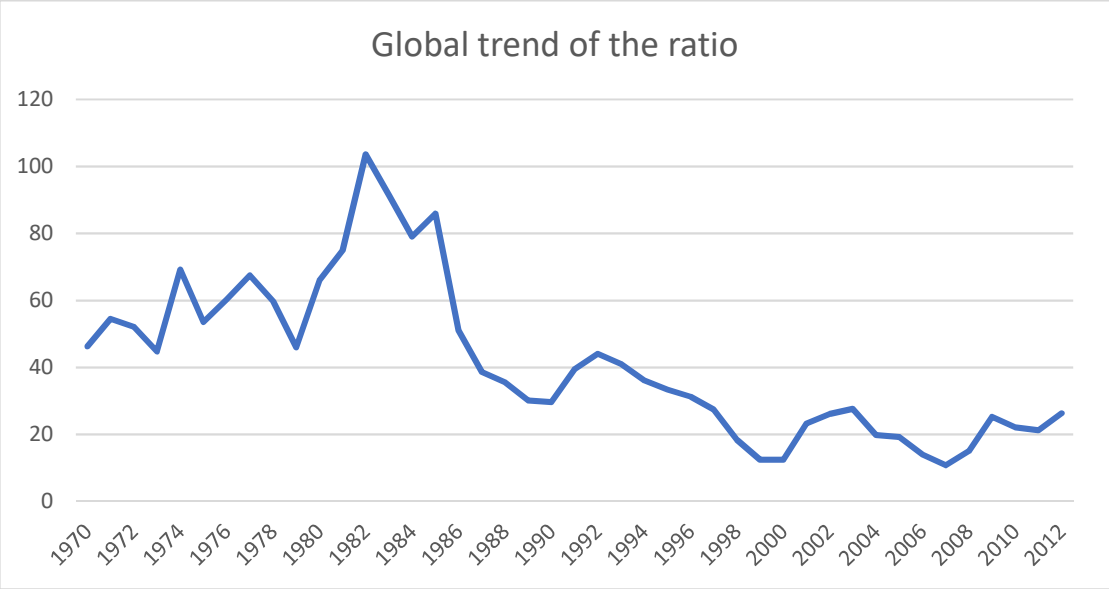
The already existing literature about the impact of the free trade area on intra-trade and intra-FDIs was made up of papers not focused on the ECC / EU. These papers were in fact centred on NAFTA or were pure theory and so not based on empirical research. Despite of this, it was possible to conclude that the free trade area should have a positive impact on the ratio, which is due to the huge increase in intra-trade. The fourth regression confirms this result and as we said in the previous section, the positive sign of the coefficient β_3 associated with variable FTA_dummy can be due both to an increase in intra-trade and stable intra-FDIs or to a huge increase in intra-trade together with a (not so huge) increase in intra-FDIs.

A huge problem that arises when trying to investigate the impact of the free trade area is the lack of support from the time-series. The availability on data about intra-FDIs starts in fact in 1985, and so there is a too short observable period on each time series to see whether this positive trend is verified or not. In other words, it is not possible to see whether there is an increasing or a decreasing trend before 1985. For countries who joined the free trade area after the 80s, there is instead the problem related to the impossibility to disentangle the effects of the free trade area and those of the common market. Another possible option would be to consider a cross-sectional approach, but there would be many problems related to the

presence of couples of countries which for different reasons tend to have persistently higher or lower value of trade.

The only way through which we can support our finding through graphs is guaranteed by the global trend, for which there are data which go back to 1970s both for trade and for FDIs. Graph 5.4 shows this trend. As it is possible to observe, the global ratio between 1970 and 1985 is increasing. It is possible to conclude that the establishment of the free trade area in Europe exacerbated this trend at national level for those countries who entered the ECC between before the 80s. On the contrary, the free trade area allowed countries who entered the ECC / EU after the 80s to have a not so huge decrease in the ratio, which was instead verified at global level.

Table 5.4 summarises these results.



Graph 5.4: The global trend of the ratio is decreasing after the 80s but increasing before the 80s. This means that the ratio increased very rapidly for those countries who entered the EEC before the 80s.

Table 5.4

	impact of the free trade area	global trend	total effect
countries who entered before the 80s	positive	increasing ratio trade/FDI	huge increasing ratio trade/FDI
countries who entered after the 80s	positive	decreasing ratio trade/FDI	The two causes tend to offset each other

5.4.2. Conclusions on the common market

If we go back to tables 3.3 and 3.4, we have the key results of the already existing literature about the impact of the common market on intra-trade and intra-FDIs. Straathof et al. notice that the single market has a positive impact on intra-communitarian trade and the increase is estimated to be equal to 18%. The same authors notice that there is a positive impact even on intra-FDI and this second finding is confirmed by Ilzkovitz at al. and Forslid.

Straathof et al. found that bilateral intra-FDI stocks were 28% higher than bilateral FDI stocks between two non-member countries in the 1981-2005 period. Ilzkovitz at al. found instead that intra-communitarian FDI inflows passed from 53% to 78% of total FDI inflows in the 1995-2005 period, while intra-communitarian FDI outflows passed from 50% to 66% of total FDI outflows in the 1995-2005 period. This implies that, according to Ilzkovitz at al, intra-FDI inflows could increase of at least 47% while intra-FDI outflows could increase of at least 32% (78 is in fact 1.47 times 53, while 66 is 1.32 times 50). The difference in the increased percentages between Straathof et al. (28%) and Ilzkovitz at al. (47% for inflows and 32% for outflows) is due to both different models used and different period considered. If we take an average, we can say that the common market could increase intra-FDIs of more than 30%.

Since we have an increase of 18% for intra-trade and an increase of 30% for intra-FDIs, the results of the already existing literature are compatible with the results of our regression model. There is in fact here an increase in the numerator and a more than proportional increase in the denominator which implies a decrease in (normalized) ratio.

Table 5.5 summarizes these results.

Table 5.5

authors	results / statements	compatible with our result?
Straathof et al. (on trade)	The single market has a positive impact on intra-trade (it generates a 18% increase).	yes
Ilzkovitz at al. (on FDIs)	Intra-FDI inflows passed from 53% to 78% of total FDI inflows, while intra-FDI outflows passed from 50% to 66% of total FDI outflows in the 1995-2005 period.	yes
Straathof et al. (on FDIs)	Bilateral intra-FDI stocks were 28% higher than bilateral FDI stocks between two non-member countries in the 1981-2005 period.	yes

Even in this case, when trying to verify these results through graphs, it is necessary to consider that the huge decrease of the ratio which can be seen on many time-series around the 90s is due both to the creation of the single market and to the global trend. To better understand this, it is useful to consider time-series of couples of countries who do not belong to the European Single Market in the 90s: on these time-series it is possible to see a decrease which is less strong that the one on time-series related to countries who are members of the common market.

5.4.3. Conclusions on the currency union

If we go back to tables 3.7 and 3.8, we have the key results of the already existing literature about the impact of the currency union on intra-trade and intra-FDIs. Micco, Stein and Ordonez estimated a positive impact of 4 - 16% on intra-trade for those couples of countries who adopted the common currency. To obtain a result compatible with what our analysis suggests, we should have a denominator which increases in a more than proportional way than the numerator (i.e. intra-FDIs which increase more than intra-trade). The compatible findings with this scenario are those suggested by Aristotelous and Fountas, Campa and Sousa and Lochard.

Aristotelous and Fountas noticed in fact that the elimination of exchange rates decreases the volatility of returns and the transaction costs of international investments, while Campa

found that the establishment of a common currency makes the volatility of returns equal to zero and so should be positively correlated with the amount of FDI received from other member countries. The result of Sousa and Lochard, however, is the only one which provides a numerical conclusion: according to the two authors, intra-EMU FDI stocks could in fact increase on average by 30% after the creation of the currency union.

Since we have an increase of 4-16% for intra-trade and an increase of 30% in intra-FDIs, the results of the already existing literature are compatible with the results of our regression model. There is in fact here an increase in the numerator and a more than proportional increase in the denominator which implies a decrease in (normalized) ratio. This remains true even when considering the results of the research made by Gomes et al, who noticed that when the sample is not extended back many years before the creation of the EMU, a strong positive correlation of Euro and intra-EMU trade is verified, but this is not true in the opposite situation, when a longer dataset is used. In this case, we would in fact obtain a lower but still positive impact of the currency union on intra-trade. The results of Goldberg and Kolstad are instead not compatible with the results of our research, since they noticed that high exchange rate volatility seems to push risk-adverse firms to invest more in foreign markets, increasing intra-FDIs. But High exchange rate volatility is potentially verified when there is no common currency between two countries. Even the conclusion of Pantelidisa et al. is not convincing. They noticed that the common currency has no significant impact on intra-FDI flows across member countries, while as we have seen before, there should be a positive impact.

