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## The Single Currency Effects on a Heterogeneous Economic and Monetary Union

## [Eurozone Case]

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#### Abbreviations

ARDL	Autoregressive Distributed Lag
CPI	consumer price index
DOLS	Dynamic Ordinary Least Square
ECB	European Central Bank
ECSC	European Coal and Steel Community
EEC	European economic community
EMCF	European Monetary Cooperation Fund
EMI	European Monetary Institute
EMU	Economic and Monetary Union
E-OCA	Endogenous OCA
ERM	exchange rate mechanism
EU	European union
FEER	fundamental equilibrium exchange rate
FMOLS	Fully Modified Ordinary Least Square estimator
GDP	gross domestic product
GFCF	gross fixed capital formation
NCB	National Central Bank
NFA	net foreign asset position
OCA	The theory of optimum currency area
OG	Output Gap
PCA	principal component analysis
REER	real effective exchange rate
ULC	unit Labor Cost
BEER	Behavioural Equilibrium Exchange Rate
EC	European Community
ECB	European Central Bank
ECOFIN	Economic and Financial Affairs
ECU	European currency unit
EEA	European Economic Area
EEC	European Economic Community
EEC	European Economic Community
EFTA	European Free Trade Association
EMCF	the European monetary cooperation fund
EMS	European Monetary System
ESCB	European System of Central Banks

ESCB	European System of Central Banks
EU	European Union
Euratom	European Atomic Energy Community
MCM	monetary compensatory amounts
MFI	Monetary Financial Institution
NCB	National Central Bank
РСА	Principal Component Analysis
РРР	Purchasing Power Parity
PROD	Prodactivity
REER	Real Effective Exchange Rate
TARGET	Trans-European Automated Real-time Gross settlement Express Transfer
TARGET	Trans-European Automated Real-time Gross settlement Express Transfer
тот	Terms of Trade

## **Non-Technical Summary**

In this thesis, the major goal is to analyze the effect of the establishment of the Eurozone from multiple points of view in six chapters.

First of all, a thorough presentation of the euro area background, institutions and operating mechanisms is performed. The main goal of this chapter is to catch the evolution of the converging process. Our findings are that the Eurozone pattern has evolved over time and that before the experience of the unique money, theoretical challenges were put forward in order to show the limits of the optimum currency area theory.

The second chapter adopts a principal component analysis to show the limited convergence of the European monetary union. Actually, the Eurozone economies converge and diverge according to the conjuncture. This could be considered as normal, but in a monetary union it could reflect the fragility of the convergence of Eurozone economies.

The third and fourth chapters are dedicated to the euro behavior. In fact, Chapter three, aims at analyzing the euro real effective exchange rate determinants showing the disconnection between the evolution of the exchange rate and those of its determinants. The next chapter is dedicated to the comparison of the real effect exchange rate of the euro to its equilibrium level obtained according to the behavior equilibrium exchange rate methodology.

The last two chapters discuss the role of the euro in the deterioration of the competitiveness. In the two chapters, a comparison between two measures of price-competitiveness is performed, namely the real effective exchange rate deflated by the consumer price index and the real effective exchange rate deflated by the unit labor cost. But in the fifth chapter, a comparison between exports determinants of core and peripheral countries is also examined and in the sixth chapter a comparison between intra-Eurozone exchange rate and global exchange rate is presented. Note that the estimated models in these two chapters are definitely different. In reality, the fifth chapter's purpose is to capture the price and non-price competitiveness effects on exports and the following chapter's objective is to capture the euro effects on exports.

Chapters three, four and five are based on different panel co-integration techniques in order to estimate the long run relationships described above. The last chapter is based on a time series technique.

## Abstract

The Eurozone pattern has evolved over time and that before the experience of the unique money. Since the beginning of the crisis, the heterogenity of the Eurozone is more than ever highlighted. Actually, the Eurozone economies converge and diverge according to the conjuncture. The crisis placed the euro behavior and role at the core of the economic debate. The disconnection between the evolution of its exchange rate and those of its determinants is showed in the thesis as well as its impact on exports. Our findings suggest that even the exchange rate is an important determinant of exports, the role of structural competitiveness is increasingly important.

Key Words: Exchange Rate, Euro Zone, Cointegration, Time-series Econometricsn Panel

## Résumé non technique

L'objectif principal de cette thèse est d'analyser l'effet de la création de la zone euro à partir de plusieurs points de vue en six chapitres.

Tout d'abord, une présentation du contexte dans lequel a émergé la zone euro, des institutions et des mécanismes de fonctionnement est effectuée. L'objectif principal de ce chapitre est de mettre en avant l'évolution du processus de convergence. Nous concluons que la structure de la zone euro a évolué dans le temps et ce avant même la mise en place de la monnaie unique. Les développements théoriques ont été mis en avant pour montrer les limites de la théorie de la zone monétaire optimale.

Le deuxième chapitre adopte une analyse en composantes principales afin de montrer la convergence limitée de l'union monétaire européenne. En effet, les économies de la zone euro convergent et divergent en fonction de la conjoncture. Cela pourrait être considéré comme normal, mais dans une union monétaire cette alternance de convergence et de divergence pourrait refléter la fragilité de la convergence des économies de la zone euro.

Les troisième et quatrième chapitres sont consacrés à l'étude du comportement de l'euro. Le troisième chapitre, vise à analyser les déterminants des taux de change réels effectifs de l'euro des pays de la zone euro montrant la déconnexion entre l'évolution du taux de change et celle de ses déterminants. Le chapitre suivant est consacré à la comparaison du taux de change réel effectif de l'euro à son niveau d'équilibre obtenu en se référant au taux de change d'équilibre comportemental.

Les deux derniers chapitres traitent du rôle de l'euro dans la détérioration de la compétitivité. Dans les deux chapitres, une comparaison entre deux mesures de la compétitivité-prix est effectuée, à savoir le taux de change réel effectif réel déflaté par l'indice des prix à la consommation et le taux de change réel effectif déflaté par le coût unitaire du travail. Dans les deux chapitres d'autres perspectives comparatives ont été développés.

Dans le cinquième chapitre, une comparaison entre les déterminants des exportations des pays du centre et ceux des pays périphériques a été effectuée. Dans le sixième chapitre, une comparaison entre le taux de change intra-zone euro et taux de change global de quatres pays de la zone euro est présenté. Il est à noter que les modèles estimés dans ces deux chapitres sont différents. En réalité, le but du cinquième chapitre est de capturer les effets de la compétitivité-prix et la compétitivité hors-prix sur les exportations et l'objectif du chapitre suivant est de capturer les effets de l'euro sur les exportations.

Les chapitres trois, quatre et cinq sont basés sur différentes techniques de co-intégration sur données de panel permettant d'estimer les relations de long terme décrites ci-dessus. L'économétrie des séries temporelles est utilisée dans le dernier chapitre.

## **Résumé Court**

La structure de la zone euro a évolué dans le temps et ce avant la mise en circulation de la monnaie unique. Depuis le début de la crise, l'hétérogénéité de la zone euro est plus que jamais mise en avant. En effet, les économies de la zone euro convergent et divergent en fonction de la conjoncture. La crise a placé le comportement et le rôle de l'euro au cœur du débat économique. La déconnexion entre l'évolution de son taux de change et celle de ses déterminants ainsi que son impact sur les exportations sont démontrés dans la thèse. Nos résultats suggèrent que même si le taux de change reste un déterminant important des exportations, le rôle de la compétitivité structurelle est de plus en plus important.

Mots clés: Taux de Change, Zone Euro, Séries temporelles, Econométrie des données de panel, ACP

## **General Introduction**

The origins of the European integration date back to the Second World War. The political and economic integration between neighbors separated by long hostilities appears as a base to ensure peace and prosperity that the century of war made impossible for a long time (Guttman and Plihon, 2012).

The integration process is crowned by the introduction of the common European currency. The creation of the Economic and Monetary Union (EMU) is based on an economic justification. The theory of optimum currency areas provides the theoretical framework of reference for thinking on the Economic and Monetary Union.

The theory of optimum currency area (OCA) in its original version is to determine the conditions under which a group of countries or group of regions is encouraged to form a monetary union. The starting point of this approach was given by the pioneering article of (Mundell, 1961), which, with contributions from (McKinnon, 1963) and (Kenen, 1969), is the cornerstone of what we may call the traditional approach of the theory of optimum currency areas. It basically focuses on trade off between microeconomic benefits derived from the use of a single currency reduction of transaction costs and macroeconomic costs arising from the loss of the exchange rate as instrument stabilization. According to the OCA theory, two

countries have an interest in achieving a monetary union if they maintain important trade relations and if they have instruments to compensate the loss of the exchange rate as an adjustment instrument in case of cyclical discrepancy between them.

At the time of the appearance of the euro, Economic and Monetary Union (EMU) did not meet the criteria supposed to regulate, ex-ante, a monetary area perfect factor mobility, labor in particular, fiscal federalism convergence cycles in order to respond to asymmetric shocks, given the single monetary policy and the inability to use the intra-European exchange rate adjustments. The discussion then moved to new approaches.

The Economic and Monetary Union has obviously led to the disappearance of currency crises that had defined the rhythm of the dynamics of European economies since the 1970s. This must be emphasized in the light of the present situation in Greece, but also in other member countries plagued by large current account imbalances or a difficulty to sustain public debt. All have benefited greatly from the shield of the euro area. But the EMU performances differ greatly, depending on whether the real criteria are favored growth, productivity gains, unemployment or considered disappointing and whether monetary targets inflation, long-term interest rates are considered to be satisfied. Furthermore, the assessment of the effects of the euro is not the same when we reason on the scale of the entire Eurozone or when that one integrates heterogeneous member economies the North versus the South, big countries versus small countries, countries with high external opening rate versus less open country (Cartapanis, 2010).

The discussions that were initiated in 2007 about macroeconomic governance in the euro area soon eclipsed for several reasons; triggering and worsening of the financial crisis was one of them. However, in 2010, questions and even controversies about the functioning of the euro

area are legion. The situation in Greece is the question of financial solidarity and fiscal coordination within a currency area not covered by a State, but which falls under a federal unfinished construction. The questioning of wage moderation implemented by Germany covers the issue of macroeconomic adjustment in the euro area in the presence of asymmetric shocks. The difficulties in building a stronger European prudential architecture to respond to the symmetric crisis risk are explained by political obstacles, but also by the heterogeneity of financial systems in the EMU.

Finally, the debates concerning the costs of a strong euro, even if they seem less heated since the stabilization of the euro vis-à-vis the dollar, illustrate the ambiguities of the Maastricht Treaty in terms of currency policy as regards the objectives or the distribution of powers between an independent European Central Bank (ECB) and disunited governments.

Since the crisis, controversies multiply about macroeconomic management of the Eurozone. The Euro area did not succeed in getting out of the turmoil. The recovery remains to be confirmed after disappointing growth figures in several major countries, including a decline in activity in Germany and Italy. Significant efforts between 2010 and 2013 continue to weigh on activity while new risks appear weighing on growth prospects geopolitical tensions related to the situation in Ukraine in particular. By the end of the year, the recent deterioration of the economic trends surveys raises fears over a continuous weakness of the activity with a decline in inflation to particularly low levels. This situation and the very high level of unemployment raise the question of the proper calibration of the policy mix in the euro area (Trésor Public, 2014).

If this decline in inflation is partly due to changes in energy prices, the fact remains that underlying inflation slipped to below 1%. Under these conditions, a reversal of inflation expectations cannot be excluded, which would inevitably push the Eurozone into deflation. The ECB is concerned about this situation and pretends to be ready to act. However, no concrete clue as to how to ease monetary policy and avoid the anchoring of expectations of deflationary path has been defined (Antonin and Blot, 2014).

Growth will continue to be sluggish for a certain period and will especially be very uneven across countries. Unemployment in the euro area remains at a historically high level and risks to become structural and to damage the economic and social fabric. The growing weariness proven in front of the new austerity measures and, to a lesser extent, structural reforms could seriously compromise the results to come in terms of growth. In addition, the results of employment in Europe are uneven and the gap between the best and worst countries performances is very marked.

The southern countries of the Euro area that have been mostly hit by the crisis in the last five years have undertaken several measures to deal with structural and cyclical problems. The measures taken to improve competitiveness and address the debt and external imbalances accumulated before the crisis cannot lead to the desired goal by national and European authorities without continuing sustainable ways to mitigate internal imbalances in the area and to strengthen the recovery in the entire region. In particular, there should be room for further reforms that increase competitiveness in some countries in the heart of the Euro area where the momentum for reform has not been as strong as in the south after the crisis (OECD, 2014).

The pace of structural reform has accelerated in the most severely affected countries by the crisis, notably Greece, Ireland, Portugal and Spain. The focus was mainly on labor markets and some commodity markets. These reforms were intended to reduce the gap between the unit labor costs in many Eurozone countries compared to Germany and other northern

countries of the area since the entry into force of the Euro. Much progress was made in 2013 in terms of the necessary rebalancing of the current account. All the countries of the South are now close to balance. However, the dispersion of unit labor costs between deficit and surplus countries is even more important than before in the monetary union and the price adjustment was lower than that of wages in part due to the slow pace of reforms on product markets. In some countries, the fall in unit labor costs must be more broadly reflected into adjustments to the export prices to improve external competitiveness. An asymmetric correction of the current account is observed, but the overall current account surplus of the Euro area increased to 2.5% of GDP. The current account imbalances were reduced in the euro area, including in several deficit countries thanks to the sharp decline in domestic demand on imports and increased competitiveness boosted by exports in some countries. This rebalancing has been significant in Spain, Greece and Portugal which went from a deficit of nearly 10% or more just before the crisis to a small surplus. In these countries, the unit costs workforce declined sharply.

Productivity levels vary considerably in the euro area. The pace at which countries with lower productivity continue to catch is uneven and the OECD forecasts suggest that even in the longer run, no low-productivity country could catch up without important reforms. Such a catching process is extremely necessary if we also consider the increasing competitive pressures in emerging countries. The shares of these countries in export markets have grown very rapidly in recent years due to low unit labor costs and strong trade links with other high-growth countries.

These observations suggest several questions about the role played by the euro in the growing heterogeneity explanation between countries in the Eurozone as well as the role played by the common currency in the determination of the performances of the countries in the zone.

To answer these questions, 6 chapters were developed and organized in 3 parts.

The first part (chapters 1 and 2) is dedicated to an inventory of the evolution of the project, of the theory and of the institutions of the euro area. The second part (chapters 3 and 4) is devoted to the determinants of the real effective exchange rate of the Euro. Finally, the third part (chapters 4 and 5) is dedicated to the study of the determinants of exports from the Eurozone. Each part is divided into two chapters.

In the first chapter, we perform a brief introduction to the history of the establishment of the economic and monetary zone and a literature review of the traditional theory of optimum currency area (OCA), its limits and its extensions as well as the endogenous OCA (E-OCA) theory. A development around the Euro, its exchange rate policy and the institutions that manage it is also established.

The second chapter highlights the heterogeneity of the Eurozone and its evolution in time and puts into question the relevance of the endogenous OCA theory. This theory which we owe to Frankel and Rose (1998) incorporates the dynamic effects of currency areas. Frankel and Rose show that monetary union properties change over time. Intra-zone trade and the degree of openness of each country - including vis-à-vis the rest of the area - increase once the currency area is in place due to the disappearance of the exchange rate risk and lower transaction costs and information costs.

The third chapter "The transfer effect: A comparative perspective between the European Monetary Union regime and fixed and floating regimes" published in *International Economics* states that the exchange rate regime in itself is an important determinant of the real effective exchange rate. Based on co-integration techniques on panel data, our results show that for the Euro area countries, an accumulation of net foreign assets leads to a depreciation

of the their real effective exchange rate. Based on this result, we concluded that the exchange rate of the single European currency behaves in a way that does not reflect the fundamentals of all countries of the region. This result indicates that the evolution of the Euro exchange rate primarily reflects the situation of the most powerful and most virtuous countries. Furthermore, in this article we consider that the regime change took place since 1994. The results supported this consideration.

This chapter is supplemented by the following one, submitted to the Economic Review " The BEER Approach: What Role for the Exchange Rate Regime? "The BEER approach is based on the estimation of a long-term relationship between the real effective exchange rate and a set of fundamental determinants, such as net foreign assets, the terms of trade and productivity differentials to determine its equilibrium level.