Table 5.6 summarises these results.

Table 5.6

authors	**results**	**compatible with our result?**
Micco, Stein, Ordonez (on trade)	Positive impact of Euro on intra-eurozone trade. Estimation: 4 - 16 %	yes
Gomes et al. (on trade)	Results depend on the ample extension: short time-series generally return stronger positive correlation than long time-series.	yes
Aristotelous, Fountas (on FDIs)	Positive impact of Euro on intra-eurozone FDIs due to the decrease in the volatility of returns.	yes
Campa (on FDIs)	Positive impact of Euro on intra-eurozone FDIs due to the decrease in the volatility of returns.	yes
Goldberg, Kolstad (on FDIs)	Negative impact since high exchange rate volatility (no currency union) push risk-adverse firms to invest more in foreign markets, increasing intra-FDIs.	no
Pantelidisa et al. (on FDIs)	The common currency has no significant impact on intra-FDI flows across member countries.	no
Sousa, Lochard (on FDIs)	Intra-EMU FDI stocks could increase on average by 30% after the creation of the currency union.	yes

5.5. Final observations on the importance of timing

A dedicated section of the generic literature review was related to the importance of timing when doing research on the effects of economic integration on trade and FDIs. Many already existing papers consider in fact some issues related to when events occur, to better build econometric models or to get better conclusions. These issues have been categorized in four categories: gradual causes, gradual effects, fuzzy steps and anticipation. When the regression model was built, these issues were considered:

- Gradual causes and gradual effects were "modelled" through the transformation of simple dummy variables (FTA_dummy, ESM_dummy and EMU_dummy) into "pseudo-dummies (FTA, ESM and EMU).
- Anticipation and fuzzy steps were instead "modelled" through the decision of considering 1991 as the first year of existence of the single market, even if the European Single Market was later introduced in 1993. Some typical elements of a common market had in fact already been introduced in 1986 (fuzzy steps), while economic agents started to invest more in foreign market some years before 1993 (anticipation).

In the fourth chapter, two regressions were used to verify the opportunity of using "pseudo-dummies" instead of simple dummies. The result was that the regression based on pseudo-dummies had a little improvement, but coefficients became less easy to be interpreted. This is the reason why pseudo-dummies have not been kept in many regressions. The differences between the two regressions were not in fact so huge and the results are not influenced by the decision on whether to use simple dummies or pseudo-dummies. The time-consuming activity required to transform pure dummies into pseudo-dummies does not justify the little improvements obtained. In other words, the econometric model does not return significantly different results when gradual effects and gradual causes are modelled. It is not wrong to make the assumption that causes and effects are all concentrated at a given time. It is important to underline that this is true in our research but the conclusions could be different in other contexts, as for example other trade blocs or other macroeconomic phenomena. A positive aspect related to the modelling of gradual causes and gradual effects is the possibility to understand whether pseudo-dummies are significantly better than simple-dummies in a relatively fast way, through the double implementation of the econometric model and the comparison of the results. There is no way to know that ex-ante.

Even anticipation and fuzzy steps must be verified ex-post. The problem is here represented by the presence of too many options: the first year for the single market can be considered the 1993 (no anticipation), the 1991 as it was done, the 1992 or even years before the 1991. Even in this case, however, there should not be a significant improvement in our research, especially when two close years are considered. This change is even less significant that the one which occurs when passing from simple dummies to pseudo-dummies. There would be instead a significant change when two distant years (as for example 1987 and 1993) are considered. Even in this case, these results are valid for our research, while there could be other contexts in which even the differences between two close years are significant.

A last consideration is related to the trend of causes and effects. This issue has not been considered in our research, since we assumed that, even if gradual, causes and effects were linear. The opportunity to introduce different trends (quadratic or logarithmic for example) should follow a deeper analysis of events.

5.6. Final observations on creation, diversion and unequal benefits

As we have seen in chapter 3, the difference between creation and diversion cannot be perceived, since we are focusing on intra-trade and intra-FDIs and so we are discarding the relationships with "outer" countries. Some important inferences can be instead done for the issue related the unequal distribution of benefits. As it is possible to see in the various tables which show the various outputs of the fifth adjusted regression (tables 4.19 and 4.20), the incidence of the various steps of the economic integration when the analysis is centred on a country partially depends on the country itself. The positive impact of the regressor FTA_dummy and the negative impact of the regressors ESM_dummy are verified even when the analysis is centred on single countries, but the magnitude of the associated coefficients β_3, β_4 and β_5 vary according to the country on which the regression is centred. It is possible to compare the results both between the regression centred on a country and the regression based on the whole dataset on one side and between two regressions centred on two different countries on the other. Many hypotheses can be made to explain these different behaviours. It is necessary to verify them through a deeper analysis. It is important to underline that it would be better to talk about unequal effects than benefits, since we are not considering absolute values of trade and FDIs but their ratio.

5.7. Final observations on the gravity model approach

The gravity model approach does not fit well with our research, or at least with the dataset through which we have made this research. This was already true a priori and this is the reason why a dedicated chapter was introduced to explain the differences between the gravity model and our model. Some typical elements of the gravity approach as the economic size and the GDP per capita were discarded, while other typical elements (the distance and the presence of border) were kept.

After having run the second regression, however, we noticed that even the two remaining "ingredients" of the gravity model could be discarded without losing significant information about the trend of the dependent variable. This was due to the change in the dependent variable, after the normalization process. If we had kept the simple ratio between intra-trade and intra-FDIs as dependent variable, we would have obtained higher significance of the two dependent variables "distance" and "border". These variables, however, would have explained the "structural" higher values of trade and FDI flows between some couples of countries and this is the reason why it is not important in our research to keep them.

The model that have been obtained (the one used in the second and following regressions) cannot be defined as a gravity model. All the analogies with the Newton's law have disappeared: distance between countries and the size of the countries can be ignored, since they have low significance.

This process through which the gravity model has been discarded little by little is logical, if we consider the approach used. To run the second regression, a panel approach was used: when data were not normalized, the most significant differences were at cross-sectional level and this is the reason why the variables "distance" and "border" were significant. After the normalization process, the most significant differences were on the time-series and this is the reason why the regressors FTA_dummy, ESM_dummy and EMU_dummy could increase their significance, at the expenses of the two control variables. It is possible to conclude that the gravity approach has sense when the difference at cross-sectional level are huge, while it is useless in the opposite situation, when the most significant differences occur on the time-series and not across different series.

5.8. Final observations on substitutability and complementarity

Even if this was not the key question in our research, thanks to the various findings we now know something more about this topic. The trend of the ratio between intra-trade and intra-FDIs is in fact negative for most of the time-series in the dataset from 1985 to 2012. As we have already noticed in the previous chapters, this behaviour can be mathematically explained in five ways. Thanks to a deeper analysis, however, it is possible to establish that this decreasing trend is due to an increase in the numerator and a more than proportional increase in the denominator. A possible and logic conclusion would be to consider intra-trade and intra-FDIs as complements, since they are both increasing, but thanks to the existing literature, we know that another interpretation is possible: Head and Ries stated in fact that the coexistence and correlation of FDI and exports are consistent with models where the two modes are substitutes. In other words, we can even think that two events have happened in the considered period:

- New opportunities of trade and investments have been generated
- The behaviour of the economic agents has changed: they prefer to serve foreign markets through FDIs instead of through export.

The first implication is related to trade- and FDI-creation, while the second implication is related to the substitution of intra-trade with intra-FDI. This could mean that in the 1985 - 2012 period good conditions for intra-trade but optimal conditions for intra-FDIs were verified, so that some of the economic agents, because of their arbitrage, started to make investments abroad instead of exporting. If we plot the level of intra-FDIs on x-axis and the level of intra-trade on y-axis, we could observe a positive correlation between these two dimensions even if there is substitution between them. This way of reasoning can be applied both for exogenous and endogenous causes.