In this chapter, we study the behavioral equilibrium exchange rate BEER taking into account the change of regime that took place in the Eurozone. This paper confirms that the choice of exchange rate regime is not without consequences for the economy of a country and influences the behavior of the exchange rate. Thus, the BEER approach must retain the exchange rate regime as a fundamental variable that can influence the calculation of equilibrium exchange rates and currency misalignments. The BEER approach presents a weakness concerning the non consideration of structural changes touching different economies.

The fifth chapter highlights an important component, price and non-price competitiveness of countries in the Euro area. The continued appreciation of the Euro against the dollar and the differences in the evolution of the real effective exchange rate between countries put the single currency at the center of the debate. The article shows that the structure of

competitiveness has evolved in the sense that price competitiveness is no longer separate from the non-price competitiveness.

The sixth chapter published in *International Economic Journal* seeks to isolate the single currency effect on global trade of the Euro area countries and on intra-euro area trade. In this article, we studied the impact of the real exchange rate on exports of four countries, namely France, Germany, Italy and Spain in a double comparative perspective: first, the comparison between the four countries in the Euro area where the economic developments differ considerably; then, the comparison between the two measures of the real effective exchange rate. The analysis shows that the impact of the real effective exchange rate on intra-Euro area exports is much more important than the impact of the real effective exchange rate on total exports particularly given the homogenization of goods produced in the euro area, which explains the need for differentiation by price.

# Part I

This first part aims to highlight the limits of European integration. The regional integration process in Europe is the most successful experience, particularly in the monetary field with the birth of the economic and monetary union EMU in 1999.

But at the time of the appearance of the euro, EMU did not meet the supposed governing criteria, ex-ante, in a monetary union as the perfect mobility of labor factors in particular, fiscal federalism or the convergence of cycles in order to respond to asymmetric shocks, given the single monetary policy and the inability to use the intra-Eurozone exchange rate adjustments.

Given the concerns expressed by advocates of the strict fulfillment of the *ex-ante* criteria of belonging to an optimum currency area, (Frankel and Rose 1997, 1998) have focused on the feedback effects that the belonging to the euro area could have on the characteristics of each country member, facilitating ex-post the macroeconomic functioning in the area: the endogenous optimality of the euro area. The development of intra-European trade and financial integration due to monetary integration should lead to an increased synchronization of cycles and to smoothing consumption levels by strengthening the intra-European allocation of savings.

The lessons drawn from the European experience is mitigated. Indeed, EMU has provided exchange rates stability, but also large current account imbalances in many countries or a public debt difficult to sustain specially in southern countries. But the judgment of the EMU performance as well as the judgment of the effects of the Euro depend on the reasoning level: aggregate level or country by country the North against the South, large countries against smaller countries, countries with an external open rate high by less open country. If the Euro area is not an optimal currency area, it is because it does not meet the OCA criteria. But it is also because the heterogeneity of the euro area has not decreased or even worsened in some respects, for ten years

The first and second chapters come back to these issues.

## Chapter I: The Eurozone: From Theory to Evidence

#### Abstract

This chapter reviews recent analyses that enroll in the approach of the optimum currency areas. We initially recall the historical background preceding the emergence of the Euro. Subsequently, the traditional criteria are presented followed by the presentation of an alternative approach of the optimality, namely the endogeneity of the optimum currency area criteria. The chapter sets out recent theory development. The rest of this chapter brings out the institutional frameworks of the Eurozone.

**JEL Classification:** F15, F36, F33, F42, E42

Keywords: OCA Theory, E-OCA theory, euro area, Recent Modelling, European Integration
# 1 Introduction

"The Community [The European Community's mission] shall have as its task, by establishing a common market and an economic and monetary union and by implementing the common policies or activities referred to in Articles 3 and 3a, to promote throughout the Community a harmonious and balanced development of economic activities, sustainable and noninflationary growth respecting the environment, a high degree of convergence of economic performance, a high level of employment and of social protection, the raising of the standard of living and quality of life, and economic and social cohesion and solidarity among Member states" Article 2 of the Treaty of Maastricht.

The theory of currency areas is dominated by the theory of optimum currency areas inherited from Mundell (1961). This approach considers that countries can dispense with a floating exchange rate in the case that whether economic, cultural, social and institutional characteristics are met. These features are the optimality criteria. The main criteria recognized by this theory are labor mobility, trade openness and the existence of a structure of redistribution between countries.

The project of the economic and monetary union which, since its implementation, constitutes a theoretical and practical challenge presents indeed some dangers. The theory of optimum currency areas discussed the existence of shocks that would hit some countries and spare others ones. This theory raised therefore the issue of the appropriate response that would be unique but applicable to countries in different situations.

Aware of these difficulties, the euro area members have tried to bring their economies closer thanks to convergence criteria. However, besides the fact that these criteria were related to nominal variables, they did not bring real solutions to possible divergent responses due to symmetric shocks. However, the unique monetary policy would require, in the ideal case, that real variables respond identically to changes in monetary instruments.

The purpose of this chapter is to present the different axes, namely the theory of optimum currency area, the steps before the establishment of the euro area and the various institutions, mechanisms and policies that govern it. It is organized as follows: In the first section are presented historical developments, theoretical foundations and the institutions of the euro area. The second section is devoted to the theoretical and empirical reappraisal issue of the optimality of the Eurozone. The exchange rate is treated in the third one. The monetary institutions of the Euro area are presented in the fourth section and a final section concludes.

# 2 Eurozone: Historical Evolution, Theoretical Foundations and Institutions

The euro is the result of the evolution of European integrations started since the end of Second World War. The Euro area is the experience of the most successful regional monetary integration. Since the introduction of the euro, particularly in the wake of the sovereign debt crisis, one question remains: Is European construction completed? The lack of common political institutions appears to affect the proper functioning of both the market and the single currency.

This introductory work aims to present, in a brief manner as simply as possible, the elements of the construction of the Euro area that are likely to inform our analysis.

The central theme of this thesis is the exchange rate of the Eurozone, a significant portion of it is devoted to the study of institutions and mechanisms for the exchange rate policy in the European currency area.

# 2.1 The Economic History of European Construction:

The process of European integration was launched in 1950 by the Schuman Plan. The same plan has resulted in the creation of the European Coal and Steel Community (ECSC) in 1951. The European Economic Community (EEC) is established after the signing of the Treaty of Rome, March 25, 1957<sup>1</sup>. In the preamble of the Treaty of Rome, the signatories announce the

<sup>&</sup>lt;sup>1</sup> Two treaties were signed in Rome March 25, 1957, the one establishing the European Atomic Energy Community Euratom and the one establishing the European Community.

foundations of a European union based on a common market, common objectives and common institutions. From 1 January 1958 began the establishment of a customs union the first reduction of 10% between member countries was established on 1 January 1958.

In addition to the common market first system, the United Kingdom proposes the establishment of a free trade area, which implies the need of coexistence for the institutions of free trade area and the joint market, although based on separate principles<sup>2</sup>. The two systems are different: the EEC will establish a common external tariff, while members of the free trade zone will maintain separate external tariffs, which implies that the first system will establish a customs union with common policies, while the second system will be limited to a customs union. By the 1970s, the objective of price stability and exchange is adopted by the Heads of State and European governments. In 1999, the process culminated in the birth of the euro.

## 2.1.1 The Steps of the Establishment of the European Common Market

Three stages are planned for the transitional period of twelve years, which began on January 1, 1958 and was scheduled to end on December 31<sup>st</sup>, 1969, but it ended 18 months earlier, on 1 July 1968.

## 2.1.1.1 The Transitional Period

The first year was devoted to the establishment of the institutions of the EEC. The beginning of the first phase coincides with the end of the transitional period of the common market in coal and steel. The first task was to determine the level of future common external tariff, i.e.

<sup>&</sup>lt;sup>2</sup> The Stockholm Convention in July 1959, 7 countries UK, Sweden, Norway, Denmark, Austria, Switzerland and Portugal decided to create the European Free Trade Association EFTA. The members agree to phase out tariffs among its members on industrial products only.

the arithmetic mean of human giftedness into force on 1 January 1957 in the four customs territories of the community: Germany, France, Italy and Benelux. After this first step, tariffs on industrial products were reduced by 40% and those on agricultural products by 30%. In 1960, tariffs were reduced within the Community for a third part of 10%.

Starting from 1962, the realization of a common market insuring the free movement of goods, services, capital and people and governed by common policies can no longer be contested. The European parliament voted in favor of moving to the second stage, and highlighted that the Cabinet must decide at the same time the launching of the common agricultural policy.

The agreements established are returned to the agenda, the transition to the second stage was an opportunity to request revisions and adjustments. The tricky negotiations preceding the second phase and the continued implementation of the common market had generated some conflicts and compromises. Nevertheless, during this phase the process of European integration was crowned by some progress.

Upon adoption of the transition to the second stage by the council of ministers of the EEC, July 1<sup>st</sup>, 1962, domestic tariffs were lowered by 50% and the common agricultural policy was implemented. This was the beginning of a small monetary cooperation between the central banks of the Community. The Werner report in 1970 established a timeline for the achievement of economic and monetary union.

## 2.1.1.2 Monetary Concerns

In the early 1970s the question of the common monetary policy had arisen. In the same year, the agreement between central banks on short-term monetary support has been signed.

With the modification of the parity between the French Franc and the German Mark, the first compensatory amounts appeared in 1969, according to an almost normal process. The devaluation of the Franc on August 10, 1969 should have resulted in an increase in support prices. The will to fight against inflation led for a time to maintain the level previously reached by the support prices in French Francs.

This would have been intolerable for French farmers' trading partners, which would have led French products to arrive with a bonus on exports: The principle of the unique market that wanted to establish a compensatory amount taxing French exports and subsidizing imports. At the moment of the revaluation of the German Mark on 26 October 1969, the German authorities capitalized on a bad precedent: they have abandoned the idea to increase prices expressed in Marks, and of course, they have subsidized German exports and taxed imported goods.

These early monetary compensatory amounts were removed in several stages because it was argued that if the franc was devalued, the production costs of French farmers should increase faster than those of their partners.

The currency unrest that began in 1971 was at the origin of new changes parities, the floating of certain currencies, the floating of some other free currencies and the sustainability of the system of Monetary Compensatory Amounts (MCM). A new distinction emerged between fixed MCM for countries respecting joint float rules nicknamed "snake" on the one hand and variable MCM in countries having freely floating currencies.

The international situation has also had its impact. Following the suspension of formal convertibility of the US dollar into gold in August 1971, the Washington Agreement in December of the same year ratified the devaluation of the dollar; more importantly, they

widened to  $\pm 2.25\%$  the margins fluctuation of the exchange rate, making the situation intolerable: indeed, the maximum instantaneous deviation between two European currencies was 4.5% and 9% between the decision to award a contract and its realization.

Facing a new global economic environment where the Bretton Woods system collapsed and the fixed exchange rate regime is finally abandoned, the common market countries tried to hedge against currency volatility by setting up the serpent in 1972 and the European Monetary System (EMS) in 1979.

In 1972 the countries of the community decided that, the exchange rates between countries should not deviate by more than 2.25%, thus was born the European currency snake. The dogma of the fixed exchange rate had been seriously shaken in 1971; the convulsions of early 1973 put an end, ushering in a period of generalized floating.

Certainly, the rule of limited fluctuation of exchange rate was maintained for European currencies, but over the years the European Monetary Snake has made emerging strong currencies namely, the Mark, the Guilder, the Belgian franc and Danish crown.

The EMS, officially launched on 13 March 1979 was intended to strengthen ties in the field of monetary policy between the countries of the Community in order to achieve a zone of monetary stability in Europe. It aims to ensure the stability of exchange rates between 9 EEC partners, without Britain who decided to go alone. This purpose necessitates the use of credit mechanisms and interventions consisting primarily of the European currency unit (ECU), the exchange rate mechanism and various credit devices.

The European currency unit serves as a reference to the system. It is not a currency but a weighted average of European currencies. The weight of the Deutsche Mark 33% will be decisive in the ECU; with 20% of the Franc occupies the second place. In the exchange rate

mechanism, each currency will have a central rate against the ECU. These central rates are used to determine a grid of bilateral central rates around which are fixed margin of 2.25% temporarily widened to 6% by Italy. These margins define a snake new formula that, like its predecessor, allows a maximum fluctuation margin of 2.25%.

In reality, the movements on currencies are not spontaneous: to depress the value of a currency that tends to appreciate and to prevent a weak currency to fall, interventions are needed. The new European monetary system has provided innovative solutions.

As in the previous serpent, the intervention in the currencies of the participating countries is required when the fluctuation margins are reached. But also and this is the originality of the system, a divergence threshold is fixed for each currency at 75% of the maximum deviation of divergence. The crossing of this threshold would have led to, in the concerned country, the adoption of corrective measures or at least the opening of an explanation procedure.

Four types of measures are planned: diversified interventions mainly purchases and sales of foreign currency to prevent the increases as well as the decreases of currencies, domestic monetary policy measures, changes in central rates devaluations or revaluations in the system: this ultimate weapon would sanction the appreciation or the depreciation of a currency, and finally the economic policy measures (Bentolila and Theveny, 1979).

The European exchange rate mechanism (ERM) of the European monetary system was the most important anchor system. The objective of members of this system was the adjustment of parities before the imbalances are widening further. The system has subsequently been exposed to large asymmetric shocks induced by the reunification of Germany, and has become more vulnerable due to the increased mobility of capital and the strengthening of parities after the negotiation in 1991 of Maastricht Treaty on economic and monetary union.

The process of monetary integration goes along with the single currency and the single market. According to Emerson report of the European Commission, the single currency is required to operate the largest European market established by the single act.

The Single Act, ratified in 1986, is a fundamental pillar in the European construction, as it organizes the creation, into the European economic area, of a single market for goods and services, labor force and capital from 1992. With this act, Europe is registered in the neoliberal globalization process. While the single act devotes market dominance in the functioning of the European economy, the Maastricht Treaty introduced meanwhile the primacy of monetary policy in economic policy in the euro area (Plihon, 2002). The ERM has been subject to strong tensions in 1992-1993, and to speculative pressures.

These tensions were first caused an unprecedented amendment of the ERM statute: expanding bilateral fluctuation margins for most of its members, suspension of the participation of the Italian lira until 24 November 1996 and output the British pound, realignments of the Peseta, of the Escudo and the Irish pound.

The violence of speculative attacks, the inability of monetary authorities to agree on both the diagnosis and on the cure to prescribe illustrates the fragility of monetary integration process between heterogeneous countries, without common policies.

Relative calm is then installed during the years preceding the introduction of the euro and the formation of the European economic and monetary union in 1999, a process that has abolished the risk of currency crisis in Europe and justified the efforts to achieve the goal of the convergence. Despite these tensions in 1992- 1993 it was in this period that the entry into force of the Treaty on European Union and the completion of the single market took place.

The second stage of Economic and Monetary Union, with the creation of the European monetary institute EMI comes into force in 1994.

The legal status of the euro is adopted and agreements on the new exchange rate European mechanism as well as the Stability and Growth Pact are signed in 1996. A year later the report on the regulatory framework, organizational and logistical of the single monetary policy appeared. The same year, in the Board of Amsterdam, resolution on the European exchange rate mechanism II is definitely adopted as much as the regulatory device on the pact for stability and growth and regulation containing the most urgent provisions about the legal status of the euro.

A year before the implementation of the monetary union, the reports of the EMI and the Commission on convergence is published.

Countries wishing to adopt the euro as their currency must achieve a high level of "sustainable convergence". This degree of convergence is assessed on the basis of several criteria defined by the Maastricht Treaty, according to which a country must have: a high degree of price stability, sound public finances, and a stable exchange rate of the rates long-term interest low and stable.

The criteria are defined so that only those countries following the economic policies oriented towards stability and having achieved good results in the area of price stability be permitted to participate in the third stage of EMU.

However, the effectiveness of the criteria is limited, because the nominal convergence is only a weak form of structural convergence and there is no positive causality between these two forms of convergence (Tavera, 1999). The criteria for entry into the EMU have been developed at the expense of real convergence: the unemployment rate, growth, productivity or wages. The crisis of 2007-2008 showed that optimal monetary policy for all the countries of the euro area passes through real convergence.

On 31 December 1998, the conversion rate of different currencies of European countries that joined the EMU against the euro is definitely fixed.