5.9. Final observations on the three regressors

At the beginning of this thesis, a lot of space was dedicated to the description of the main steps of the regional economic integration in Europe. Thanks to this section, it was possible to observe that the integration process has been something continuous. Despite of this, there have been some years which were characterized by radical changes, thanks to which it was possible to distinguish between “before” and “after” that changes. These years were all

characterized by an increase in the depth of the economic integration, since a further step was introduced. It is possible to identify three of these years:

- 1968: introduction of the free trade area through the creation of the EEC
- 1993: introduction of the common market (European Single Market)
- 2002: introduction of the common currency (Euro)

Of course, countries who joined the common institution (the EU) later were obliged to enter both the free trade area and the common market as soon as they entered, while many countries adopted the common currency after the introduction of the Eurozone, and so the year in which the previous mentioned three main steps occur can vary a lot from a couple of countries to another.

The important point here, however, is represented by the possibility of creating a model to answer the research question in two possible ways:

- On one side, it is in fact possible to use a single regressor ("integration"). The value of this variable should increase little by little, while a huger increase should be considered when reaching the three main steps. This model fits better when we want to give evidence of the economic integration as a continuous process.
- On the other side, it is instead possible to use more than one regressor as we did (FTA_dummy, ESM_dummy and EMU_dummy), This model fits better when we want to give evidence of the economic integration as a sequence of radical changes, to obtain the separate effects of the three steps. This is the reason why we selected this alternative in our research.

6. Actualization of the results

6.1. Implications on Brexit

At the beginning of the thesis, in the introduction, we have actualized our research question when we talked about Brexit. After the long analysis, we should now be able to better interpret this phenomenon and to better forecast the future scenarios for each of the alternatives of Brexit, form the hard version to the soft version. As we have already said in the introduction, there are in fact different ways through which the U.K. can leave the EU as a valid taxonomy provided by the financial times suggests. The four main alternatives are:

- No new bilateral agreement
- Bilateral agreement on free trade
- Participation of the UK to the custom union
- Participation of the UK to the single market

Since we have always considered the free trade area and the custom union as being the same thing in our analysis, we can match the second and the third alternative in a unique one, so that we can focus on three scenarios.

The first scenario (no new bilateral agreement) is the most difficult to interpret: without an agreement, it is not possible to forecast the future events. This is the reason why only the other two scenarios are deeply analysed.

Let's now see what could happen if the U.K. continue to participate to the free trade area / custom union and decide to leave the common market. The exit from the European Single Market would create an economic scenario in which inward and outward intra-FDI flows would become less favourable. This is exactly the opposite scenario to what would happen if there were the creation of the common market. As we have said in the analysis of the results, a negative impact on intra-FDI flows does not automatically imply a decrease in the intra-FDIs level, since these can continue to increase, thanks to the exogenous causes, but at a slower pace.

The effects on intra-trade are a little bit more complicated. We have in fact seen that there is no a huge direct impact of the introduction of (and exit from) the common market, while the change in the trend of intra-trade can be due to a sort of indirect impact, through the "decrease" of intra-FDIs. Regardless of the complementarity or substitutability between intra-trade and intra-FDIs, we know that when there is an increase in intra-FDIs due to the

introduction of the common market, we can only obtain a decrease in the ratio. This is due to the fact that if trade and FDIs are substitutes, a decrease in trade should be registered, while if they are complements, trade should increase but in a less than proportional way, since the direct impact of the common market is on intra-FDIs, while the increase in trade is FDI-driven. The existing literature, however, suggests that the second scenario is the most likely. This is the reason why the exit of the U.K. from the European Single Market should have a negative impact even on intra-trade but with a lower intensity. Even in this case, a negative impact does not automatically imply a decrease in intra-trade in absolute terms. The Exit of the U.K. from the common market is in fact compatible with a still increasing trend of intra-trade, but this increase is likely to be lower than the one we would have in the case in which no exit occurs.

In any case, the incidence of intra-trade against intra-FDIs should be higher once the U.K would have left the European Single Market. This is the only right conclusion, suggested by the result of our research.

- If the U.K. leaves the common market, it is not true that its levels of intra-trade and intra-FDIs would decrease: this is a possible scenario, which is verified only if the endogenous cause (leaving the common market) is stronger than the exogenous causes.
- If the U.K. leaves the common market, its rate of growth in the levels of intra-trade and intra-FDIs would become lower. If the rate of growth were negative, leaving the common market would make this rate even more negative.
- If the U.K. leaves the common market, the relative incidence of intra-trade versus intra-FDIs would increase. Many economic agents would in fact opt for trade instead of FDIs to serve other member countries.

Let's now see what could happen if the U.K. continue to participate to the common market and decide to leave the free trade area. The direct impact would be on intra-trade in this case: leaving the free trade area means creating economic barriers and especially non-economic barriers as frictional barriers which would have a negative impact on the level of intra-trade. A negative impact, however, does not mean that the level of intra-trade will decrease for sure. The exit of the U.K. from the common market is in fact compatible both with a decrease in intra-trade and with a lower increase in intra-trade if this increase is compared to the one that would be registered if the exit does not occur. It is necessary to understand the incidence

of endogenous and exogenous causes. When endogenous causes are stronger, a decrease in trade should be verified, while an increase should be registered in the opposite situation.
The effects on intra-FDIs should be analysed by considering the effects on intra-trade first. The exit from the free trade area has in fact no huge direct impact on intra-FDIs, while it has an indirect impact, due to the relationship of complementarity and substitutability between trade and FDIs. The impact of the exit from the free trade area on intra-FDIs can be positive, if trade and FDI are substitutes or negative if trade and FDIs are complements. According to the existing literature, the second scenario is more likely, so that the exit should have a negative impact on intra-FDIs. This negative impact should be less than proportional to the negative impact on intra-trade, so that there should be a positive impact on the ratio.

- If the U.K. leaves the free trade area, it is not true that its levels of intra-trade and intra-FDIs would decrease: this is a possible scenario, which is verified only if the endogenous cause (leaving the free trade area) is stronger than the exogenous causes.
- If the U.K. leaves the free trade area, its rate of growth in the levels of intra-trade and intra-FDIs would become lower. If the rate of growth were negative, leaving the free trade area would make this rate even more negative.
- If the U.K. leaves the free trade area, the relative incidence of intra-trade versus intra-FDIs would decrease. Many economic agents would in fact opt for FDIs instead of trade to serve other member countries.

Until now, we have centred the conclusions about Brexit on the U.K. We now must focus on the "remaining bloc". The exit of a country from a trade bloc has in fact many impacts even on the other members, who remain part of the trade bloc. These impacts depend on the characteristics of the trade bloc in terms of size and number of countries. We can for example distinguish between NAFTA and the EU:

- NAFTA is made up of only three countries, and the U.S., which are the most populated one, account for 67% of the population of the whole trade bloc. This trade bloc can be defined as "concentrated".
- The EU is instead made up of twenty-eight countries. Germany, which is the most populated country, accounts for 15.7% of the population while the U.K., which are the focus of our analysis, accounts for 12.9%. This trade bloc can be defined as "spread"

Because of this huge difference, it is necessary to underline that the following conclusion are true only for "spread" trade blocs as the EU is.

If the U.K leaves the free trade area or the common market, there would be a negative impact on the economic relations with the U.K for other member countries: trade and investments to and from the U.K. would decrease if endogenous causes prevail or increase at a slower pace if exogenous causes are stronger. If the free trade area were left, the huger impact would be on trade while if the common market were left, the huger impact would be on FDIs. It is important to underline that this negative impact occurs only for the economic relations with the U.K. and not in general terms. The remaining countries have in fact the possibility to divert the potential trade and FDIs with the U.K. to and from other member countries. Another advantage for remaining countries is represented by the relatively small incidence of trade and FDIs with the U.K. on the total levels of intra-trade and intra-FDIs. When the U.K. leaves, it suddenly faces many difficulties to keep the same levels of trade and FDIs it had before with all the countries who remain in the trade bloc. This is not true for the other countries, which suddenly face these difficulties only for the economic relations with the U.K.

These conclusions would not be valid in the NAFTA case if the US leave. In this hypothetical scenario, the countries facing the most significant problems would be Canada and Mexico. As the US leave, these two countries would become part of a trade bloc which would have one third of the previous population and even no common border between members. The US alone would instead still have two third of the previous population and so a huge internal market and border with both Canada and Mexico. This is even the reason why the US represent the *conditio sine qua non* of the NAFTA, while no European country can play in the EU the same role that the US play in North America.

Tables 6.1 summarizes the impact of Brexit and the alternative opportunities for the U.K and the remaining countries.

Table 6.1

	impact of Brexit	Alternative opportunities
United Kingdom	high	few
Remaining countries	low	many

The huge different effects of the two alternative ways of Brexit (exit from the free trade area and exit from the common market) even imply a huge difference in the incidence of the various ingredients of the GDP.

Let's assume that the UK leaves the free trade area. This would have a significant negative impact on both the amount of:

- export from the UK to the countries which remain in the trade bloc
- import from the countries which remain in the trade bloc to the UK

It is possible to generalize these two effects by simply saying that there would be a negative impact on intra-trade in general. Some of this trade would be diverted to and from other countries. Remaining members would substitute trade to and from the UK with trade to and from other member countries. This would be more difficult for the UK, but we can assume that part of trade is diverted to and from other non-member countries for the UK. Part of the amount which was originally traded would be however "destroyed", where trade destruction is here used to describe the opposite process of trade creation. The exit from the free trade area has even a negative impact on investments from abroad (intra-FDIs). This impact, however, should be less strong in percentage terms than the impact on intra-trade. The result can be summarised in the following sentence: *exiting from the free trade area allows leaving countries to avoid foreign competition in trade by having a relatively low decrease in intra-FDIs*.

Let's now assume that the U.K decides to leave the common market. Even in this case, there would be a negative impact on trade, which would be however less strong than the previous scenario. This means that the U.K would be less able to avoid foreign competition in trade. The negative impact on intra-FDIs would be instead of higher magnitude. The result can be summarised in the following sentence: *exiting from the common market implies no*

significant changes in the foreign competition in trade and a huge decrease in the intra-FDIs received.

Even if the common market is usually perceived as a further step of the free trade area, something which integrates an already existing agreement, the most critical option for leaving countries could be exactly the exit from the common market, which is perceived to be the "soft" alternative. Leaving the free trade area, which is instead perceived as the "hard" alternative, could have a lower impact on the GDP.

6.2. Implications on Eurozone exit

The previous analysis made on the exit from the free trade area and from the common market can be declined even on the common currency case, even if this is still a totally hypothetical scenario, since there are no countries who are going to leave in the future. This analysis is a little bit more complicated, since leaving a currency union does not automatically imply the abandonment of the fixed exchange rate regime. When a country belongs to a strict currency union sharing a common currency with other members, the fixed exchange rate regime is in fact an obliged condition, since the monetary policy is in the hands of the central bank (the ECB in the Eurozone). When a country is outside the currency union or has leaved it, two scenarios are possible:

- The country opts for keeping a fixed exchange rate regime. In this case, the value of the national currency is peg to the Euro.
- The country opts for introducing a floating exchange rate regime. In this case, the value of the national currency can float.

Things are even made more complicated, considering that there are intermediate scenarios as for example "managed float" systems and "fluctuate in a band" systems. However, these cases are not treated, since they represent some intermediate alternatives between a pure fixed exchange rate regime and a pure floating exchange rate regime.

To better analyse what could happen in the two previous mentioned scenarios, it is necessary to understand their implications first. If confronted to the currency union case, peg currencies imply higher transaction costs and lower price transparency due to the different "languages spoken" between buyer and seller or investor and investee. Floating currencies imply the same problems and even the risk and the uncertainty related to changes in exchange rates. It is necessary to underline that even in the fixed exchange rate regime with peg currencies

there is risk related to exchange rates, caused by devaluations or to the increased value of the currency. But while these changes (depreciations and appreciations) occur on a less than daily base and are totally independent form the central bank in the floating exchange rate regime, they are instead exceptional events and controlled (i.e. announced) by the central bank in the peg currencies case.

Table 6.2 shows whether transactions costs, price transparency and risk related to changes are low or high in the three considered scenarios of currency union, peg currencies and floating exchange regime.

Table 6.2

		transaction cost	price transparency	risk related to changes
fixed exchange rate system	currency union	low	full	null
	peg currencies	high	low	low
floating exchange rate system		high	low	high

The generic conclusion is that both peg currencies and floating exchange rate systems have a negative impact on trade and FDI flows between countries if these countries were members of a currency union before. It is however not possible to understand whether this negative impact affects more intra-trade or intra-FDIs. This is due to the fact that there are different causes, among which price transparency should have a higher impact on intra-trade, while risk related to change should have a higher impact on intra-FDIs.

To understand the impact on the ratio, it is not only necessary to distinguish between peg currencies and floating rates cases, but it is even important to understand the "direction" of the flows, assuming the correct perspective by centring the analysis in the right way. In the free trade area and common market cases, we saw that changes were symmetrical. If for example a country joins the EEC, it should increase both its export and its import, and this is the reason why we have always refereed to them by simply talking about trade. In the same way, leaving the European Single Market should have a negative impact both on FDI inflows and FDI outflows. In the currency union case, changes are instead asymmetrical: if

a country leaves, it is likely that it will export more and import less than before or vice versa, so that when it for example exports more, other member countries export less. This would imply that these asymmetrical behaviours off-set each other in the econometric model, so that no impact of the currency union on the ratio should be registered. This could be even one of the reasons why the significance of the variables EMU_dummy was low in the fourth regression based on 343 bilateral relations. The difficulty in finding a general effect is due to the fact that the entrance to or the exit from a currency union, which is the "endogenous" cause, imply even the "exogenous" cause, which is instead represented by the change in the exchange rate regime.

Let's see now what would happen if a country leaves in four different cases:

1. The Country who leaves devaluates its currency versus the Euro before keeping the new fixed exchange rate.
2. The country who leaves keeps a floating exchange rate regime and its currency depreciates versus the Euro.
3. The Country who leaves valuates its currency versus the Euro before keeping the new fixed exchange rate.
4. The country who leaves keeps a floating exchange rate regime and its currency appreciates versus the Euro.

This taxonomy is given by the crossing of two dimensions. The first one is the adopted exchange rate regime, which depends on the monetary policy of the leaving country, while the second one is the behaviour of the currency versus the Euro, which does not depend on the decisions of the leaving country but on its economic situation. Countries who are supposed to have a weaker currency when leaving are those which belong to the so-called South of Europe as for example Italy, Greece, Spain and Portugal while countries who are supposed to have a stronger currency when leaving are those which belong to the so-called North of Europe as for example Germany, the Netherlands and Finland. Other member countries are in the middle.

When the Country who leaves devaluates its currency, keeping then the new fixed exchange rate, its level of export increases while its level of import from other member countries decrease (there is an increase in the balance of trade). Cross FDI-flows should not be altered. When the country who leaves keeps instead a floating exchange rate regime and its currency depreciates versus the Euro, the effect on trade is the same of the previous scenario: there is

an increase in the balance of trade, since export will increase while import will decrease. Cross FDI-flows would be instead altered in this scenario: the floating exchange regime makes the risk related to changes high and so intra-FDI flows should decrease in both directions.

The third and the fourth scenarios are specular to the first and second scenarios: in both cases there is an increase in import and a decrease in export for the country who leaves, but a decrease in the intra-FDI flows in both directions should also occur in the fourth scenario.

It is possible to conclude that the impact of the exit from the currency union cannot ignore the exogenous causes (type of adopted exchange rate regime), which are for sure more explicative than the endogenous ones.

7. Limitations and suggestions for further research

As we have already observed many times in our research, there are some important limitations, which should be better explained.

- Low squared R
- Short period considered for EMU_dummy
- Correlations between couples of independent variables
- Collinearity

For each of these limitations, a suggestion for further improvement will be associated. There is however even a last limitation in our research, which is the low replicability of the results referred to different trade blocs from the EU.