# 2.2 The Economic and Monetary Union

The Maastricht Treaty on European union signed in 1992 and entered into force in 1993 completes the process of monetary integration by creating the single currency. The process of monetary union was launched in 1998. The list of 11 states fulfilling the EMU membership conditions was arrested and preparations for the establishment of the European central bank have been launched.

The introduction of the single currency was carried out in two stages: in 1999 for financial operators and in 2002 for non-financial operators. The euro was born on the first day of 1999. Since this date the European currency became a full currency which replaces the national currencies.

To facilitate the implementation of the single monetary policy and to establish safe and effective devices to perform in all circumstances the settlement cross-border payments, the ECB and the EMI decided in 1995 creating the Trans-European Automated Real-time Gross settlement Express Transfer TARGET. Since 1999, the European euro money market had to be able to rely on a payment system designed to perform high amounts of regulations quickly and safely throughout the European Union.

In the TARGET system, only certain common functions will be assumed by the ECB. Except for the very limited number of transactions arising from corporate activities of the ECB, payments will be carried out through TARGET, will be the subject of a treatment and a payment in national gross settlement systems and then the subject of an exchange between national central banks. This decentralized solution allows reconciling the need for central banks to set up a system for the implementation of the single monetary policy, with that of preserving national systems adapted to the specificities of each European Union member. This solution is consistent with a decentralized implementation of the single monetary policy (Lachand, 1995).

In 1999, the Euro capital market was opened and the public debt of the eleven member states has been therefore expressed in Euro since this date. The economic and monetary union construction is achieved in 2002.

The Euro, the single currency of the European Monetary Union EMU, is considered by its proponents, wrongly as the facts will show, as the final step in the integration process. Because of the economic heterogeneity of national economies, the Euro will be a single currency for multiple economic structures and will face asymmetric shocks<sup>3</sup>.

In fact, the euro area is distinguished from other monetary unions by the lack of successful rebalancing mechanisms at the community level. Beyond fiscal transfers, alternative adjustment variables include the mobility of labor or the wage rate.

The potential risk posed by this heterogeneity would be overkill for some. In reality, the market integration would contribute to the synchronization of business cycles and would reduce the risk that a country experiences a highly specific shock (Frankel and Rose, 1998).

<sup>&</sup>lt;sup>3</sup> Asymmetric shock means a macroeconomic shock that affects only part of a larger economic zone. In the case of the Euro area, it could be a demand or a supply shock that affects one country in the zone. Symmetric shocks rather denote disturbances affecting the entire economic zone.

The report of the Delors Committee published in 1989, as well as the Emerson report appeared a year later, justifies the monetary union creation by generated microeconomic gains. On the macroeconomic front, the Mundell's works are the reference. The theoretical framework of the EMU is the optimum currency area OCA theory.

# 3 The euro area: Theoretical Foundations

The theory of optimum currency areas has evolved both at theoretical and empirical levels. Indeed, the crises that marked the convergence process which led to EMU in Europe have rubbed off on the evolution of the theoretical foundations of the OCA. Moreover, it is widely accepted that in 1999 the Eurozone was not an optimum currency area, but the crisis of 2007-2008 has questioned this theory more than ever.

# 3.1 The Theory of Optimum Currency Area

Robert Mundell laid the theoretical foundations of the European Monetary Union. His theory of optimum currency areas would be used since the 1960s as an analysis framework for many debates over the merits of creating a European currency. The optimum currency areas theory outlined by Mundell is going to be a strong supporter of the euro.

Mundell develops a cost-benefit analysis of the monetary union. The benefits of adopting a common currency reside in reducing various transaction costs caused by the existence of different currencies and currency liquidity gains due mainly to the expansion of its transactions area.

The elimination of the exchange rate between the different components of the union is the main cost linked to the common currency. It is no longer possible to let the exchange rate absorb the shocks that would hit in asymmetrical ways one or many countries of a monetary union.

An extensive literature emerged around this theory. In this section we present briefly the most common OCA criteria taken back by the economic literature. The review of the developed criteria by the OCA theory such as the mobility of factors of production and the degree of flexibility of wage and price, measures the adjustment costs entailed in giving the exchange rate instrument.

#### 3.1.1 The Traditional Criteria for Optimal currency Areas

Mundell 1961 defines the optimum currency area as an area in which the optimal adjustement is realized with fixed exchange rate. The theory of optimum currency area has gradually been enriched with new criteria. To the labor mobility highlighted by Mundell (1961) in a pioneering article, McKinnon (1963) adds the degree of openness, Kenen (1969), the degree of diversification, Johnson (1970), the fiscal integration, Ingram (1969), the financial dimension, Cooper (1977) and Kindleberger (1986), the homogeneity of preferences.

These criteria have been expanded and challenged by several more recent studies.

#### 3.1.1.1 Labour Mobility

The labor mobility is a mechanism that restores an initial equilibrium disturbed by a shock. The labor factor movements eliminate the need for declining wages in a given country or region, thus eliminating the use of the devaluation of the exchange rate. Worker mobility was one of the strategic priorities in the context of the Lisbon agenda 2000. Ten years later, the failure is obvious.

As stated above, Mundell (1961) describes an optimum currency area as an economic entity in which the factors of production are mobile. The movement of labor force from the depressed region to the prosperous region would balance the two labor markets. The balances of trade balances would be also adjusted.

Labor mobility thus protects the fixed exchange rate regime between countries' currencies and allows monetary union. When production factors are not sufficiently mobile, the adjustment must be done otherwise. In this case, the adjustment could be ensured by the relative prices. If wages are rigid, the alternative is the depreciation of the currency of the "depressed" countries. In the Eurozone case, because of the impossibility of using exchange rate, the adjustment involves the decline in production and underemployment.

In other words, in the absence of labor mobility, the countries forming the EMU do not constitute an optimal currency area because the adjustment implies either the exchange rate change or the change of the level of activity and employment. This then is the alternative between depreciation and deflation. In the case of asymmetric shocks, if the work is not sufficiently mobile and the exchange rate is fixed, recession of a country can be transmitted to another since the adjustment by the exchange is abolished.

Furthermore, labor mobility within the Euro area, weakened by the abundance of languages in Europe and the persistence of national specificities of organization and production, was not sufficient to make from the Eurozone an OCA. Moreover the political goodwill has failed to realize this (Bilger, 1996).

# 3.1.1.2 The Degree of Openness

McKinnon (1963) complements this analysis by adding the degree of openness of the economy as a criterion of optimality. He argues that the effectiveness of the exchange rate in pursuing the dual objective of external equilibrium and of price stability is all the more important that the economy is closed to the rest of the world. The degree of openness is measured by the ratio between the tradable and non-tradable goods by McKinnon.

The more an economy produces tradable goods, the more it will be open to the outside and the more the domestic prices will be sensitive to exchange rate fluctuations. currency fluctuations are transmitted rapidly to domestic prices: the fall in real income becomes apparent, and economic agents require revising their nominal incomes. In an open economy, stabilization policies simultaneously affect the tradable and non-tradable. Since the prices of tradable goods are, by nature, determined on the international market, a policy against inflation weighs heavily on the demand for non-tradable goods. In an open economy, a fixed exchange rate is therefore a domestic price stability condition and a strong currency becomes a competitive factor. On the contrary, in a little open economy, where the production of non-tradable goods predominates, changes in the exchange rates are inefficient and have little effect on the price level. The degree of openness of the economy thus affects the effectiveness of stabilization policies.

# 3.1.1.3 The Degree of Diversification

Kenen (1969) adds the degree of diversification of production as an additional optimality criterion. If the demand for a product declines, the consequences of a choc on employment of a diversified economy are much less extensive than the consequences of a choc on employment in a less diversified economy.

Thus, the diversified economies can more easily maintain fixed exchange rates, and become part of a currency area, than those that are not, given that diversification will have as effect to effectively offset the possible international labor immobility through inter-sectoral mobility. It is also pointed out that a strong diversification of production of the member countries of a monetary zone reinforces the symmetry of shocks in a monetary union. A strong diversification of outputs of the member countries is likely to increase the symmetry of shocks in a monetary union (Kenen, 1969), (Emerson report, 1990) and (De Grauwe, 1992).

This is explained by the following mechanism: economic integration and the single currency entail a change in industrial structures in the sense of the strengthening of intra-industry trade and cross investments, which means that most countries will export and import products from various industrial sectors. The classical comparative advantage which requires that countries specialize in certain products will lose its importance. Therefore, specific shocks to some sectors will not necessarily have an impact on any particular countries (Fontagné, 1999).

The importance of the criterion of diversification is recognized widely enough in theory (Masson and Taylor, 1992), (Bayoumi and Eichengreen, 1993), (Brociner and Levin, 1992), (De Grauwe, 1992), (Mélitz 1995).

# 3.1.1.4 The Financial and Fiscal Integration

Ingram (1969) adds the financial dimension. In the optimum currency area, compensating transfers rebalance the internal balance of payments if capital mobility is as such that financial deficits in some countries can be met by surpluses in other countries of the currency area. The OCA is also an integrated financial area. The more the OCA is integrated, the easier will be the deficits funding, without strong pressure on the exchange or interest rates.

Financial integration of the countries of the monetary union is greatly enhanced. This process of financial integration in the EMU countries was instead homogeneous. In addition, the geo(Graphical origin of foreign investment in the EMU countries on the equity and bond markets reveals that the share of residents of the euro area among all international investors has reached 47.8% in 2008. This suggests that the common currency - particularly by removing the exchange risk - has been a financial integration. From this particular point of view, the euro is a success.

This process is not irreversible. Indeed, the risk of sovereign default, once perceived by residents and non-residents investors, could lead to an increase in the savings retention coefficient which would have a negative impact on growth. Moreover, a decline in the financial integration of EMU countries would make the constraint of balance of payments much more demanding (Bienvenu et al., 2011).

Johnson (1970) proposes tax integration as a new criterion to define an optimal currency area. This integration assumes that there are fiscal transfers between countries that form the currency area through automatic stabilization mechanisms of imbalances between countries. This approach is based on the political integration and on provisions to risk sharing between member states of the monetary union. Kenen (1969) has also developed the idea that fiscal integration should be selected as a criterion for judging the optimality of participating in a currency area. The more tax integration between two regions or countries is pushed, the more the two areas have the potential to smooth asymmetric shocks, through fiscal transfers from low unemployment region towards high unemployment region.

More generally, we may speak of the degree of integration of economic policies. Ingram, (1969), Harberler (1970) and Tower and Willett (1970) argue that this is not the economic characteristics that are important for the formation of a currency area but rather the compatibility between the members countries in situations requiring the control of economic fundamentals inflation, unemployment in this respect a monetary union is optimal when it includes countries that have similar propensities to inflation (Magnifico, 1972).

## 3.1.1.5 The Homogeneity of Preferences

If the Member states of an integrated zone have extensive exchanges and if they have identical preferences or close not only for the goods and services they exchange but also for the public goods themselves, they meet the conditions to constitute an optimal currency area (Kindleberger, 1986). The countries of the euro area are expected to be convergent particularly with regard to internal stability objective fight against inflation.

The candidates for monetary union must share the same key objectives. It is essential in particular that they seek the convergence of the internal stability, and they should accept the same trade-off between unemployment and inflation. The sufficient condition of the union is depending on the agreement on some great preferences; those conditions are the mobility of factors or open economies (Bourguinat, 1999).

The homogeneity of the preferences<sup>31</sup> of candidates for European Monetary Union countries was documented and formalized by the signing of the Maastricht Treaty. The qualification procedure, especially the imposition of convergence criteria and the entry into force of the Stability and Growth Pact, have established a relentless periodic verification of convergence. Convergence was more difficult to obtain for the countries whose preferences were different. Greece, for example, was unable to integrate the euro area before 2001, in that year its government succeeded to share the preference for monetary stability to its population , which allowed the fulfillment of the convergence criteria, inflation, public deficit reduction public debt, convergence of interest rates. The verification of this convergence over the following years will be discussed in the next chapter.

According to the proponents of this theory, the increase of the monetary union is based on the convergence of preferences. The optimality and the viability of this construction are, in turn,

conditioned by objective data: factor mobility, the degree of openness and in particular the interdependence of economies.

This brief review highlights a number of criteria to be met by a monetary union. These considerations have dominated the scientific debate on European Monetary Union. But beyond the debates, considering the facts especially since 2008, it is clear that the countries of the euro area do not constitute an optimal currency area because they only partially meet the above criteria.

# 3.2 The Endogenous Optimality of the Euro Area:

Frankel believes that the monetary unification of several countries improves both the trade openness of these countries integration, by stimulating their trade, and the correlation of their business cycles symmetry by lowering transaction costs and transportation between them.

The approach called endogeneity of criteria of OCA (Frankel and Rose, 1998), (Frankel, 1999), (Rose, 2000) leads to a change in the nature and role of optimality criteria and represents a radical change of analysis of OCA (Cesarano, 2006).

Two fundamental criteria of traditional OCA theory were distinguished for the evaluation of the net benefits associated with monetary unions: the intensity of bilateral trade between partner countries and the level of symmetry of the cycles. A group of countries characterized by a pronounced trade integration and / or a strong correlation cycles would rather have interest in establishing a single currency despite the costs associated with the loss of monetary autonomy (Frankel and Rose, 1998).

The intuition behind the endogeneity of optimality criteria is that monetary integration would reduce transaction costs even beyond simple savings from the elimination of exchange rate volatility. A common currency would be perceived by economic actors as an act safe, durable and highly stable commitment because it would exclude any possibility of competitive devaluation in the future. It will generate an increase in foreign direct investment, an intensification of intra-regional trade, strengthening the economic and financial integration, and finally improve the asymmetry of business cycles.

The main criticism of this theory concerns the link between monetary union and increasing of the correlation between incomes of countries (Krugman, 1993), (Krugman and Venables, 1996), (Milewski, 2004). This "alternative" theory of optimality of currency areas has been criticized both theoretically and empirically (Persson, 2001), (Rose and Wincoop, 2001), (Nitsch, 2002), (Glick and Rose, 2002), (Kelejian et al., 2011). In the second chapter of this thesis, the work developed joined this perspective and draws critics to this theory.

The basic idea is that the decrease of transactions costs and transport costs between the monetary union countries increases the exports field of each country and promotes the specialization of economies and hence the decrease in their diversification.

For Dellas and Tavlas (2009) however, economic diversification is an ambiguous argument which can work in both ways: less diverse countries, can't adjust easily to exogenous changes in exchange rates. This review is therefore insufficient to invalidate the theory.

This endogenous approach to the theory of optimal monetary zones introduces a dynamic component to the theory. This analysis has important policy implications: monetary union is no longer a goal, which is reached after meeting the criteria, but a means in itself to reach optimality.

In the case of the euro area, the idea is that while the eurozone was not an optimal currency area before 1999, it could do so by becoming a single currency area.

# 3.3 The Optimality of the Eurozone: between Validation and Theoretical and Empirical Questioning

The notion of the optimality of the euro area has evolved in theory, even before being confronted with reality. The theory of optimum currency areas seems to be disconnected from the European monetary reality. This disconnection comes from Mundell himself. Between the pioneering article (1961) and the beginning of the great European monetary concerns in the seventies, Mundell has abandoned the original vision of optimum currency areas because of the monetary system woes of the time. In the work that followed, Mundell (1973a, 1973b) argues fixed exchange regime; the defense of the European therefore becomes increasingly Policy (Laurentjoye, 2014).

The contributions of Mundell (1961), McKinnon (1963) and Kenen (1969) form the basic trilogy of the optimal currency area theory for many authors (Bilger, 1996), (Bayoumi and Eichengreen, 1997), (Krugman, 2012). This paradigm provides three basic criteria for assessing the optimum currency area that are labour and capital mobility, trade openness and the existence of redistribution system between the monetary zone component regions.

We can summarize the characteristics identified by Mundell, McKinnon and Kenen as relevant to assess the optimality of the union between two countries (Mongelli, 2002), (Milewski, 2004), (Dellas and Tavlas, 2009) in 8 points: 1) the degree of labor mobility, 2) the flexibility of prices and wages, 3) the probability of occurrence of asymmetric shocks, 4) the degree of openness and trade integration, 5) the size of an economy, 6) the similarities in production structures, 7) the degree of diversification of production , and 8) the level of tax consolidation.

These criteria, however, are not entirely consistent (Tavlas, 1994), (Dellas and Tavlas, 2009) even contradictory. Several paradoxes inherent to the traditional criteria of the currency area theory have been identified. Indeed the criteria developed by Mundell (1961), McKinnon (1963) and Kenen (1969) contradict each other (Tavlas 1994).

First, a small open economy should be interested in fixing its exchange rate under the criteria set out by McKinnon. However, this economy can be with a very low degree of labor mobility with its trading partners, which on the contrary tend to advocate a flexible exchange rate regime criterion of the degree of labor mobility. Then the opening characteristic suggests that small economies should adopt fixed exchange rates, insofar in average, small economies are more open criteria McKinnon. But, still on average, small economies tend to be relatively undiversified, which predisposes them to let float their exchange rates criterion of the degree of production diversification. From the point of view of the consistency of economic policy, small countries are relatively losers after the installation of the monetary union, which conflicts with the idea that their opening predisposes them to integrate an EMU criterion of the degree of poenness and trade integration (Dellas and Tavlas, 2009).

The principle of diversification the criterion of the degree of production diversification also leads to a paradox. In its original form (Kenen, 1969), it suggests that two countries with relatively undiversified production structures should let float their currencies. However, if the economies in question fixed their currencies between them, the productive structure of the union after their combination would be more diverse than those of the member countries individually. This suggests that both undiversified economies have interest in entering into monetary union if the union that results is more diverse, that is to say, if they have dissimilar production structures. But, this last assertion contravenes the criterion of similarity of production structures. Moreover, these criteria are criticized regardless of the paradoxes they present; they are particularly face the test of reality.

First, labor mobility, which is the most emblematic criterion of optimum currency area theory since it was identified by Mundell (1961), is recognized as a key parameter in determining the optimality a monetary zone.

A comprehensive agreement also recognizes that this is an important determinant of longterm adjustment capacity of economies (Ricci, 2008). But, the merits of labor mobility as an adjustment mechanism within economic and monetary unions do not exclude that many critics are retained by the theory concerning the importance of this criterion.

The criticisms raised about the effectiveness and desirability of this criterion concern its consideration as a short term adjustment factor (Kenen, 1969), (Ishiyama, 1975), (Tower and Willett, 1976), (De Grauwe, 2003). These analyses lead to the inefficiency of labor mobility, because it has costs for migrants themselves, and that not useful in a large scale for temporary shocks.

Mélitz (1995) considers that Mundell (1961) refers to the long-run Phillips curves, but given the challenge to the concept of arbitration between unemployment and inflation, the standard of Mundell must also be questioned. Only a strong specific macroeconomic model could lead to the conclusion that geographical mobility of labor is the critical adjustment variable. Brociner and Levine (1992), consider that international migration has had a relatively small role. Inter-regional migration corresponds to permanent phenomenon that is not reversible in the short term and could hardly appear as a balancing factor (Buiter, 1995).

It was to be expected that weakness mobility of labor even before the adoption of the single currency, based on the US experience, the pioneer in this field. Indeed, although the mobility of labor appears to play a role in this country, far more significant than in the Eurozone, the segmentation of the labor persisted until the Second World War (Eichengreen, 1990). It was then plausible that the Economic and Monetary Union, despite that its integration process began before 1999, could not claim to an increase in the mobility of the workforce after the establishment of the European Monetary System given the large degree of heterogeneity (Masson and Taylor, 1992). And we can also find an explanation for this failure in the many barriers to migration such as differences in languages and cultures (Brociner and Levine, 1992). If we consider only this criterion, it appears that European Union is not an optimal currency area.

As a matter of facts, labor mobility is low in the euro area. The soaring number of unemployed people observed since the beginning of the crisis is under a significant heterogeneity among the countries of the zone. In Germany and Austria, the number of unemployed people is stable or even slightly down. Instead it doubled or nearly tripled in some countries such as Spain or Ireland, so that the dispersion of the national unemployment rate is now significantly higher than it was in 1999.

This heterogeneity highlights the insufficiency of labor mobility within the European monetary and economic union. Indeed, compared to the US, in case of asymmetric shock, the dispersion of European unemployment is growing rapidly and sustainably, while it remains relatively stable across the Atlantic. On the other hand, the obstacles to labor mobility in the European eremain significant language barrier, credit market segmentation.

The labor mobility can even be dangerous in certain conditions, especially when there is no transfer structure between the social systems of the countries of origin and host of workers (Coppola, 2013), (Krugman , 2013). The establishment of an optimum currency area in

Europe is inherently incompatible with the fact of establishing the market as a single resource allocation institution (Laurentjoye, 2014). The fundamental importance of policy coherence of a monetary zone has been anticipated (Cesarano, 2006) by studies close to the theory of optimum currency area (Lerner, 1944, 1947), (Friedman, 1953), (Meade, 1955a, 1955b, 1957), (Scitovsky, 1957, 1958). Although these works has preceded the seminal paper of Mundell (1961), they developed the idea to establish a sustainable monetary area could not be done only on the basis of mobility of factors of production and goods to within the zone.

One the one hand, labor mobility can therefore itself be dangerous if it is not accompanied by a redistribution structure between social systems (Coppola, 2013), (Krugman 2013), and on the other hand, trade openness can be harmful if it is not accompanied by labor mobility and fiscal federalism (Ricci, 2008).

Still with regard to the opening criterion, the idea that the benefits of a monetary union increase with the degree of openness does not require an elaborate justification (Mélitz 1995).

The higher the intra-regional trade within a monetary and economic union is important, the higher the saving of transactions costs will be. This is the basic benefit considered by the theory of optimum currency area. The more a country is open to its partners, the higher the profits it will earn from its participation in a monetary union with the partner in question (De Grauwe, 1991). The gains from the reduction of uncertainty are due to the fixing of exchange rates (Krugman 1990), (De Grauwe 1994). Mélitz (1995) considers that the degree of openness is the essential criterion even exclusive of an optimum currency area. Indeed, the more the economy is open the more the marginal propensity to import is high, which results in a less pronounced dependence vis-à-vis the exchange rates adjustment. On the other hand, in open economies, the exchange rate has a reduced ability to modify the terms of the real

exchange. This lower capacity comes from the faster adjustment of import prices and wages and therefore faster responses of domestic prices of traded goods (Krugman, 1990), (Mélitz 1995).

Finally, the degree of diversification has provided a solid foundation for the building. This contribution would be the largest according to Krugman (2013).

Nevertheless, it is reproached to the criteria their ambiguity of definition of the concept (Flanders, 1969). Insofar Kenen holds into account in its model only economies with import industry, neglecting the economies exporting several ranges of different goods.

The consideration of irrelevant assumptions, such as the infinitely elastic domestic supply, with a given nominal wage rate, and the change at the same extent of the international price of imported goods and the wage rate, could be considered as a second weakness of the theory.

Asymmetric shocks affecting individual countries will have moderate effects given the diversification of production structure. In reality, only symmetric shocks will have significant effects. Furthermore, an economic and monetary area can accentuate regional economic specialization and thus amplify the specific aggregate demand shocks to a region (Bayoumi and Eichengreen, 1997).

The impact of the Economic and Monetary Union depends on the intra euro area trade evolution that determines the degree of asymmetry. The dynamics of specialization generated by increased economic and monetary integration can induce a paradox named Integration Paradox (Krugman, 1993): the creation of the EMU is based on economies whose production structure is well diversified but monetary integration leads to regional specialization. This specialization leads to the instability of regional exports, on pro-cyclical capital flows and on long-term growth differences. Other studies show the contrary, that the differences in growth rates of output and employment are more important and persistent between regions within countries than between European economies (De Grauwe and Vanhaverbeke, 1991). Given that the regions of the same country are more integrated economically than as between countries, European integration may not decrease the likelihood of asymmetric shocks and could even accentuate the differences between countries (Pelissier, 1995).

There is no taxonomy of shocks in the OCA theory (Dellas and Tavlas, 2009) and this raises the problem of knowing which kind of adjustment mechanism is adapted for a given shock. Besides their nature, we need to take into account other characteristics of the shocks sustained by the economy. The need for an economy for adjustment factors increases with the frequency, intensity, and duration of specific shocks sustained by that economy. In particular, the benefits associated with exchange rate adjustment, and thus the loss linked to its abandonment is lower in case of temporary shocks than in the case of permanent shocks (Poole, 1970).

The extent to which a monetary union induces greater adjustment costs than a flexible exchange rate regime depends on the efficiency of the exchange rate as an adjustment tool (Ricci, 2008).

Other studies show that the optimality of the optimal currency area was a matter of time horizons. If in the short-medium term the existence of a transfer structure is a sufficient condition of optimality of a currency area, this is not true in the long term: we need then other methods of adjustment, and in particular the mobility of the work. The transfer is not in itself an adjustment factor, but a way of financing the adjustment. The existence of a transfer system can finance idleness as well as activity, mobility as well as fixity of resources (Ricci, 2008).

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The mechanisms making an optimal currency area have not been at the center of European monetary integration process (Bilger, 1996). It was therefore necessary to establish an income redistribution system between states, copied from the model of the united States and Germany, before planning to circulate a single currency within the euro area. It is the policy of redistribution between Member states and fiscal convergence, and not "irrelevant financial management criteria for the establishment of a single currency" as national budget deficits, which should have the object of the convergence criteria (Bilger, 1996), (Krugman, 2012).

The construction of the Eurozone would not be faithful to the Mundell criteria, nor to those of his predecessors. It appears that European monetary construction is a mixture of both hopelessly contradictory visions (Bilger, 1995). The monetarist view has gained considerable ground since, which would explain the emergence in the European political circles of a favorable consensus monetary union (De Grauwe, 1994). The monetarist view considers that exchange rate changes, are either ineffective or degrade the situation of the country.

In 1999, the EMU did not meet the criteria supposed to govern, ex-ante, a monetary zone in order to respond to asymmetric shocks, given the single monetary policy and the inability to use the intra-European exchange rate adjustments. In fact, the theoretical basis justifying the adoption of the euro should rather be sought on the side of the triangle of incompatibility of Mundell, much more than in reference to the theory of optimum currency areas (Cartapanis, 2010). From all criteria which were issued as part of research on traditional optimum currency areas, a significant number of them pose problem, because of conflicts with other criteria (Tavlas, 1994), or because of the unrealistic assumptions on which are based their effectiveness as is the case of the criterion of price flexibility downwards. More recently, the veracity of certain criteria, such as labor mobility factor, considered as the most solid in the foundation of an optimum currency area, was questioned.

The "alternative" theory, the one of endogenous optimality of the Eurozone, has also been criticized as well as theoretically and empirically disproved.

# 3.4 Changes in the Modeling of Currency Areas:

In addition to inadequacy, the limits and the lack of realism of some assumptions inherent in the theory of optimum currency areas, its lack of formalization makes the proper treatment of some important issues difficult.

It is argued that a more formal approach of optimum currency areas is required (Ricci, 1997). The lack of consensus on some of the most basic questions is attributed to lack of willingness to adopt an independent formal analysis of aspects of economic policy (Mélitz 1995). Several models have been developed to address the shortcomings. We present a non-exhaustive review of those works.

Bayoumi (1994) proposes a general equilibrium model in which goods are differentiated by region or country to analyze the consequences in terms of well-being and several aspects of the theory of optimum currency areas: correlation of real shocks, labor mobility, and openness. Furthermore, the model is to n countries (n> 2), which compares the well-being of countries that joined the monetary union, than those who did not enter. Each region is supposed to completely specialized in the production of a single good. The analysis assumes asymmetric wage rigidity flexibility upward, downward rigidity. Labour is supposed to be the only factor of production. The consumption of each region is based on Cobb-Douglas utility function. The expected cost of a monetary union for a very specific region depends increasingly on the degree of openness of economies and the variance of the difference of shocks affecting these economies. This variance depends on the size of these shocks and also to their correlation, i.e. the degree of asymmetry of disturbances within the union. The model

allows concluding that monetary union increases the welfare of the country who participated, while it decreases the welfare of other countries. So it becomes attractive for foreign countries to join the monetary union. The multi-regional version of the model also shows that the incentives to join an existing monetary union are higher than the incentives to form a new monetary union. On the other hand, an existing monetary union presents only few incentives to incorporate a new small economy. These results have important implications for EMU.

The contribution of Bayoumi (1994) is certain because it is the first formalization of the mainly verbal arguments that constituted the OCA approach. However, this passage comes at the cost of using a series of simplifying assumptions. The most questionable concerns the determination of the level of the equilibrium exchange rate in monetary union. Without theoretical justification, this equilibrium exchange rate is assumed equal to the geometric mean of the exchange rates of different regions in floating regime. This lack of microeconomic underbody can be considered as the limit of these developments in the context of a general equilibrium model.

A model close to the model presented above is used to determine how the major world regions (Europe, North America, the former USSR, CFA ...) could be divided into OCA (Ghosh and Wolf, 1994). A group of regions is considered as an OCA if the correlation of output shocks between these regions is high enough that the adjustment costs are lower than the benefits of monetary union (they are exogenous in the model).

Another model developed by Ricci (1997) illustrates the importance of the correlation of real shocks between countries and the role of the size of these shocks. The most interesting result, however, discusses heatedly the traditional effect of openness on the cost of a monetary union. Ricci (1997) showed, in particular, that the opening degree increases the impact of

shocks to the monetary cost component. This impact, however, is uncertain in that it depends on the correlation between domestic shocks and foreign shocks. In addition, the analysis of the real cost component of a monetary union shows that the degree of openness has a negative impact on net income because it increases the importance of trade shocks.

One of the major criticisms against this model is related to the fact that its analysis considers a world of two countries. An approach that integrates several countries is not only realistic but also allows addressing certain issues that do not appear explicitly in a two countries analysis.

One involvement of a multi-country approach is the determination of the degree of sacrifice involved in stabilizing the transition to monetary union. Adding several potential partners for a country complicates the degree of efficiency of the exchange rate as an adjustment instrument (Mélitz, 1995). A two countries' analysis also avoids the problem of choosing the best partners for a particular country. Thus, other analyses have been developed to reduce the problem of the determination of a critical level of openness to trade, beyond which it is interesting for the country to enter into union with his business partner (De Grauwe, 1991).

Work of Erkel-Rousse and Mélitz (1995)<sup>4</sup> cast doubt on the historical reality of the cost of joining a currency area, at least for a number of states member of the 'European Union. The independence of monetary policy would have been of little use to respond to shocks occurring outside the monetary union<sup>5</sup>. Finally, the cost of any waiver exchange adjustments between the countries of the European Union could be very limited for most countries, since the Member states of the monetary union would retain sufficient independence of fiscal policy.

<sup>&</sup>lt;sup>4</sup> Also Mélitz and Weber 1996

<sup>&</sup>lt;sup>5</sup> In France, Spain, Italy and Netherlands. This result was not observed for Germany

This study shows that a simple statement of the degree of asymmetry between domestic shock is not enough to properly assess the costs of EMU.

In order to estimate more accurately the magnitude of the sacrifice of six member states of the union by abandoning the sovereignty of the monetary policy, Erkel-Rousse and Mélitz (1995) attempted to isolate shocks having impact specifically on their rates exchange, as well as shocks having impact on domestic demand, on the basis of structural Var model.

The underlying theoretical model to structural Var, explicitly includes the dimension of the open economy and contains more variables and shock than in Bayoumi and Eichengreen (1993) who have argued, in the theoretical framework of a closed economy model, and tried to isolate the demand and supply shocks suffered by each country individually and then they analyzed the correlations between domestic shocks of the same type. Results from Erkel-Rousse and Mélitz (1995) reflect weak correlations between domestic shocks, which seem historically asymmetrical.

Another model with an international aspect was developed by Ricci (2008). Shocks studied by Ricci identify two types of shock: real shocks and monetary shocks. Real shocks are the traditional shocks of OCA theory since Mundell (1961), they carry on the demand or supply of goods produced, and potentially require a shift of production factors. And monetary shocks are for a non-produced asset, currency, and cannot be resolved by the mobility of production factors.

Ricci (2008) defines, furthermore, the monetary shocks, or pure nominal shocks, in such a way that these would be, in floating exchange rates regime, confined shocks. Thus, monetary shocks sustained by a foreign country - manifested by a price movement in this country - are totally absorbed by fluctuations in the exchange rate. They therefore affect only the foreign

country and do not spread to the domestic economy. Similarly, domestic monetary shocks are not transmitted to the foreign economy; they are blocked by the flexibility of the exchange.