7.1. Low squared R

As we have noticed in chapter 4, the squared R is relatively low in many regressions. This is particularly true if the squared R of the fourth regressions (ratio as dependent variable) is compared to the squared R of the first adjusted preliminary regressions. The fourth regression, which has the ratio as dependent variable, has a squared R of about 0.25, while the first adjusted preliminary regression, which has the level of intra-trade as dependent variables, has a squared R of about 0.50. This means that, while only half of the variability remains unexplained in the first adjusted preliminary regression, the fourth regression has about 75% of unexplained variance. The squared R of the fourth regression is instead very similar to the squared R of the second preliminary regression, which has intra-FDIs as dependent variable. This means that high variability of the ratio is mainly due to the high variability of the intra-FDIs. It is possible to say that there are structural reasons at the basis of such a high variability. As we could test in the other regressions, it is possible to get a decrease in the variability when the analysis is restricted to a narrow dataset, made of 205 instead of 343 observations, or especially when the analysis is centred on a country. In both cases, however, the increase in the squared R is obtained by shifting the focus of our research question, which is not focused on the whole trade bloc anymore. It is necessary to find a way through which the squared R can increase by keeping the 343 observations. Because of the normalization process, it is not possible to introduce other control variables: their significance would be in fact low and so they would not contribute to generate a significant

increase in the squared R. A feasible solution is instead represented by the introduction of a cluster analysis, which should be conducted before the regression. Thanks to cluster analysis, it is possible to divide all the observations in smaller groups, which should be as much internally homogenous as possible and as much externally heterogenous as possible. This means that Each cluster should contain very similar observations, but the observations the various clusters should be different. The clustering process can be done on the independent variables and on the normalized_ratio. The most advanced cluster techniques even allow to create clusters taking more variables as "driver". In our case, possible clusters can be based on the trend of the ratio between intra-trade and intra-FDIs from 1985 to 2012. As we know, this trend is negative for the average and for most couples of countries observed. This decrease can be relatively flat or relatively steep, but there are few cases in which the trend is even positive. Through cluster techniques, it could be possible to categorize these trends in different groups. A dummified categorial variable can be later introduced in the regression, reflecting the clusters. The squared R is expected to increase after this process.

Even if this was not shown in the dedicated section, a sort of clustering process was used before implementing the fourth adjusted regression. Through this regression we wanted in fact to show that the subdivision of the considered period in two subperiods allows to obtain a significant increase in the squared R. The variance explained by the model could increase from to 14.8% to 22.6% by just adding a dummy variable which is equal to 1 if the observation belongs to the 1985 - 1997 period, while it is equal to 0 if the observation belongs to the 1998 - 2012 period. It is interesting to observe that the improvement generated by the introduction of the variable "time" instead of this dummy variable is relatively low, since the squared R increases from 0.226 to 0.250.

The huge increase in the squared R due to the introduction of the dummy is nothing which can be automatically obtained by simply adding the dummy. It is in fact the result of a clustering process through which the best subdivision in subperiods was obtained. In other words, the 1997 is the year which better subdivides the whole period in two subperiods which are as heterogeneous as possible between them and as homogeneous as possible within them. Table 7.1 shows the coefficient associated to the dummy, the p-value of the dummy and the squared R of the model for twenty-seven regressions, which have the same variables of the sixth regression, except the variable "period", which is different in each of these twenty-seven regressions.

Table 7.1

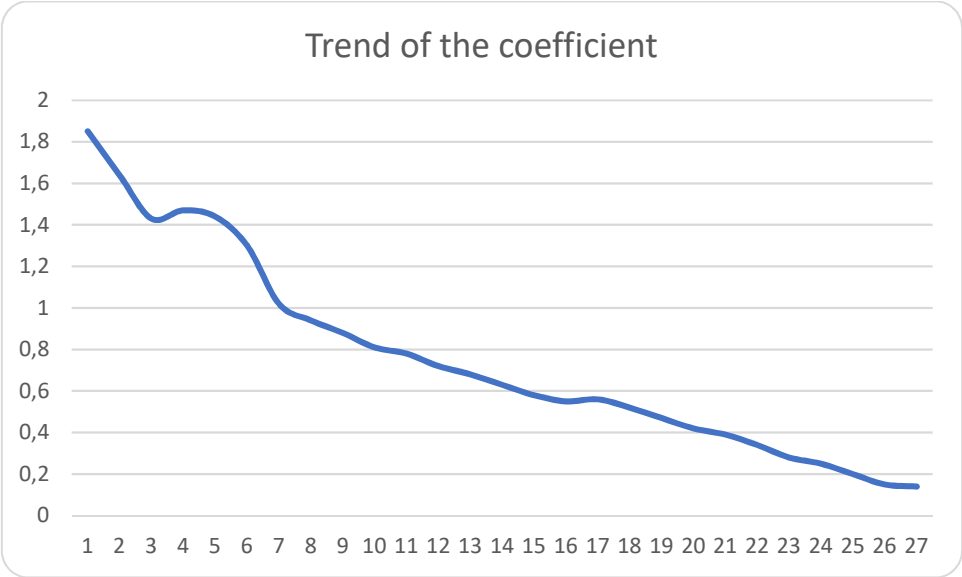
	year	coefficient	p-value		squared R
Y1	1985	1.85	6.7e-020	***	0.160
Y2	1986	1.64	1.0e-039	***	0.172
Y3	1987	1.43	4.4e-054	***	0.181
Y4	1988	1.47	4.4e-073	***	0.193
Y5	1989	1.44	2.1e-077	***	0.196
Y6	1990	1.30	4.0e-061	***	0.186
Y7	1991	1.02	2.7e-069	***	0.191
Y8	1992	0.94	7.1e-088	***	0.202
Y9	1993	0.88	8.5e-104	***	0.212
Y10	1994	0.81	6.6e-108	***	0.214
Y11	1995	0.78	7.4e-125	***	0.224
Y12	1996	0.72	2.4e-125	***	0.225
Y13	**1997**	0.68	**2.8e-127**	***	**0.226**
Y14	1998	0.63	1.1e-119	***	0.221
Y15	1999	0.58	3.8e-110	***	0.216
Y16	2000	0.55	2.8e-101	***	0.210
Y17	2001	0.56	1.9e-102	***	0.211
Y18	2002	0.52	2.7e-090	***	0.204
Y19	2003	0.47	1.2e-070	***	0.191
Y20	2004	0.42	6.8e-058	***	0.184
Y21	2005	0.39	7.4e-053	***	0.180
Y22	2006	0.34	8.4e-039	***	0.172
Y23	2007	0.28	1.2e-025	***	0.163
Y24	2008	0.25	7.2e-019	***	0.159
Y25	2009	0.20	1.2e-010	***	0.154
Y26	2010	0.15	1.7e-05	***	0.150
Y27	2011	0.14	0.0036	***	0.149

Dummy variable Y1 is equal to 1 when the observation is made in year 1 (1985) or before while it is equal to 0 otherwise, dummy variable Y2 is equal to 1 when the observation is

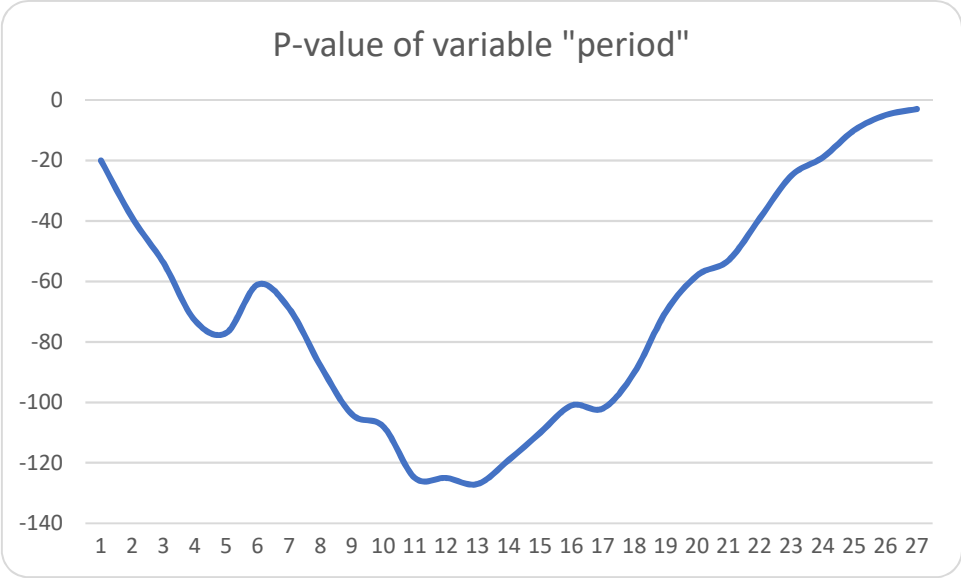
made in year 2 (1986) or before while it is equal to 0 otherwise and so on until dummy variable Y27. As it possible to observe in table 7.1, the minimum p-value for the dummy variable "period" and the maximum squared R of the model are obtained using Y13 as dummy variable "period". The thirteenth years of the dataset is the 1997.