Ricci takes two forms of adjustment to real shocks between countries: labor mobility and fiscal federalism. Labor mobility is measured by the variation of labour volume in each country, and fiscal federalism is measured by the amount of tax collected positive in the country least affected by the impact, negative in the most affected countries.

# 4 The Exchange Rate in an Economic and Monetary Union:

Since its launch in January 1999, the Euro has met wide variations. Changes in the exchange rate of the single European currency seem disconnected from fundamentals. This obviously raises questions concerning the proper functioning of the market and the role of the European Central Bank. But the issues related to the euro exchange policy does not arise only at the macro level, microeconomic agents are also affected by this almost continuous appreciation that hit the European currency since 2002. Indeed, the soaring of the euro also raises concerns for businesses that need to manage large changes in exchange rates and adapt to the persistently high level of the euro<sup>6</sup>. The sharp rise of the euro in recent years and the problems it causes for some industrial sectors invited to question the ability of the euro area to control the movements of its currency. The issue is the subject of Chapters 3 and 4 of this research work.

The peculiarity of the euro is the fact that the currency is subject to two constraints: an irrevocable fixity at intra area and a total flexibility vis-à-vis the rest of the world. The question is legitimate because other countries seem to be able to orient their exchange rate in a direction favorable to their economy. Indeed, if the movements of the dollar are counter-cyclical, the level of the dollar amount rises when the US economy is rapidly expanding and declining during slowdowns or recessions. The yen for its part is at a low level since the weakening of the Japanese growth. As for the Chinese Yuan, despite its recent moderately rise, it is maintained by a strict exchange control at an artificially low level, as evidenced by

<sup>&</sup>lt;sup>6</sup> The issue of competitiveness will be raised in Chapters 3 and 4.
the conjunction of a strong growth and a huge trade surpluses, while the euro has gone up at a time when European growth remained fragile.

The euro also encouraged some price convergence among member states but gaps remain and the national inflation rates remain quite different. The share of the euro area market declined due to the commercial development of emerging countries. It should be noted that the decline in the share of the euro area market suffers from a great heterogeneity among countries including in the center. Indeed, if the share of Germany increased those of France fell sharply. These differences are explained by the differences in competitiveness between countries and probably also by the different sensitivities of the economies to the euro fluctuations. The questions concerning the euro arise in a dual perspective: what exchange rate policy to adopt to manage the Euro, but also what impact of this common exchange rate policy on the various economies?

### 4.1 Economic Policies in the euro area and its Institutions:

The Treaties establishing the European monetary and economic zone include several institutions to ensure the implementation of the policy and economic and financial governance, particularly with respect to the monetary policy and exchange rate policy.

The monetary institutions, with the Treaty establishing the European Community, the Statute of the European System of Central Banks (ESCB) and the European Central Bank (ECB), are the legal basis for monetary policy in the euro area. The ESCB is composed of the ECB and the national central banks NCBs of all member states of the EU whether they have adopted or not the Euro. But as long as all Member states have not introduced the euro, it is the Eurosystem to act as a key player.

The exchange rate policy is a shared responsibility; the Eurogroup has, under certain conditions, the responsibility for determining the exchange orientations, and the ECB the responsibility for conducting foreign exchange transactions.

# 4.2 Economic Governance and the Exchange Rate Policy:

Three institutions are in place: First, an Economic and Financial Committee consisting of two representatives from each member state Ministry of Finance and National Central Bank and two representatives of the Commission and the European Central Bank (ECB) which is responsible for monitoring the economic and financial situation of Member states and prepare the work of the Council of Economic and Financial Affairs Ecofin council. The topics reviewed concern: stability and convergence programs of the Member states, draft opinions on the programs established in the framework of multilateral surveillance, application of the Stability and Growth Pact, the Broad Economic Policy states, international meetings where the EU is represented.

Then, the Council of Economic and Financial Affairs is the formation of the Council of the European Union which brings together the Ministers of Economy and Finance of member states. The fields of competence of Econfin council are particularly in terms of coordination of the general economic policies of the Member states and economic surveillance, control of fiscal policy and public finance, monitoring issues relating to financial markets, economic relations with third countries, the establishment together with the European Parliament of budget of the European Union. The Council may, after consulting the ECB, formulate general orientations for exchange rate policy. However, these general directions can not affect the main purpose of the European System of Central Banks, namely the maintenance of price stability.

Finally, The Eurogroup is a specific instance of the Eurozone established in 2000. It is not a decision-making instance and falls formally under the Ecofin Council. Its missions are essentially consultation between Member states in the field of conjuncture, dialogue with the ECB and the preparation of the positions of the euro area on the international scene, as well as employment and structural issues. Regular consultations with the European Commission and the European Central Bank are also part of the mandate of the President of the Eurogroup.

# 5 Monetary Institutions: an Overview of the Framework of Monetary Policy

The Treaty establishing the European Community and the Statute of the European System of Central Banks and of the European Central Bank ECB are the legal basis of the single monetary policy.

# 5.1 The Eurosystem

The mission to conduct foreign exchange operations is entrusted to the Eurosystem, and central banks have the necessary operational instruments. One of the main objectives of managing the foreign reserves portfolio is to ensure that the ECB has sufficient liquidity to conduct its foreign exchange operations. The Eurosystem holds and manages the official reserves foreign currency, gold of Member states participating in Monetary Union.

The Eurosystem manages the TARGET system which is used for the settlement of central bank operations, for interbank transfers of large amounts in euro as well as for other euro payments. Target, which was launched in January 1999, contributed to the integration of the euro money market and to improve security of payment of high amounts (ECB, 2009).

The Eurosystem has also introduced a new generation of the system: the Target 2, developed and managed by the Banque de France, Banca d'Italia and the Deutsche Bundesbank, and became operational in stages from November 2007 to May 2008.

As regards retail payment systems, the Eurosystem is closely associated with the initiative of European banks to create the unique space of payments in euro Single Euro Payments Area (SEPA), which is translated, since January 2008 by the progressive introduction of new payment means and the constitution of a unified European set of retail payment.

# 5.2 The European System of Central Bank :

The European System of Central Banks is composed of the European Central Bank and the national central banks of the Member states of the European Union. The ESCB operates in accordance with the Treaty establishing the European Community and the Statute of the European System of Central Banks and of the European Central Bank.

The ESCB contributes to the smooth conduct of operations by the authorities. The internal organization of the ECB and its decision-making bodies decide how the Eurosystem should be represented in international cooperation. For all decisions related to the definition and conduct of the single monetary policy, the Governing Council votes on the principle of « one member, one vote ». For patrimonial decisions eg, increase in capital of the ECB, the votes are weighted according to the distribution between the NCBs in the subscribed capital of the ECB.

The ESCB is governed by the ECB's decision-making bodies. In this respect, the Governing Council of the ECB is responsible for the formulation of monetary policy, while the Executive Board is empowered to implement monetary policy according to the decisions made and guidelines prescribed by the Board of Governors. For the sake of operational efficiency, the ECB has recourse to the national central banks to carry out operations that are in the responsibility of the Eurosystem. Eurosystem monetary policy operations are executed in all Member states on uniform terms.

The ESCB contributes to the smooth conduct of operations by the competent authorities related to the prudential supervision of credit institutions and the stability of the financial system.

The importance given to price stability in the euro makes the euro area an effective anchor for other countries seeking to reduce inflation and a reliable currency reserve, even if the benefit is not decisive against the dollar and the yen presenting comparable guarantees on inflation. The euro should be well placed to reassure investors seeking an alternative to the dollar which tends to depreciate over a long period. On this basis, Chinn and Frankel (2008) anticipate that by 2020, the half of global foreign exchange reserves could be denominated in Euro and the other half remaining in dollars.

The development of the international role of the euro is primarily manifested in the store-ofvalue function. The share of exports of euro zone to countries outside the euro area denominated in Euro has also increased dramatically. However, the weight of the euro showed only few changes as a vehicle currency: the dollar remains the main market exchange currency and the euro is rarely used in commercial transactions not involving the Eurozone.

The euro nevertheless suffers from four handicaps against the dollar. First, there is no equivalent in the euro area for US bonds Treasury: the Treasury bonds market is fragmented between eighteen countries whose securities are not perfectly substitutable, as witnessed during the 2008-2010 crisis, even if each national market is built shallower than that of T-bonds<sup>7</sup>. Second, most raw materials are traded in dollars, not Euros. Goldberg and Tille

<sup>&</sup>lt;sup>7</sup> The sometimes mentioned projects establishing a European Agency for issuing debt securities go in the direction of greater market liquidity but not in the direction of desired responsibilization of states after the Greek crisis. In addition, there is no guarantee, in a context of highly dispersed

(2009) show that the incentive to label trades in dollar is even stronger than the traded goods are homogeneous, which is the case of raw materials and energy. Third, the low growth rate in the Eurozone is a major obstacle to the development of the European currency on the international stage. Fourth, the economic governance of the Eurozone is not yet stabilized. On the other hand, the rapid development of China makes the Renminbi an inevitable new competitor to the dollar, although we have to wait for the perfect convertibility of the Chinese currency and the development of domestic financial markets in China (Bénassy-Quéré and Coeuré, 2010).

### 5.3 The European Central Bank:

The ECB itself makes only a limited number although a very important number of operations. Its role is to formulate the policies and to ensure that national central banks implement the decisions consistently. It is responsible for monetary policy for the euro area: the price stability, the modalities of inflationary risks analysis and the interventions on foreign exchange markets with the collaboration of different central banks if necessary. The central bank decides so, coordinates and monitors the monetary policy operations while ensuring international and European cooperation.

An exchange of views and information may nevertheless intervene between the EU Council finance ministers and the ECB, on the exchange rate of the euro against non-Community currencies. The NCBs transfer to the ECB a portion of these reserves.

credit spreads since the crisis that the interest rate applied on the new debt "unified" would be aligned with the lowest rate of the area those of France and Germany as was the case in 1999 on the money market. The Governing Council of the ECB determines the objectives and principles of a common policy of the Eurosystem regarding oversight of payment systems, which is implemented jointly by the ECB and the NCBs. Surveillance is exercised in relation to safety standards and joint efficiency. The Governing Council of the ECB may, at any time, change the instruments, the conditions, the criteria and the procedures related to the execution of the monetary policy operations of the Eurosystem.

### 5.3.1 The ECB and the euro Exchange Policy :

The monetary union had led to great uncertainty about the long-term evolution of the economic characteristics of the euro area. A fear widespread in the late 90s was that of a structurally weak Euro, due to its singular status of "currency without a state", which could weigh heavily on the conduct of the single monetary policy, the ECB was then forced to opt for high interest rate to maintain the currency value and limit imported inflation.

Another question was about the effect of the single currency on price dispersion within the zone. Indeed, the dispersion should logically be reduced, as in any unified monetary zone. However, the dispersion could not disappear for three main reasons. In fact, even within a unified set since long time, there are still price differences for the same goods, in particular because of the difference in preferences of consumers and in competitiveness more or less intense among local producers. Otherwise, the indirect taxation on the products, such as VAT, distorts the price paid by the consumer, reducing the possibility of comparing prices of the same goods in several countries.

The introduction of the euro in January 1999 was another step in the evolution of the international monetary and financial system; the European Central Bank's mission was to anchor monetary policy on domestic price stability rather than the exchange rate.

Institutionally, the ECB must ensure that the evolution of the exchange rate does not interfere with its objective, the Council keeping a stranglehold on any discretionary decision of guidance. In principle, if inflation is under control, if price stability is reached, nothing prevents the ECB to fight against the appreciation of the euro to support economic activity, without prejudice to its primary objective.

The exchange rate of the euro area is subject to two constraints. With the choice of a single currency, the Eurozone countries leave part of their sovereignty, but undertake to be subject to euro fluctuations. The debate over the single currency began before the crisis of 2008. But with the debt crisis, the issue of the single currency, the ECB and its governor have become the focus of the debate.

The strong euro was accused of the loss of competitiveness of countries in the euro area, of the loss of market share, of offshoring, and thus of the increase in the unemployment rate. The euro is not only a currency without a state, but would also be a currency without sovereignty (Creel et al. 2007). The question of the impact of the single currency will not be discussed in this chapter, which has as objective to present the euro area, its institutions and the mechanisms underlying its operation. The question then is: what is the institutional status of the exchange rate policy in the euro area and what are its consequences on its dynamism and economic stability?

The situation is such that the ECB acts in the absence of a common strategy for growth and macroeconomic coordination instruments and that the exchange rate policy in the euro area is taken up with the objective of price stability. The exchange rate policy implemented by the ECB would have then led to a counter-productive management of this one. But the policy established by the euro area seems however to have managed to build some credibility on inflation management. Even if since the crisis of 2008, in terms of monetary policy, it is no longer just a question to fight against rising inflation; the problem is to deal henceforward with deflation.

Artus and Wyplosz (2002) highlight the evolution of the exchange rate of the euro that had pro-cyclical effects thus destabilizing. The evolution of the exchange rate of the Euro, in real effective terms as well as vis-à-vis the dollar, has exercised pro-cyclical effects on most European economies, except Germany: a depreciation between 1999 and 2002, during the high phase of the cycle; and, conversely, a sharp appreciation after 2006, during slower growth phase (Bénassy-Quéré and Cœuré, 2010) ,(Cartapanis 2010).

Institutions and rules in place in the euro area to manage the single currency and supervise the handling of national fiscal policies seem clearly inappropriate. The monetary authorities are too exclusively concerned with monetary stability in a particularly narrow sense of the notion, and monetary policy therefore seems insufficiently responsive to downturns and too quickly restrictive in the event of recovery. This reinforces the pro-cyclical bias contained in the Stability Pact (Creel et al., 2007).

Changes in the Euro-dollar exchange rate have been very wide since 1999. The depreciation of the euro against the dollar by 26% between January 1999 and June 2001, and especially its appreciation of 85% between June 2001 and July 2008 disrupted the price-competitiveness of the euro area as well as its organization of their production chain (Bénassy-Quéré and Cœuré, 2010).

The appreciation of the euro interrupted by the bearish phases against the dollar is not the problem in itself. In fact, there is absolutely no a good level of the nominal exchange rate. In

reality, the problem is in the fact that the European currency has been appreciated in a phase of very low growth, much lower than that of the rest of the world (Fitoussi, 2004).

The ECB interventions have played a limited role in the evolution of the euro-dollar exchange rates. Between 1999 and 2009, the ECB has intervened only once - in the fall of 2000. By contrast, the frequent interventions of third countries such as China have contributed to the appreciation of the euro over the period 2002 -2008. During this period, in fact, anchoring a large number of currencies to the dollar has postponed on a small number of currencies Euro, Pound Sterling including the burden of adjustment to the falling dollar.

Otherwise, the euro is not a world currency yet, but rather it is a diversification currency for international investors and as a regional currency, used both as indebtedness currency and as trading currency mainly in neighboring countries the euro area ECB, 2009 Kamps, 2006. The single currency does not appear as either a safe-haven currency (Coudert and al., 2014).

#### 5.3.2 The Loss of the Exchange Rate as a Weapon of Economic Policy:

The theory of optimum currency area focuses particularly on the cost of the loss of the nominal exchange rate as a stabilization tool. The introduction of the single currency, the euro in the case of European economic and monetary area, has to establish whether a given geographic area may constitute an optimal currency area. In the absence of flexible exchange rates, any adjustment suffered by a country following a shock, is done through changes in income and unemployment. The question to ask is: is it profitable to adopt a single currency or exchange system whose rigidity is irrevocable?

The abandonment of monetary sovereignty implies a need to completely rethink the conduct of economic policy in the euro area. More specifically, the balance is to be retained between the single monetary policy of the ECB and the national budgetary policies. The whole question was to know whether national governments were not going to adopt nonconcerted measures of budgetary expansion, forcing the ECB to increase its key interest rates in order to maintain the value of the euro and contain inflationary pressures, risking weighing on growth. It is partly to prevent this risk and to ensure the coordination of national fiscal policies that the Stability and Growth Pact has been adopted. Once the idea of strengthening the communities' budget had been abandoned, an uncooperative behavior prevention instrument of national governments was needed.

At the heart of the debate around the policy mix (Creel, 2004), the question of the balance of power between ECB and national governments has fueled many discussions. Indeed, the ECB has no equivalent direct interlocutor for fiscal policy. The important fear was that the ECB's options prevail over the expectations of national governments, especially as the statutes of the ECB offered to the latter, the highest degree of independence in the world vis-à-vis political power. This is why the Eurogroup has been created to establish a common and coordinated vision of national governments on the economic situation of the area.