This cluster process could be "manually" implemented by replicating the sixth regression twenty-seven times. This activity would be less feasible if there were many years involved in the dataset. Even the decision to subdivide the period in two subperiods could facilitate this analysis. If we wanted more subperiods, a more complicated algorithm should be used to obtain the correct years.

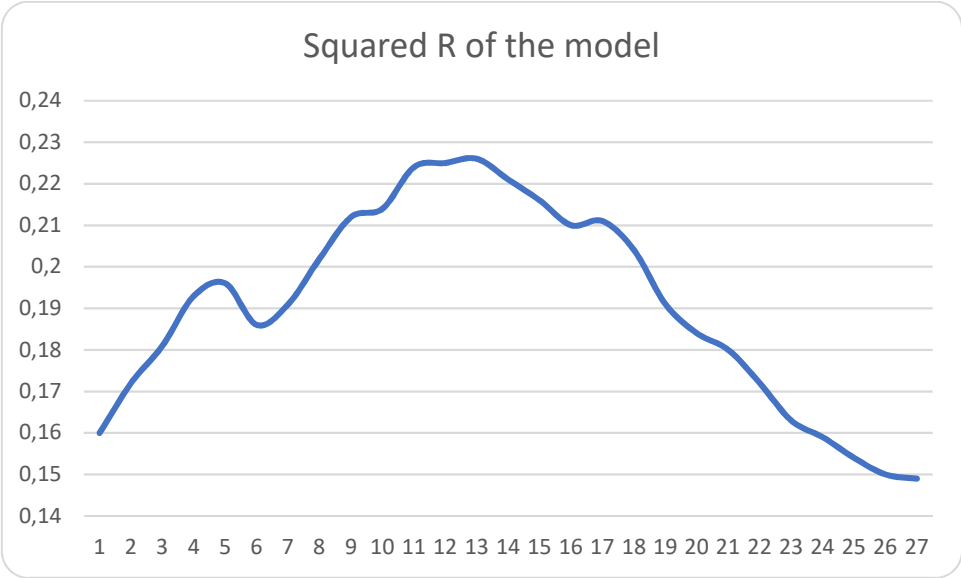
Graphs 7.1, 7.2 and 7.3 allows to better understand how this cluster process works.



Graph 7.1: the trend of the coefficient associated with variable "period" is decreasing. This is due to the values of the ratio for the first years of the dataset. When these years are the first cluster and the other years the second cluster, a significant higher value of the ratio is verified for the observations of the first cluster. When these years are instead little by little mixed with more recent years, the difference becomes lower. The magnitude of the coefficient, however, is not a good driver to select to best subperiods.



Graph 7.2: The dummy variable "period" which has the minimum p-value is the one which subdivides the dataset in the two subperiods 1985 - 1997 and 1998 - 2012.



Graph 7.3: The dummy variable "period" which allows to obtain the highest squared R is, once again, the one which subdivides the dataset in the two subperiods 1985 - 1997 and 1998 - 2012.

As it is possible to observe in graph 7.3, if we had selected other subperiods, we would have obtained a lower benefit in terms of squared R increase. The minimum benefit would have been obtained if we had subdivided the dataset in the two subperiods 1985 - 2011 and 2012 alone. The squared R would be in fact equal to 0.149 in this case, which would be not very

far from the 0.148 that is obtained when no dummy variable is used (third regression). The interesting result is that, to get a higher value of the squared R, it is not sufficient to introduce a new explicative variable, but it is even necessary to well manage it, by fixing for example the best threshold before and after which the dummy is equal to 1 and 0 respectively.

7.2. Short period considered for EMU_dummy

The number of observations in which the regressor EMU_dummy is equal to 1 is relatively low on the total number of observations. This is due to the fact that the common currency was introduced only in 2002 for part of the communitarian countries. There are just 11 years of observations, from 2002 to 2012, in which it is possible to have EMU_dummy = 1. This can partially explain the reason why the significance for EMU_dummy is low in many regressions. In this case, to get better results, it is not possible to act on the regression, but on data. To obtain more observations it is enough to wait some years and to replicate this regression when another decade since the introduction of the currency union is passed. In this future regression, however, it can be even possible to base the observations on a dataset which start later and to eliminate the regressor FTA_dummy, which would have instead a too long period of observation in which its value is equal to 1 otherwise. It is necessary to balance the number of observations, avoiding "tails" in which all the observations are equal to a certain value (1 or 0). Another way through which an improvement can occur is represented by variables signalling the years in which, despite being out of the currency union, countries were compliant with the European Exchange rate mechanism (ERM), which requires keeping the exchange rate within a certain interval, which is limited by an upper bound and a lower bound. This regime stacks in fact in the middle between pure fixed exchange rate regimes (among which the currency union represents the most integrated regime) and pure floating exchange rate regimes. The length of the period in which countries were compliant with the ERM can affect the magnitude of the coefficients associated with variable EMU or EMU_dummy. Among countries who have already adopted the common currency, some (Belgium, France, Germany, Ireland, Luxemburg and the Netherlands) were part of the ERM since the beginning, others (Italy) were part since the beginning but with some long periods of exception (from 1992 to 1997 for Italy), others (Greece, Finland and Austria) for no more than four years, other again (Spain and Portugal) for eight to ten years. These huge differences can be seen even among the later adopting countries. If Malta and

Cyprus were involved in the ERM for three years, Lithuania had to wait ten years to adopt the Euro since it entered the ERM.

7.3. Correlation between couples of independent variables

A problem which one could face when doing this type of research is the presence of correlation between couples of regressors. This is usually a general problem that arises when an empirical study through econometric models is made. It is necessary to pay extreme attention when two correlated regressors are used. In our regression model, there are several correlations among variables. It is possible to categorize them in three classes:

- Correlations between couples of "cross-sectional" regressors
- Correlations between couples of "time-series" regressors
- Correlations between a "cross-sectional" regressor and a "time-series" regressor

It is important to underline that we when talk about "cross sectional" regressors, we are referring to those variables which change their value only from a time series to the other and not on the same time series. This is the case for variables "distance" and "border". In a broader sense, "cross sectional" regressors can even refer to those variables which change their value at least from a time series to the other, without considering whether they change on the time series or not. If we assume this definition, even FTA_dummy, ESM_dummy. EMU_dummy and GDPsum can be considered cross sectional regressors.

When we talk about time-series regressors, we are instead referring to those variables which change only on each time series but keeping their value constant from a time series to the other in each year. This is the case of variable "time" and of those dummy regressors which signals whether an observation belong to a certain year or to a certain period of more years. Even in this case, if the broader definition is used, we can consider FTA_dummy, ESM_dummy, EMU_dummy and GDPsum time series regressors.

It is even possible to refer to "distance" and "border" as pure cross sectional regressors and to "time" as pure time series regressor. FTA_dummy, ESM_dummy. EMU_dummy and GDPsum are instead both cross sectional and time series regressors.

Let's now make analysis of the correlation between two cross sectional regressors ("distance" and "border").

Correlation distance - border

- Ordinary least squares (OLS)
- 343 observations
- Dependent variable: distance
- Regressors: border

Table 7.2 - Correlation distance - border

	coefficient	stnd error	t ratio	p-value	
Const	1405,45	35,95	39,10	<0,0001	***
border	−944,37	91,44	−10,33	<0,0001	***
Squared R = 0,238					

The two variables "distance" and "border" are highly correlated as the low p-value suggests. The distance between two countries who share a common border is expected to be 944,37 km lower. Despite the correlation, it is better to keep both regressors in our model. This is due to the fact that, as we have noticed in the literature review, the presence of a border cannot be considered as an extreme case in which the distance between two countries is very low, but it implies an extra amount of trade levels which is not verified in other couples of countries. So, even if "distance" and "border" are two measures related to how countries are far, the effects of these two variables are sufficiently different to keep them both in the model.

The common border alone can explain quite the 24% of the variance, while the other 76% is not explained in the model. This is due to the high number of couples of countries and so the high variability of distances regardless of the presence of a common border. The second reason is that we are trying to investigate the correlation between a dummy variable and a continuous variable which cannot assume a value equal to zero: this cannot return a high squared R by construction.