According to some criteria developed above, a monetary union must meet a number of criteria: the absence of frequent large-scale asymmetric shocks and mobility of factors of production, and export diversification which reduces the impact on shock economy affecting a narrow category of export products and, for countries of the same monetary zone, the degree of openness of their economies. The higher is this degree of openness, the more the economy of the candidate will be sensitive to shock and its currency less stable and liquid. It follows that for an open and diversified economy, the benefits of joining a monetary union in terms of earnings and liquidity and financial stability can compensate the additional adjustment costs that could impose its accession to the Union.

In the absence of mobility of production factors, asymmetric shocks could be absorbed by a change in the exchange rate, but this requires that the affected regions have their own currency. This is not the case for a monetary union. As part of the theory of optimum currency area defended by Mundell, the euro can solve this problem.

First, argue that the floating exchange rate regime is more suitable than the fixed exchange rate regime or a common currency to cushion the effects of asymmetric shocks is based on the existence of money illusion. Economic agents suffer from money illusion if they are ready to accept a decline in real wages as long as it is done by a rise in prices that leaves their nominal wages unchanged, but not if its performed by a decline in their nominal wages ie if workers accept a reduction in their real wages because of the increase in prices caused by the devaluation, employment can be maintained. However, it is not possible to rely on the persistence of this illusion in the short term. Indeed, for a small country or a region where the share of imports and exports in GDP is important, the effects of devaluation on the price level will be immediate and money illusion will quickly disappear. Moreover, if a country uses the depreciation of its national currency in a systematic way to boost employment, wages will soon be indexed and the stimulatory effect will disappear to make room for inflation. Under these conditions, the main argument for flexible exchange rates is the possibility or the need to adopt an exchange rate different than the rest of the world, it also allows to adopt a more moderate rate of inflation if the rest of the world is unstable and the need to adopt a higher rate of inflation if the country is unable to manage its fiscal and monetary policy stably.

Secondly, within the same country, capital mobility can replace the work to facilitate adjustment. And the monetary union itself is a factor of integration which equally increases the mobility of production factors and reduces the probability of asymmetric shocks, especially with the advantages of a common currency and its integration effect on other markets, particularly financial markets.

This theoretical framework developed by Mundell, is clearly a monetarist inspiration. In this context, the fixing of exchange rates and the adoption of a single currency will ensure sufficient convergence of economies wishing to form a monetary area. The key is to give up the autonomy of national monetary policy and put in place the necessary institutions for the management of the common monetary policy.

Monetarists, in contrast to Keynesians, believe that exchange rate changes are ineffective or that they contribute to the deterioration of the situation of countries. The weapon of the exchange rate is finally abolished; correction of discrepancies is completely left to the real sector that ensures the adjustment via the flexibility of prices and incomes, and by the mobility of production factors. The opposite argument, is that the adoption of a single currency must be the culmination of a long process of convergence of candidate economies, hence the conditions for the creation of the common currency, as illustrated by the Maastricht criteria or the stability pact. The Keynesian theoretical framework of the theory of optimum currency area uses the Keynesian notions of sticky wages and prices and focuses on symmetric and asymmetric effects affecting the constituents of an economic and monetary union. This Keynesian framework obviously influences the perception of the effectiveness of the exchange rate in correcting the effects of different developments of demand and costs between countries forming a monetary union.

# 6 Conclusion

An Optimal currency area (OCA) is defined as the optimal geographical area for a currency or of several currencies whose exchange rates are irrevocably fixed.

Its optimality was defined through a number of criteria that have evolved over time: mobility of labor and price flexibility (Mundel, 1961), the degree of openness of economies (McKinnon, 1963), the diversification of production (Kenen, 1969), financial integration (Ingram, 1962) and the fiscal integration (Johnson, 1970).

The contributions of Mundell (1961), McKinnon (1963) and Kenen (1969) form the basic trilogy of the optimal currency area theory for many authors (Bilger, 1996), (Bayoumi and Eichengreen, 1997) and (Krugman, 2012).

The notion of optimality of the euro area has evolved in theory even before being confronted with reality. The chapter brings out recent theory development, including adoption.

The mechanisms making an optimal currency area have not been at the center of the European monetary integration process (Bilger, 1996). In addition to inadequacy, the limits and the lack of realism of some assumptions inherent in the theory of optimum currency areas, its lack of formalization makes the proper treatment of some important issues difficult.

According to the traditional OCA theory, satisfying these criteria is a prerequisite that ensures the optimality of the currency area. Frankel and Rose (1998) challenge this analysis, arguing that even if the satisfaction of optimality criteria is not proven *ex-ante* before the unification of currencies, it is quite likely to be proven *ex-post* following the beneficial effects of the union. The "alternative" theory, the one of endogenous optimality of the Eurozone, has also been criticized as well as theoretically and empirically disproved.

# Chapter II: Eurozone Heterogeneity: Persistent structural divergence: PCA Evidence

# Abstract

The convergence of the euro area has not been carried out before the introduction of the Euro. The failure of nominal convergence has not been offset by an endogenous convergence in the euro area.

After a descriptive evidence of heterogeneity, a principal component analysis was performed to confirm this heterogeneity, but also to show that it has increased over time unlike what has been suggested by Frankel and Rose (1998).

JEL Classification: C1, F02

Keywords: Eurozone convergence, Heterogeneity, The Endogeneity of the OCA Criteria, PCA

# 1 Introduction

In this chapter, we show that the heterogeneity of the euro area has worsened over time. Indeed, although in aggregated terms, the euro area presents satisfactory fundamentals, this is far from being verified for all the countries in the area.

The chapter shows the heterogeneity of the euro area and presents a reassessment to the approach known as "The Endogeneity of the optimum currency area Criteria". We conclude that in the euro area, there is instead an "endogenous divergence."

According to the traditional theory of optimum currency areas (OCA), the satisfaction of its optimality criteria is a prerequisite for the establishment of a monetary zone. Frankel and Rose (1998) call into question this analysis and argue that even if the optimality criteria are not met ahead of the introduction of the single currency, they can be downstream.

This theory has been a reversal in the analysis of OCAs (Cesarano, 2006). It induces a change in the nature and the role of optimality criteria relating to the traditional approach of OCAs. In the endogenous approach of OCAs, the fact that the monetary zone exists renders this one automatically more optimal. Moreover, this theory allows introducing a dynamic component to the OCA theory: in t + 1, the optimal position of a currency area depends on system parameters in t, including the existence of a monetary union. The monetary union is no longer a goal that is reached after satisfying the optimality criteria, but a means in itself to push towards optimality.

The ability of a country on its entry into a monetary union depends on a number of economic conditions. These include the intensity of trade with other potential members of the monetary union and the extent to which business cycles are correlated with those of other countries. The countries commercially closely linked have more correlated business cycles. This positive

relationship between the synchronization of business cycles and trade integration has given more credence to the thesis of endogeneity of OCA criteria (Frankel and Rose, 1998), (Calderon et al., 2003), (Imbs, 2006), (Baxter and Kouparitsas, 2005), (Darvas and al., 2008), (Tapsoba 2007, 2009), (Inklaar and al., 2008).

Since the introduction of the euro, member states were called to achieve required convergence in order to create an environment of price stability in Europe, but also called to continue its efforts after 1999, while the responsibility of the monetary policy was transferred since that date to the Eurosystem and to the European Central Bank on the first line. The economic policy-related responsibilities, however, remain the responsibility of the participating Member states, but in a European context.

The introduction of the euro is supposed to have been made possible by the convergence of certain fundamental economic characteristics of the concerned countries to the reference values. But, at the time of the appearance of the euro, the EMU did not meet the criteria supposed to manage, ex-ante, a currency area and it has not succeeded in reducing the disparities between eurozone countries.

Currently, the European economic and monetary union (EMU) has multiple heterogeneities among countries in the euro area: 1) heterogeneity of price levels: heterogeneity of inflation rates twice as high in the countries of south European countries, 2) heterogeneous endowments of factors: qualification of labor, capital intensity, innovation effort; 3) heterogeneity of the workings of the labor markets leading to a divergence of trends in cost competitiveness; 4) heterogeneity of productive specializations more or less industrial, 5) heterogeneity of situations of current accounts (Artus, 2012 a). The result is that the institutions of the euro area, founded on the assumption of the convergence of countries, is now unable to eliminate the disparities in economic situations and to find solutions to problems that become persistent as unemployment and the loss of competitiveness.

Contrary to expectations, the adjustments into the monetary union in front of asymmetric shocks have become more complex, especially since 1999. The divergences in developments in different European countries were greater then expected. The financial crisis of 2007-2008 has had different impacts on countries of the euro area. If the Greek crisis has put the light first on the limits of the Eurosystem, macroeconomic policy inconsistencies inherent in the functioning of the area have proved persistent for several countries in the periphery. This context has given timeliness to questions related to the functioning of the economic and monetary union.

The question is all the more important that since the introduction of the single currency, the countries of the euro area are deprived from two adjustment mechanisms that are the exchange rate and the budget transfers to cope with asymmetric shocks. In this situation, the prices and wages adjustment are privileged.

In addition to the prices and costs adjustments, European authorities encouraged the intrazone financial integration as asymmetric shocks stabilizing factor. The market channels as insurance mechanism facing an asymmetric shock is confirmed by the work of Melitz and Zumer (1999, 2002), Kalemli-Ozcan, Sorensen and Yosha (2003) and Asdrubali and Kim (2004) which have particularly emphasized the strong stabilization by capital income within the united States. At the edge of these results, it seems that the monetary union should promote intra-regional capital mobility and encourage smoothing through market channel (Clévenot and Duwiquet, 2011).

The implementation of the single payment system TARGET has integrated the various money markets and has fostered the emergence of a wider interbank market. However, the substitutability of the debt securities of the states of the euro area remains imperfect because of the differences of signature bonus and of liquidity across countries, of the absence of the federal budget, of the disparity of procedures and issuance schedules, and of the primary dealers systems that can create market distortions due to overbidding by these actors (Pouvelle, 2006).

In the euro area, the problem is also to deal with symmetric shocks. In reality, the common monetary policy cannot have the same impact on all economies because of their heterogeneity.

This chapter discusses the elements mentioned above and focuses on explaining the differences between countries within the Eurozone. This is why this article focuses especially on four economies in the Eurozone: France, Germany, Italy and Spain.

The first section reviews the evolution of convergence problems and its relationship with the debt crisis, the heterogeneity of countries in the euro area is exposed in the second section; the third section examines the results of the principal component analysis and a final section concludes.

# 2 From Convergence Problems to the Debt Crisis

The introduction of the euro was preceded by three major steps: First, the European integration that goes back to the fifties and that has marked the beginning of the gradual expansion of the European Union; then the economic integration in the 1970s; and finally monetary integration with the irrevocable fixing of exchange rates.

Countries wishing to adopt the euro as their currency must achieve a high level of "sustainable convergence". This degree of convergence is assessed on the basis of several criteria defined by the Maastricht Treaty under which a country must have: a high degree of price stability, sound public finances, a stable exchange rate and a long-term interest rate that is low and stable. The Treaty also requires the independence of the central bank in each country.

Nominal convergence through respect of the Maastricht criteria was designed as the first step in this process. However, during the initial phase of the launch of the European single currency, member countries of the Eurozone did not form an OCA. Indeed, member economies were characterized by great disparity associated with the rigidity of wages and prices, and satisfied only partially the criteria for an optimum currency area. This unambiguous finding was making of the advent of the euro the result of a decision based primarily on political elements (Wyplosz, 1997), (Feldstein, 1997). In addition, the OCA theory discussed previously makes no reference to the Maastricht convergence criteria (De Grauwe, 1999).

Even if the monetary union is not an optimal currency area, it is important that its members could experience a real convergence process leading, in particular, to a convergence of international competitiveness. In several works, Frankel and Rose (1997, 1998), Rose (2000a,

2000b) considered that sharing a single currency would boost trade between member countries and would accelerate trade integration; and that increased trade integration is likely to promote a process of convergence of production structures and of exports (Baldwin et al, 2008).

The issue of convergence is at the heart of the issue of the economic and monetary union EMU after fifteen years of the adoption of the euro, especially after the Eurozone crisis. Indeed, in a context of wage rigidity and prices, the cost of the loss of the exchange rate as an instrument of economic policy reemerges.

In 2008, most authorities in the euro area - including Germany and France - had failed to respect the rules of the stability and growth pact. The public debt of several Eurozone countries has reached a high level, generating concerns about the sustainability and solvency of debt. These factors have led to the outbreak of a serious crisis of confidence particularly with respect to peripheral Eurozone countries.

The chronic external deficit was one of the fundamental causes of the crisis in the euro area; this deficit, firstly, had as counterpart the indebtedness of the private sector in south countries, then public debt when the private sector could no longer take on more debt. When external indebtedness of southern Eurozone countries has become excessive, north of the Eurozone countries have refused to lend more, and this has encouraged the outbreak of the crisis.

The average public debt of euro area is lower than that of Japan or the United States, for example. The problem is that it does not reflect the image of all economies in the euro area (Graphs 2.1, 2.2).



Source: IMF-WEO

The explosion of debt and recession in the Eurozone, has caused the increasing fiscal deficits. Indeed, for countries that already had high levels of public debt in 2008, the level of debt as a result of the crisis has exceeded the threshold beyond which investors raise doubts about its sustainability and thus seek compensation to the default risk (Matheron et al., 2012).

The increase in public debt has caused investors since 2010 to doubt about the capacity of governments to repay their debt, mainly those countries in the periphery of the Eurozone. Greece, Ireland and Portugal were excluded from market financing, while Italy and Spain had to pay substantial risk premia compared to German debt interest rates. These risk premia reflect several concerns: those of a possible default of these countries or the Eurozone breakup.

Government intervention from the fall of 2008 has been necessary because of the impact of the financial crisis on the real economy. The fiscal stimulus in addition to the automatic stabilizers which have become essential to support final demand contributed to the significant increase of public deficits. At another level, the ECB lent long-term liquidity to avoid a banking liquidity crisis; this sector has been strongly and directly affected by the 2008 crisis which has exacerbated the situation.

The debt crisis for the most fragile states has resulted in a higher cost of funding with a substantial increase in the issuance rates of their borrowing. Thus, the Greek crisis has initiated a period of substantial increase of bond yields level in the euro area, after years of compression of intra-zone sovereign spreads.

Financial stress is allayed only since the summer of 2012. But despite this relative calm in the financial markets, bank lending rates for firms in southern countries such as Italy and Spain have not declined and the volume of credit continues to contract. The stability of the public

debt markets is mainly due to the intervention of the European Central Bank and especially its commitment to buy government securities of the euro area states attacked by the market. The commitment result is the decrease of rates in peripheral countries of the Eurozone without real need of ultimate ECB intervention to implement its commitments (Graph 2.3).



Graph 2.3: Long-Term Interest Rates France, Germany, Italy, Spain [1999-2014]

The crisis has unveiled a structurally unbalanced situation in advance, especially in some countries in the euro area. If this economic and financial crisis explains part of the current imbalances, it is not the root cause of a situation that existed earlier, especially in the peripheral countries of the euro area.

The crisis in the Eurozone has highlighted the dangers of macroeconomic imbalances within the euro area.

# 3 The Heterogeneity of the euro area: a Fact

Imbalances that preceded the crisis and the crisis itself showed that the heterogeneity of the Eurozone is a problem causing several faults in the euro area.

# 3.1 The Euro: the Single currency with Multiple Effects

The exchange rate as an adjustment mechanism was finally abandoned, but it does not seem that the other mechanisms recommended compensating the abandonment of this weapon of economic policy, such as the mobility of factors of production and labor in individual or wage flexibility and relative prices have played the expected role.

Since the creation of the euro, the exchange rate is considered as a transmission channel of monetary policy and not as an intermediate target capable of having a real impact on corporate margins, investment and activity growth.

Monetary policy can influence the economy mainly through three transmission channels: the economy financing channel credit channel if the economy is mainly financed by bank credit; Channel asset prices and wealth effects and the channel of exchange rates.

Monetary transmission mechanisms were variable in time and have been influenced by the financial fragility of banks, companies and households. They changed with the crisis since the amplifying effects of the credit channel in the countries in sovereign stress situation. For these countries, the fragility of banks has been particularly important in 2008-2009. The impact of monetary policy on global production is stronger during the financial crisis in countries facing a sovereign financial distress. This amplification mechanism operates both bank credit and the non-financial borrowers sector (Ciccarelli et al., 2013).

Up to the present time, European intervention in the foreign exchange market has been sporadic for limited amounts, except in September and November 2000 when it was meant to limit the depreciation of the euro given the risk that imported inflation could generate and by the time of the September 2001 attacks in order to curb any financial panic (Cartapanis, 2014).

The ECB reacts to the average situation of the countries of the euro area and not to the dispersion situations in these countries, while the financing of the economy is very different in the north of the euro area fixed-rate financing and in the south of the euro area floating-rate financings. This implies that monetary policy has little effect on the economy in the north of the Eurozone and has a strong effect on the economy of southern Eurozone countries. Therefore, when growth was low in the northern countries of the euro area in the 2000s, the ECB was conducting an expansionary monetary policy, looking at the average situation in the euro area, this policy had no effect on these countries but has shown the housing bubble and debt in the South. More recently, the ECB reacts to the weak growth in the south of the euro area, and this has no effect on the North of the Eurozone which does not need an expansionary monetary policy.

The constraints imposed by the single currency are supposed to represent in return a guarantee of stability. Yet, successive crises show that the euro has neither played its unifying role nor amortized the risks for the most vulnerable countries. Several of the most vulnerable countries, in fact, show a considerable increase in their sovereign spreads when it is not countries that have officially announced their bankruptcy.

# 3.2 Heterogeneity of Current Balance Situations

The accumulation of imbalances in current accounts between the early 2000s and the outbreak of the crisis in 2008 have considerably weakened the economies of the periphery of the Eurozone.

The degradation of the current account balance in the countries of the euro area took place in a context of strong heterogeneity of the dynamics of wages and unit labor costs.

This question often overlooked (Giavazzi and Spaventa, 2010) previously, partly because current account imbalances were supposed to reflect a situation of economic catching in a financially integrated area, is now included in European governance. Indeed, the current account surpluses or deficits are not in themselves indicators of economic performance or vulnerability. Imbalances can be "good" or "bad", as they reflect convergence factors (capital flows from rich countries of the European Union to poorer countries catching up) or a bad allocation of capital (boom offline private credit productive investment, real estate bubbles...).

With the growing imbalances, it is no longer a hypothesis of "good imbalances". In fact, capital inflows in the peripheral countries appear to be excessive in relation to the optimal allocation of resources between member countries.

In fact, the economies mainly affected by doubts about the sustainability of public finances also had high current account deficits at the end of 2007. Current transactions in the countries in crisis deteriorated, while in Germany, the Netherlands and Austria the surplus grew (Graph 2.4). Countries with a structural current account deficit Spain, Greece and Portugal have seen their situation exacerbated, reaching more than 10% of GDP in 2007, while France and Italy went from a surplus to a deficit.

Current balances within the euro area had a significant scale, when it comes to the German and Dutch surplus, or when it comes to Greek, Portuguese and Spanish deficits (Barnes et al., 2010). Current account deficits in the southern countries of the Eurozone have exceeded their estimated value, even if there are strong differences between countries (Jaumotte and Sodsriwiboon, 2010). These sustainable current account imbalances have played a key role in the current crisis in the euro area (Lane and Milesi-Ferretti, 2011).



Graph 2.4: Current account balance % GDP France, Germany, Italy and Spain [1999-2014]

Source: IMF-WEO

In the absence of federalism, the divergence of current account situation is unbearable because it leads to the divergence of external assets and debts due to the lack of income transfers between countries which might offset trade imbalances (Graph 2.5).





Graph 2.5: External assets and liabilities %GDP France, Germany, Italy and Spain

Supporting a sustainable external deficit is particularly difficult for the southern countries of the euro area as it leads to a continual increase in their external debt, therefore to the loss of their external solvency which can turn into financial crisis, as it is has seen since 2008.

The dispersion between the situations of current account is accentuated by the dispersions of savings rates.

The dispersion of the savings rate total, household between the countries of the euro area can be explained by structural factors such as different demographic aging and other cyclical factors, mainly the level of interest rates: when interest rates are higher than the growth rate, there is normally incentive to save more, to accumulate more financial assets. Until 2009, interest rates were high in Germany compared to growth, and were lower in other countries, particularly in Spain.



Source: IMF-WEO

The dispersion between savings rate generates a similar dispersion between the situations of current account. The difference between savings rates are not corrected by a similar dispersion between the investment rate: Italy and France have higher investment rates than Germany despite their low savings rate, hence their external deficits; the external deficit in Spain has decreased with the decline in investment and especially the rise of the nation's savings rate (Graphs 2.6, 2.7) (Artus, 2012d).

The heterogeneity of the current account is also the result of productive specialization of the southern countries of the euro area in protected areas and their de-industrialization that result in a chronic deficit in the current account. Trade deficits of de-industrialized countries could not be offset by public transfers with a budget of the European Union just over 1% of GDP and in the absence of a specific budget for the Eurozone.

Since 2007, imbalances have disappeared, mainly due to a reduction in current account deficits of the peripheral countries (Italy, Spain, Ireland, Portugal and Greece). At the same time, the macroeconomic context is marked by fiscal consolidation and the measures taken by these different countries, particularly to make the labor market more flexible.

# 3.3 The Heterogeneity of the Functioning of Labor Markets

Since the beginning of European integration, the labour market has remained an exclusive domain of the member states with significant operational differences. Only the guidelines established at the Luxembourg Summit in 1997 reflect a cooperative effort at a European level, but it is largely limited to employment policies. However, differences in the functioning of the labor market, which are very important in Europe, are likely to make dissimilar adjustments of wages and employment (Cadiou et al., 2001).

The euro area is hampered by massive unemployment especially after the crisis (Graph 2.8) although the beginning of the period is marked by a decrease in this rate. The decline and rise in unemployment has alternated between 1999 and 2014, but all new records after the crisis are not commensurate with the period before. The crisis has caused massive job destruction (Graph 2.9).



From early 2008 until the beginning of 2011, changes in the unemployment rate increased sharply, stabilized, and then began to decrease gradually. After 2011, however, the Eurozone started one second increase (11.94% in 2014), reflecting a second specific shock to the euro area as a result of the crisis of sovereign debt, which is reflected in six quarters of recession in the economy of the euro area. However, unlike the post-Lehman shock that affected all economies in the euro area, almost all job losses observed in the second period were concentrated in countries that have experienced tensions in the market in public debt securities.

If the impact of the crisis has been more limited and shorter in some countries Germany, it induces very significant changes in employment and unemployment rates in other countries Spain. The labor market does not escape to the rule; it is a market characterized by significant heterogeneity (Graph 2.10).

The sharp rise in the unemployment rate recorded in the euro area since the beginning of the crisis thus covers a very mixed overall situation between countries where the unemployment rate has not or has just a little increased before declining substantially over the recent period (Germany, Netherlands, Austria, Finland) and other countries where the number of unemployed has exploded and continues to grow (Spain, Greece, Portugal, Ireland). The dispersion of the national unemployment rate is now significantly higher than it was during the introduction of the single currency.

A third group of countries shows performance roughly in line with the European average (France, Italy, and Belgium).

The heterogeneity of the euro area is a structural fact aggravated by the non-cooperative strategy of policies in Germany. Since 2004, Germany has implemented a policy of

competitive disinflation and its growth is strongly linked to external demand. In a context of wage moderation, lower social contributions offset by an increase in VAT, the German economy has benefited from a very strong contraction of relative wage costs, and thus of a real depreciation vis-à-vis to its neighbors, which came to enhances the achievements of its international specialization in high-end manufacturing. This resulted in a very strong polarization of trade balances within the euro area (Cartapanis, 2010).

Large differences were also observed between the groups of workers in the countries of the euro area. In part because of the sectoral composition of job losses which have been heavily concentrated in manufacturing and construction; low-skilled workers and young people 16-24 years were the hardest hit<sup>8</sup>.

Redeployment opportunities are inadequate for low-skilled workers who are unemployed. The analysis of the evolution of skills mismatch suggests a significant increase in the inadequacy in regions, countries, and in the whole euro area (Draghi, 2014).

It is important to note, moreover, that even if the crisis and the economic performance of countries of the region largely explain the problems and the heterogeneity of the market, the demographic dimension is also important.

<sup>&</sup>lt;sup>18</sup> However, participation and employment rates of older workers has increased over the crisis, partly because of past institutional reforms such as reforms of pension rights and increasing the legal age of retirement.



Graph 2.10: Unemployment rates in France, Germany, Italy and Spain [1999-2013]

Source: IMF-WEO

Since the early 2000s, the working-age population increased by 4% in the European Union. This increase concerns most major European countries. Germany is distinguished from its partners; its working-age population has decreased quite significantly -3% unlike Spain where demographic dynamics were important + 14% for the working-age population.

Moreover, due to the contraction of GDP (Graph 2.11), job cuts may be regarded as relatively limited.


Graph 2.11: Growth rate of GDP and Output gap<sup>9</sup> euro Zone [1999-2013]

Source: IMF-WEO

In reality the GDP of the euro area fell by a greater rate between its highest and the lowest level than the one of employment and worked hours (De Mudler and Duant, 2012), (Graphs 2.12, 2.13).

<sup>&</sup>lt;sup>9</sup> The output gap is an economic indicator that measures the difference between the actual output of an economy and its potential output, that is to say, the maximum volume of goods and services that it can produce when it works full speed, using all its capabilities.



Source: Total economy database

Indeed, the wide divergence in labor market adjustment reflects only partially the different degrees of severity of the crisis and its impact on GDP. Nevertheless, the elasticity of employment and unemployment to GDP differed remarkably in the countries of the euro area during the crisis. In particular, the response of employment to changes in economic activity was moderate in Luxembourg and Germany for example, while in countries like Ireland and Spain, employment elasticities were very high. Similarly, the unemployment reaction was very strong in Spain, while it was limited in countries like Luxembourg (ECB, 2012).

The countries in which the crisis was driven more by international trade experienced a relatively modest rate of job destruction. In some cases, this can be explained in large part by the flexibility of working time. Other country-specific factors have also had an impact on the magnitude of unemployment adjustment during the crisis. Labor markets characterized by higher proportions of temporary contracts before the outbreak of the crisis, has exacerbated the high number of job losses and rising unemployment (ECB, 2012).

Sectoral specialization also explains the disparity in unemployment rates between countries since some areas were most affected by the crisis than other.

The heterogeneity of the labor market provides data on insufficient labor mobility within the Union (Broyer et al., 2011). The comparison with the United States shows that in case of asymmetric shock, the dispersion of European unemployment rate increases strongly and sustainably, while it remains relatively stable on the other side of the Atlantic. Despite significant advances in this area (coordination of social security systems, recognition of qualifications, creation of an agency of the European employment ...), barriers to labor mobility in the European remain substantial (language barrier, segmentation of the credit market ...).

Moreover, wage adjustments were relatively limited in the countries of the euro area, despite the seriousness and extent of the recession. At the beginning of the crisis, the presence in several countries, multi-year contracts concluded before the start of the recession has contributed to the initial delay of adjustment. Wages in the public sector have responded to the crisis earlier than wages in the private sector because of the ongoing fiscal consolidation in some countries of the euro area. The heterogeneity of responses of labor markets to the crisis also reflects the nature of the shocks hitting the economies of the euro area and the presence of imbalances in the period preceding the crisis.

A significant part of unemployment becomes structural. In the first phase of the crisis, strong declines in labor demand have led to a sharp rise in unemployment in the euro area. The second recessive episode, however, led to a stronger rise in the unemployment rate, although the rate of aggregated vacancies presented marked signs of improvement. At the end of 2013, the stock of long-term unemployed those unemployed for one year or more represented more than 6% of the total workforce in the euro area, more than twice the level before the crisis.

The gaps between countries depend mainly on the rate at which productivity cycles will be completed. In Germany, the needed adjustment is almost zero or small-scale.

#### 3.4 Heterogeneity of Price Levels:

During the years that preceded the establishment of the economic and monetary union (EMU), the inflation rates in the countries which joined the euro area have converged significantly. But after have converged quite clearly to the period that preceded the establishment of the economic and monetary union, the national inflation rates began to diverge since 1999.



Graph 2.14: Inflation differential between France, Germany, Italy and Spain and the average of the euro area [1999-2014]

Early 2000, inflation in the euro area was above the 2% limit; judged by its official target the ECB faces a failure (Artus and Wyplosz, 2002). It is a failure of the monetary policy that will manifest otherwise after the crisis, the rate of inflation is below the target of the ECB.

Price flexibility is hampered by the slow executing of the development of the single market. The relative price differences can be very persistent in a monetary union (Alberola and Marqués, 1999), (Obstfeld and Peri, 1999), (Cecchetti et al., 2000).

The countries with higher inflation rate are the catching-up countries that have experienced more rapid growth, due to the Balassa-Samuelson effect. However, the Balassa effect does not seem decisive in explaining inflation in individual countries studied such as Spain (Rabanal, 2009) or Ireland (Honohan and Lane, 2003). In none of these countries, the high inflation rate

Source: IMF-WEO Note: inflation differential= Eurozone inflation rate- Country i inflation rate

was caused by an excessive level of demand induced by a high public deficit. Even taking into account the Balassa-Samuelson effect, these countries have had too high inflation rate, which gradually led to competitiveness losses, compared to Germany that had an extremely low inflation, which prevents its partners of reconstruct easily competitiveness.

With the same nominal interest rate, countries have experienced different growth-adjusted real interest rates. The single monetary policy was restrictive for Germany and strongly expansionary for Ireland, Greece, Spain, where businesses and households were strongly encouraged to borrow and invest, which amplified the growth and inflation (Mathieu and Sterdinyak, 2007).

Low real interest rates can lead to wealth effects stimulating consumer demand encouraging an increase in domestic asset prices.

The Spanish case can illustrate these mechanisms. Lower interest rates caused a boom in consumption and investment, because of the very rapid increase, and even excessive of private debt. This boom in demand has particularly supported the activities of the services sector and construction but unit labor costs rose rapidly and the current account deficit has continued to widen. The pursuit of a tight fiscal policy was not enough to restore the conditions for more balanced growth. With the downturn in real estate and credit markets, the old engines of growth collapsed. Borrowing conditions have tightened and deleveraging process is prevailed. Housing demand fell, dragging with it the construction sector, which has suffered significant job losses since 2008 (Clement and al., 2009). Low real interest rates can lead to wealth effects which stimulate demand favoring the increase in domestic asset prices.

These disparities have had their effect on the export performance of countries in the euro area. The relative prices of exports equally began to diverge since 1999, while some countries German, Finland, Ireland and the Netherlands had endured low losses in price competitiveness, Italy, Spain and Greece experienced a significant increase in their relative export prices.

The diverging degrees of price competitiveness for these countries are explained by diverging costs levels. The evolution of aggregate unit labor cost ULC of the euro area has increased since the introduction of the Euro. As inflation, the aggregate level of ULC hides a strong heterogeneity between countries in the euro area.

From the establishment of EMU, Germany has strengthened internal conditions for a sustained stability of prices. For several years, improvement of price competitiveness in Germany is largely explained by the control of unit labor costs.





Source : OECD

During the period between 2004 and 2007, a period marked by the largest increase in unit labor costs, the ULC has increased by 5% on average in the euro area, with a 10% increase in Spain and a decrease of 5% in Germany (Graph 2.15).

The heterogeneous rise of export prices also impacted on the productive specialization of countries in the Eurozone. Indeed improving cost competitiveness of companies generates the increase of their profit margins and thus their ability to gain market share. This should allow them to have greater financial capacity they can allocate to research and development. Thus, German companies were able to improve the quality of their production and therefore their non-price competitiveness and consequently were able to benefit of a more favorable productive specialization. The southern countries of the Eurozone have pursued policies that led to an unfavorable productive specialization (Artus and Gravet, 2012).

The gaps of prices within a monetary union could be seen as mechanisms for rebalancing disparities of economic situations. Indeed, a country whose economic situation is less favorable than that the average of the area often suffers from lesser inflationary pressures, partly because wage demands are less strong. The resulting improvement of price competitiveness enables it to gain market share (Moêc, 2003).