Let's now analyse the correlations between ESM_dummy and FTA_dummy and between EMU_dummy and ESM_dummy. To do that, it is not possible to run a linear regression, since we are trying to analyse the correlation between two dummies. Using a dummy variable as dependent variable is not a good approach. Even a probit or logit model would return bad result, since the probability of having FTA_dummy = 1 when ESM_dummy = 1

is 1 and the probability of having ESM_dummy = 0 when FTA_dummy = 0 is 1. This is due to the fact that we are considering only those countries belonging to the European Union and so those countries for which it is not possible to stay out from the free trade area being part of the common market at the same time. In other words, we can see the event ESM_dummy = 1 as a subcase of the event FTA_dummy = 1. The same reasoning can be applied for the EMU_dummy = 1, which is a subcase of ESM_dummy = 1 or FTA_dummy = 1.

The correlation can be easily shown by considering the following implications, which are always verified:

- FTA_dummy = 0 → ESM_dummy = 0
- ESM_dummy = 1 → FTA_dummy = 1
- ESM_dummy = 0 → EMU_dummy = 0
- EMU_dummy = 1 → ESM_dummy = 1

These implications create the following probabilities:

- Pr (ESM_dummy = 1 | FTA_dummy = 0) = 0
- 0 < Pr (ESM_dummy = 1 | FTA_dummy = 1) < 1
- Pr (ESM_dummy = 0 | FTA_dummy = 0) = 1
- 0 < Pr (ESM_dummy = 0 | FTA_dummy = 1) < 1
- Pr (EMU_dummy = 1 | ESM_dummy = 0) = 0
- 0 < Pr (EMU_dummy = 1 | ESM_dummy = 1) < 1
- Pr (EMU_dummy = 0 | ESM_dummy = 0) = 1
- 0 < Pr (EMU_dummy = 0 | ESM_dummy = 1) < 1

In this case, keeping the three regressors is not only the best approach but even the only possible approach to obtain correct results. Keeping only one of these three dummy variables would be a mistake, since it would not consider the different effects due to the different steps of the economic integration on our dependent variable. In other words, we would not be able to answer our research question.

Until now we have seen that there are some cases in which keeping correlated regressors is possible or even better, as for example for variables “distance” and “border” and other cases in which keeping correlated regressors is the only alternative, as for example the three dummy variables.

There are however some cases in which the correlation between two regressors must absolutely be avoided. There are no cases in which this happened in the various models of our research, but let's consider for example the correlation between GDPsum and GDPpc_sum. The second variable is in fact used in some gravity models. These two variables seem to be unrelated at first sight. This is due to the fact that the EU is made up of:

- "big rich" countries as Germany
- "small rich" countries as Luxembourg
- "big poor" countries as Poland
- "small poor" countries as Cyprus

This should push toward no correlation between GDPsum, which categorises countries as big and small, and GDPpc_Sum, which categorises countries as rich and poor. Despite of this, when we implement the regression by using GDPpc_sum as dependent variable and GDPsum as regressor, we observe a huge correlation between them.

Correlation GDPpc_sum - GDPsum

- Ordinary least squares (OLS)
- 9604 observations
- 343 cross sectional units
- Length of time series
- Dependent variable: GDPpc_sum
- Regressors: GDPsum

Table 7.3 - Correlation GDPpc_sum - GDPsum

	coefficient	**stnd error**	**t ratio**	**p-value**	
Const	27258,6	287,939	94,67	<0,0001	***
border	0,0128	0,0002	65,92	<0,0001	***
Squared R = 0,312					

Let's now run the first adjusted preliminary regression twice, using GDPpc_sum instead of and beside GDPsum respectively.

Second preliminary regression with GDPpc_sum instead of GDPsum

- Ordinary least squares (OLS)
- 8572 observations
- 343 cross sectional units
- Length of time series: min 13, max 28 (from 1985 to 2012)
- Dependent variable: intra-trade
- Regressors: FTA, ESM, EMU
- Control variables: "distance", "border", "GDPpc_sum"

Table 7.4 - Output of the 1st adjusted preliminary regression with GDPpc_sum instead of GDPsum

	coefficient	**standard error**	**t ratio**	**p-value**	
Const	1,53e+09	2,34e+08	6,54	<0,0001	***
distance	−1,47e+06	103848	−14,20	<0,0001	***
border	5,29e+09	2,09e+08	25,34	<0,0001	***
GDPpc_sum	10719,7	4693,55	2,28	0,0224	**
FTA	4,16e+08	6,02e+07	6,90	<0,0001	***
ESM	2,22e+08	6,94e+07	3,20	0,0014	***
EMU	9,33e+08	5,13e+07	18,19	<0,0001	***
Squared R = 0,281					

As it is possible to observe, all the coefficients behave as we would expect. Despite the high significance of all the control variables and the regressors, the squared R is relatively low, especially if compared to the squared R of the "original" first adjusted preliminary regression (the one with GDPsum instead of GDPpc_sum). This means that the level of intra-trade is much more correlated to the GDPsum.

Let's now regress data considering both GDPsum and GDPpc_sum as control variables.

Second preliminary regression with both GDPpc_sum and GDPsum

- Ordinary least squares (OLS)
- 8572 observations
- 343 cross sectional units
- Length of time series: min 13, max 28 (from 1985 to 2012)
- Dependent variable: intra-trade
- Regressors: FTA, ESM, EMU
- Control variables: "distance", "border", "GDPsum", "GDPpc_sum"

Table 7.5 - Output of the 1st adjusted preliminary regression with both GDPpc_sum and GDPsum

	coefficient	**standard error**	**t ratio**	**p-value**	
Const	5,51e+08	1,92e+08	2,87	0,0041	***
distance	−1,30e+06	84862,3	−15,36	<0,0001	***
border	4,47e+09	1,71e+08	26,16	<0,0001	***
GDPsum	3870,3	59,20	65,38	<0,0001	***
GDPpc_sum	−44373,2	3925,17	−11,30	<0,0001	**
FTA	1,69e+08	4,93e+07	3,42	0,0006	***
ESM	8,01e+07	5,67e+07	1,41	0,1577	
EMU	6,10e+08	4,22e+07	14,45	<0,0001	***
Squared R = 0,520					

If we exclude "GDPpc_sum", all the independent variables (regressors and control variables) behave as we would expect. The negative sign of the coefficient associated with variable "GDPpc_sum" is instead unexpected, especially if compared to the positive sign obtained in the previous regression. According to this regression, given the same GDP level of two countries, the one which is expected to trade more is the one having the lowest GDP per

capita. This can be interpreted by noticing that a lower GDP per capita given the same GDP means higher population: countries in which the same richness is spread on higher population are expected to trade more. As it is possible to observe, however, the significance of "GDPpc_sum" is lower than the significance of the "GDPsum". This unexpected behaviour of "GDPpc_sum" is due to its correlation with "GDPsum".

Beside these correlations between "similar" variables, there is correlation even apparently unrelated variables which mainly change their value in two different direction. This is the case of variables "border" and "distance", which change across sections, and variables FTA_dummy, ESM_dummy and EMU_dummy, which change their values in both cross sectional and time series directions.

Let' for example analyse the correlation between "distance" and FTA_dummy in the European case. The distances between the six founder members of the EEC were very low if compared to distances between them and non-members or between couples of non-member countries. The ECC (and so the free trade area) was later extended to some of the so-called outer seven countries which were contraposed to the inner six, where the terminology inner/outer was used to physically determine the position of these countries in Europe. In other terms, the free trade area was first completed in the "core-countries" and then extended to the "periphery". The first enlargement which occurred in 1973 involved the UK, Ireland and Denmark, the second one which occurred in 1981 involved Greece, the third one which occurred in 1986 involved Spain and Portugal while the fourth one which occurred in 1995 involved Austria, Finland and Sweden. It is possible to observe that newly entered countries were little by little farther from the core of the ECC. The following two enlargements, which occurred when the EU was already set, are generally called first and second eastern enlargement respectively, to underline the direction of the expansion of the EU (and so of the free trade area).

This issue related to the correlation with distance is lower for the other two variables ESM and EMU. The European Single Market was in fact established in 1993: twelve countries were already part of the EEC at the time, so that borders of the new institution were more spread and not concentrated. This implies that distances between some couples of countries were already higher than distances between the founder members in the starting year of the free trade area. The fourth enlargement which occurred two years later (1995) further increased distances, especially because of the entrance of Sweden and Finland.

The lower degree of correlation between distance and EMU is instead due to the fact that fifteen countries were already members of the EU when the common currency was introduced. Among those countries, however, three decided to opt-out the Eurozone, so that the adopters of the common currency were twelve. The distance from the core of the EU seems to not affect the decisions of countries to adopt the common currency. On the 1st of January 2002:

- The UK and Denmark, which cannot be strictly considered periphery, did not adopt.
- Sweden, which belongs to the periphery, did not adopt.
- Finland, Ireland, Portugal and Greece, which belong to the periphery, adopted

Another reason why distance and EMU are not correlated is given by the adoption of the common currency by other countries in the following years. Some of these countries are even periphery of the EU-25: Malta and Cyprus adopted in 2008, Estonia in 2011. Latvia and Lithuania adopted in 2014 and 2015 respectively, but the time-series finishes in 2012 so they are not observed in the econometric model.

In our case these correlations do not imply any problem, but it is however necessary to study these correlations always, before implementing the econometric model, in order not to obtain unexpected results once the regression has been made.

The same correlation exists between time and the three regressors FTA_dummy, ESM_dummy and EMU_dummy.

7.4. Collinearity

Because of the high use of dummies and pseudo-dummies, another issue which can arise when doing this type of research is related to collinearity. As we have already observed in section 4.9, the cross-sectional approach cannot be easily used, since there are many years in which there is full collinearity between FTA_dummy and ESM_dummy. This happens since 1991 and because now it is mandatory for member countries to be part of both the free trade area and the common market, full collinearity between these two dummy variables will last forever. Since the entrance of the last two countries (Bulgaria and Romania) which occurred in 2007, the full collinearity is even verified among FTA_dummy, ESM_dummy and the constant term. This is due to the fact that both FTA_dummy and ESM_dummy are equal in value for each observation since 2007. This is true because of the absence of observations involving Croatia. If we had considered even them, we would have obtained

collinearity with the constant term only starting from 2013. The variable EMU_dummy gives instead problems before 2002, when the common currency was launched. Before 2002 this variable is equal to 0 for all the observations. Beside these situations of full collinearity, there are even some cases in which near collinearity can be verified. Even if the software can compute the solution without signalling collinearity, the results can be strongly altered by the presence of near collinearity. It is necessary to find some ways through which this problem can be avoided, or at least the probability of its occurrence can be minimized. The first suggestion is to use pseudo-dummies instead of pure dummies. This is in fact what we have done in the cross-sectional analysis. Through the introduction of pseudo-dummies, there could be some cases in which full collinearity is transformed in near collinearity. This does not happen on our database, but there could be some other cases in which this becomes true, as for example when a certain country joins two steps of the economic integration in two consecutive or at least close years. This reduction in the possibility of obtaining collinearity or near collinearity would be instead verified even on our database if a transition period longer than five years were used. This suggests that a second way through which it is possible to minimize problems of collinearity or near collinearity is to make the transition period longer. These problems can be even potentially avoided if continuous variables without an upper limit were used. The problem of using longer transition periods or variables without an upper limit is represented by their low adaptability to the reality.

7.5. Low adaptability to other trade blocs

As we have already observed twice, the European trade bloc represents a unique case of such a high integration among countries in the World. This becomes particularly true for those countries who even share the monetary policies and so for those countries which belong to the currency union. Countries who still have their own currencies, however, share many other policies which would be not common otherwise. The EEC - CU implies a common trade policy, while the European Single Market implies the four freedoms of movement. Despite this huge deep integration, the most significant aspect which characterizes the European case is the width of the integration. Twenty-eighth country are in fact members of the European Union. There is no other trade bloc in the World which has such a high number of members. Beside this, the European Union is even characterized by “polycentrism”. This is due to the fact that there is not a country of the European Union which can be considered

the “most important one”. Germany is the most populated country and has even the highest GDP, but, as we have already observed, it accounts for less than 16% of the whole communitarian population.

Let’ now make the comparison (table 7.6) in terms of depth of the integration, width of the integration and heterogeneity and disproportionality of member countries for the EU, NAFTA and Mercosur.

Table 7.6

trade bloc	depth of integration	width of integration	most populated country and incidence on total trade bloc’s population
European Union (EU)	free trade area customs union common market *currency union*	28 members 28 members + *4* 28 members + *4* 19 members + *4*	Germany (15.7%)
North America Free Trade Agreement (NAFTA)	free trade area	3 members	USA (67%)
Southern Common Market (Mercosur)	free trade area customs union common market	5 members 5 members 5 members	Brazil (71%)

The most important implication due to the high concentration of communitarian population in one of the countries is the heterogeneity of effects on the various countries. The biggest countries of NAFTA and Mercosur (The US and Brazil respectively) can in fact obtain most advantages, through cannibalization. This situation is even exacerbated by the position of these two countries within their trade blocs. Their position can be considered “strategic”, since the US are the only country which shares a common border with the other two countries of NAFTA (Canada and Mexico), while Brazil is the only country which shares a common border with all the other countries of Mercosur (Argentina, Venezuela, Uruguay and Paraguay). Canada and Mexico do not have a common border, while the other common borders in the Mercosur are those between Argentina and Uruguay and between Argentina

and Paraguay. It can be here interesting to observe that Germany, which is the most populated country of the EU, shares a common border with just eight out of the twenty-eight (less than 30%). So, because of these disparities due to the high incidence of the population of the US and Brazil and their strategic position within their trade bloc, the impact of the various steps (free trade area for NAFTA, free trade area and common market for Mercosur) on the member countries vary a lot, regarding whether the observed couples include the US for NAFTA or Brazil for Mercosur. While it had sense to find a mean, an average expected behaviour of the ratio in the European case, the ratio for NAFTA and Mercosur has a very high variability. Most of benefits in the increased levels of intra-trade were in fact verified in the relations involving the US if we refer to the introduction of NAFTA in North America. This implies that the ratio increased a lot for the US, while it is of lower entity for the other two cases. The same reasoning can be applied to the Mercosur.

The only result obtained through the regression based on European countries, but which can be referred even to the other trade blocs is related to the positive effect of the introduction of the free trade area on the ratio and the negative effect of the introduction of the common market on the ratio. This is always due to the huger increase of intra-trade than intra-FDIs when the free trade area is created and to the huger increase of intra-FDIs than intra-trade when the common market is created. What it is not possible to "extrapolate" from the European case as a generic conclusion is the magnitude of the impact. In other words, thanks to our research question we know that whenever there is the introduction of a free trade area between countries, a positive impact on the ratio is expected but the value of this positive impact strongly depends on the trade bloc that is created. The same reasoning can be applied to the introduction of the common market: it has a negative impact on the ratio, but the value of this negative impact depends on the trade bloc itself. The impact of the introduction of the common market can be even different when the trade bloc was not a free trade area before.

8. Conclusions

The aim of the thesis has been partially reached. We are now in fact able to answer the research question for two out of the three steps of the European economic integration. We now know that the introduction of a free trade area has a positive impact on both intra-trade and intra-FDIs, but the impact on intra-trade is higher, so that there is a positive impact on the ratio. Even the introduction of the common market has a positive impact on both intra-trade and intra-FDIs, but the higher impact is on intra-FDIs in this case, so that the there is a negative impact on the ratio. The impact of the introduction of a currency union is instead less clear and this is due to two different reasons. On one side, the dataset could be in fact too short. On the other side, the impact strongly depends on the initial exchange rate regime. These results are confirmed by most regressions.

The main "lateral" findings are the importance of the normalization process, thanks to which it is possible to obtain acceptable values of the squared R, and the importance of using a panel approach when this type of research is made. Through this analysis, it is even possible to notice that all the aspects related to time (gradual causes and effects, fuzzy steps and anticipation) are not important issues in the econometric model: the various regressions run considering and without considering them do not return huge differences in the results.

The weaknesses of this research are represented by a chronically low squared R, which can however be improved by adding few dummy variables and a too short period considered for EMU.

The potential pitfalls of doing this type of research are the presence of correlated independent variables and the presence of collinearity. Both these problems could return distorted results. It is important to consider that this research fits well with the European case, but it cannot be easily declined on other trade blocs, since the EEC / the EU and the Eurozone are a very developed trade bloc, in terms of both width and depth.

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