### 3.5 Heterogeneity of Endowments in Production Factors and of Productive Specializations:

The countries of the euro area have amended their specialization in the last two decades, but in different proportions. The specialization of the euro area as a whole has therefore not changed much, whilst we could have expected a more pronounced shift towards high-quality production (table 2.1), (Graph 2.16). The fact that there has not been much progress in general may reflect the presence of structural rigidities preventing companies to adapt and to correct deeply their specialization, particularly in favor of high-tech products.

	France	Germany	Italy	Spain
1999	2,16	2,41	1,02	0,86
2000	2,15	2,47	1,04	0,91
2001	2,20	2,47	1,08	0,92
2002	2,24	2,50	1,12	0,99
2003	2,18	2,54	1,10	1,05
2004	2,16	2,50	1,09	1,06
2005	2,11	2,51	1,09	1,12
2006	2,11	2,54	1,13	1,20
2007	2,08	2,53	1,17	1,27
2008	2,12	2,69	1,21	1,35
2009	2,27	2,82	1,26	1,39
2010	2,24	2,80	1,26	1,40
2011	2,25	2,89	1,25	1,36
2012	2,26	2,92	1,27	1,30

Table 2.1: Total expenditure on R&D, in both the private and public sectors: France, Germany, Italy and Spain [1999-2012]

Source : World Bank

The currency risk disappearance led to the establishment of productive specialization between these countries based on comparative advantages according to their factor endowments (Krugman, 1993). In the short term, specialization can be effective because it increases the overall well-being, but in the longer term, this short-term optimal specialization may have undesirable effects. If a country specializes in low-tech productions, the pace of technological progress slows down, the workforce qualification decreases, and potential growth is reduced.

This productive specialization implies an increase of divergences in economic structures between countries as well as an increase in asymmetric shocks.

Two landscapes are distinguished: the north remaining industrial and the south specializing in protected sectors and / or in industrial production whose technology content is low.

Graph 2.16: Industry-financed Gross Expenditure on Research and Development as a percentage of GDP France, Germany, Italy, Spain [2000-2011]



Source: OECD

The sectoral specialization divergences, which are less and less favorable for some countries including France where intensive research and development industries represent a growing low share of value added (Houlou-Garcia, 2012), are explained by the difference in private sector engagement in research and development.

The heterogeneity existing due to productive specialization prior to the introduction of the euro and which has remained is one of the causes of the crisis. In reality, it has an effect on economic policy since it leads to the appearance of structural deficits of countries specialized in domestic services. These incompressible deficits cannot be financed in the long term by debt. Theoretically, there are only three solutions in the absence of federalism i) the depreciation of the exchange rate to eliminate deficits, which is impossible in the euro area; ii) the devaluation by wage deflation which is actually practiced by Spain and iii) the austerity policies intended to compress domestic demand until the external deficits are corrected.

A dynamic phenomenon may appear: the specialization in low-tech products reduces the tendency of potential growth and deteriorates competitiveness since it leads to a lesser technical progress and to a lesser innovation effort and therefore to a loss of qualification of the workforce. This loss of competitiveness will be offset by lower profit margins, especially in countries that have not resorted to massive layoffs like France. This decline in margins, in turn, has a negative impact on the share of investments devoted by companies to research and innovation.

On the other hand, productive specialization has an important impact on the ability of a country to bridge the productivity gaps. The lower weight of the new technologies in the economy may explain the weakening of the euro area productivity. The decline in productivity comes mainly from non-industrial sectors: the disappearance of productivity gains outside the industry explains the overall slowdown in productivity (Artus, 2013 a).

These various heterogeneities are incompatible with the rules and institutions based on the homogeneity of Eurozone economies.

### 4 Principal Component Analysis

As has been shown above, the euro area is suffering from a heterogeneity which was intensified after the 2008 crisis. The question therefore arises: Would there be "sub zones" in the Eurozone? Was the convergence process set in place between 1993 and 1999 accomplished?

To answer these questions, we conducted an analysis of the data through the principal component analysis (PCA). This is an approach that is both geometric the variables are represented in a new space, according to maximum inertia directorates and Statistic research on independent axes explaining at best the variability, the variance and the data.

As briefly specified in the first chapter, and more widely in the second, nominal convergence was favored at the expense of real convergence. The 2007-2008 financial crisis confirms that optimal monetary policy for all the countries in the Eurozone goes through real convergence of economies. And the heterogeneities that cause other contradict the expectations of the theory of endogenous criteria of optimum currency areas. In fact, during crises in particular, it is true to say that these are endogenous differences.

Actually, according to a simplified diagram of the mechanisms of discrepancies within the EMU, the single monetary policy that evolves independently of cyclical phases of different economies, manages a single exchange rate policy for different real exchange rates because of disparities in inflation rates. The importance of consequences on growth, unemployment, investment and current accounts in different countries of the Eurozone amplifies the phase difference between the economic cycles of different countries.

Indeed, the divergence of inflation, largely explained by differences in unit labor costs, has resulted in a multitude of real exchange rates and of real interest rates in the Eurozone. Disparity in interest rates between countries has driven in turn, depending on the sensitivity of these countries to interest and inflation rates, to severe credit cycles in south Europe and to divergences in investment and growth rates that have an effect on the productive specialties. The latter, already divergent given the different factor endowments, have been exacerbated by differences in investment rates but also savings rate. The dispersion of the savings rates is also dependent on interest rates, but it can also be explained by population aging in some countries.

These factors contribute to the explanation of the differences in levels of price and non-price competitiveness of the euro area. In effect, while the northern countries specialize and export goods with high technological content, other countries are marked by low rates of investment in research and development, their competitiveness is largely influenced by the change in euro exchange rate and the prices of fossil energy.

The countries of the Eurozone having different indebtedness levels also have different tax policies, which accentuates the differences in terms of investment incentives and of public investments.

Thus, a set of factors explains the divergences in front of the symmetric shocks and the vulnerability to asymmetric shocks.

A PCA was performed to account for the convergence in its two dimensions: the nominal and the real. The data used arise from the analysis presented in the first two chapters.

VRIABLE	SOURCE	
Gross domestic product	IMF	
Total investment	IMF	
Gross national savings	IMF	
Inflation	IMF	
Volume of imports	IMF	
Volume of exports	IMF	
Unemployement rate	IMF	
General government debt	IMF	
General gouvernement revenue	IMF	
unit labour cost	OECD	
Long term interest rates	OECD	
Domestic investement in research and development	OECD	
Alternative and nuclear energy % of total energy use	WB	
Population growth	WB	

Table 2.2: Data [1993, 1999, 2008, 2014]

The Principal Component Analysis is one of the multivariate data analysis methods most used.

The PCA consists in replacing a family of variables (table 2.2) with new variables that are linear combinations of the source variables. These new variables, called principal components, define factorial planes that are the basis for a flat graphical representation of the initial variables. Interpretation of the results is generally restricted to the first two factorial designs, provided that they explain most of the variance of the scatter plot of the initial variables.

There are several applications for the PCA, including: visualization of observations in a two or three dimensional space, to identify homogeneous groups of observations, or rather, atypical observations.

The PCA can be regarded as a projection methodology that allows for projecting sighting since a p dimensional space of the p variables towards k dimensional space (k < p) such that the maximum information is preserved on the first dimensions. If the information associated with the first 2 or 3 axes represents a sufficient percentage of the total variability of the scatter plot, the observations will be able to be represented on a 2 or 3 dimensional graph, thus making interpretation much easier.

To determine the number of factors that must be considered in the interpretation of the results, the screen test can be used (Cattell, 1966) which is based on the decreasing curve of the eigenvalues (Graph 2.17). The number of factors to be considered corresponds to the first point of inflection detected on the curve. It is also possible to use as a basis the cumulative percentage of variability represented by the factorial axes and settled for a certain percentage.



Graph 2.17: Histogram of eigenvalues in %

Graphs of scatter plots reported in Figures 2.18, 2.19, 2.20 and 2.21 are built in projection on the factorial planes 1 (horizontal), 2 (vertical). The dispersion of the points is consistent with the economic situation of countries. The first two axes can explain successively for the years

1993, 1999, 2008 and 2014: 57.98%, 66%, 58.19% and 72, 71% of the total inertia of the point cloud.

The study seeks to follow the convergence of the countries of the euro area over the period from 1993 to 2014 through the scatter plots obtained from the principal component analysis. We retain four key years: 1993, 1999, 2008 and 2014, corresponding to the establishment of the European Union and the single market between 1993 and 1994, the introduction of the euro in 1999, the euro area crisis in 2008 and 2014 for the phase after the crisis.

Graph 2.18: Results of the principal component analysis: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain: 1993



Source: own calculation

Graph 2.19: Results of the principal component analysis Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain: 1999



Graph 2.20: Results of the principal component analysis Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain: 2008



Graph 2.21: Results of the principal component analysis Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain: 2014



Source: own calculation

The PCA carried shows an evolution of economies with time. They converge in 1999. Ireland and Spain appear to be the countries that have made the greatest efforts to converge between the EMS crisis and the introduction of the single currency. These same countries have unhooked significantly in 2008. The results in 2014 show that the north/south divide persists.

To give more details, the PCA in 1993 (Graph 2.18) has displayed 5 groups: 1) Italy and Spain, 2) Portugal and Greece, 3) France and Finland, 4) Luxembourg, the Netherlands, Austria and Germany and finally a fifth group consisting of Ireland and Belgium.

This classification is broadly consistent with the classification of the EMS currencies performed by (Eichengreen et al., 1994) : 1) Lira: clearly overvalued; 2) a group of dubious currencies: the peseta and the Finnish markka outside the EMS which have also been

attacked in 1992 and had to abandon their unilateral link to the ECU, 3) the Belgian and French francs, the Irish pound for which there was no indication of overvaluation and who, after all, been attacked several times before being forced to adopt wide bands of fluctuation in August 1993. Finally, two currencies have maintained their status of hard currency, the German mark and the Dutch guilder. The overvaluation, is therefore far from fully explain the crisis.

The remaining differences between the classification of Eichengreen et al., (1994) and the classification highlighted by the PCA (Graph 2.18) can be explained by factors other than those inherent in exchange rate regime and overvaluation exchange rates of different currencies. In fact, several explanations, other than the overvaluation of certain currencies can be advanced.

This shock required a real appreciation of the Deutsch mark in the short term. An excess demand in the former German Democratic Republic was to appear. On the one hand, the supply collapsed. On the other hand, the unification had the effect of suddenly increasing the permanent income and therefore caused a rapid increase in consumption (Eichengreen et al., 1994). Simultaneously, private investment benefited from marginal productivity of capital, at that time, potentially very high, which attracted more foreign capital. Finally, public investment infrastructure, housing, telecommunications, and environment accelerated. But in an open economy, excess demand cause an increase in the relative price of domestic products engendering a real appreciation. This real appreciation was inevitable. It could be achieved in two ways. This real appreciation was inevitable and it could be obtained in two ways. A nominal appreciation of Deutsch mark would have allowed decoupling this currency from other European currencies. Another possibility was that the German prices rise relative to the prices of their partners. The first option was rejected by France, followed in this by the other

candidates for hard currency status; the second one could be achieved in two ways: Inflation in Germany climbs above the levels observed elsewhere in EMS countries, or inflation falls below the German rates in the EMS countries. The predictable determining of the Bundesbank to not to tolerate significantly higher inflation in Germany excluded the first possibility. Deflation had been the choice. This reasoning implies that, even if the other EMS currencies were not overvalued before reunification, they were constrained to become. The transmission of the shock involved the improvement of current accounts and the profitability of the manufacturing sector in countries other than Germany. It is the absence of such a evolution that would be an overvaluation symptom, and it is the case of Italy.

A second explanation is linked to the recession that has gripped Europe since 1991. Paradoxically, the attachment to the Maastricht fiscal criteria led the market to conclude that the only option was that of a monetary easing. The rational expectation of policy changes explains the activation of attacks even if fundamentals don't justify it. The less committed countries, at the time, in the process of monetary union Italy, Spain and Portugal were the first suspected to change their policies. In this context, the debate on the need to reduce interest rates, which appeared in France at the beginning of the summer of 1993, provided to the foreign exchange market the signal for attack. Moreover, from the time when some countries had either left the EMS and let their currencies depreciate or devalued their currencies into the EMS, the remaining countries had suffered, de facto, appreciation of their exchange rates, which increased the pressure.

The third explanation is the self fulfilling speculation mechanism. Speculative attack predicts an attack even if the monetary authorities are opposed to any change in policy. This interpretation is based on the idea that there are multiple equilibriums that may lead to selffulfilling attacks (Flood and Garber, 1984), (Obstfeld, 1986). The Maastricht Treaty could have built perverse incentives in this regard. The convergence criteria have been designed as an incentive to adopt stringent policies. The challenge is membership in the EMU. But if an attack forces a country to devalue or to withdraw from the EMS, the situation is changed dramatically: without the possibility to access to EMU, the arbitrage between rigor and relaunch can brutally tilt on the side of the re-launch. This is what has happened in Italy and Spain.

The chronology of the crisis may also provide an explanation in some extent to the dispersion of countries in 1993. The sequence of attacks targeted successively the Italian lira in a difficult position since June 1992, the Spanish peseta and the Portuguese escudo devalued several times. In fact, the EMS crisis in 1992-1993, was one of the first major events of the highly contagious recent crises. The crisis hit the countries whose currencies might appear weak Italy, Spain and has been expanded to economies whose currency did not show weakness risks France<sup>10</sup>, Ireland while sparing some currencies Netherlands (Boyer et al., 2004).

To give more details, the first problem that occurred concerned mainly the lira and the peseta. Despite sustained efforts and some success in reducing inflation in Italy and Spain, the two countries have failed to bridge the gap between the German inflation rate and theirs because of the difference in credibility between Spanish and Italian monetary authorities on the one hand and the German monetary authorities on the other. This difference has made the reduction of inflation expectations difficult in the South (De Grauwe, 1999).

<sup>&</sup>lt;sup>10</sup> The problem that has hit the franc was different. The comparison the economic fundamentals of France with Germany shows that the two countries had similar performance (De Grauwe, 1999).

In total, all EMS currencies have seen their parity vis-à-vis the Deutsche challenged, with the notable exception of the guilder thanks to aligned macroeconomic policy since 1982 on that of Germany. The initial problem is certainly heterogeneity of goods markets, labor leading to inflation disparities (Artus, 2010).

In 1999, a significant change occurred as can be seen in (Graph 2.19). Italy and Spain and Ireland seem to have made the most significant effort to converge. But the 2008 crisis shows another reality, that of a divergence between all the countries of the euro area. This heterogeneity has not been corrected in 2014 despite a decrease in divergence with respect to 2008. On the contrary, in 2014, more than ever, the two landscapes of the euro area are opposed. Axis 2 opposes Portugal, Ireland, Greece, Spain and Italy on the one hand; Germany, Austria, the Netherlands, France, Belgium and Finland on the other.

In general, Greece and Luxembourg are the antithesis of each other, with respect to the first factor or to the second one which is not against-intuitive. Italy, Spain, Ireland, Portugal and Greece appear to be the most sensitive countries in the advent of crises even after the introduction of the euro area.

The endogenous optimality of a monetary union which must be achieved over time, as predicted by Frankel and Rose (1998), has not been reached on the contrary. Rather, it is an "endogenous divergence." The increase in intra-EMU trade appears to have been more the result of an inherited tendency of monetary unification (Berger and Nitsch, 2008). During times of crisis, the historical economic relations resist Germany, Austria and the Netherlands. Would the optimality of the Eurozone be a matter of time?

The sovereign debt crisis is also the crisis of accumulation of heterogeneities. Indeed, the single currency has neither induced homogenization nor rapprochement of the economies of

the euro area so that they can cope with symmetrical and asymmetrical shocks nor permitted the establishment of a system of redistribution.

Symmetric shocks as well as asymmetric shocks, given the disparities between the economies of the euro area, were amplified by membership of the euro area (Artus, 2010). Regarding the first type of shock, a common monetary policy can be expansive for some countries and restrictive from others (Mattheieu and Sterdinyak, 2007). Regarding the second, it is a matter to having a high flexibility of prices and wages, high mobility of labor, a sufficient degree of federalism in order to face it, these are unfulfilled conditions.

Therefore, faced with changing dollar/euro exchange rates, it was not expected that the countries of the Eurozone react the same way, despite the fact that they share a single currency. The nominal appreciation of the euro against the US dollar has provided benefits for Germany by reducing the cost in euro of extra-EU imports which account for 60% of German imports, facilitating thus lower inflation and enabling German companies to maintain and even increase their benefit margins.

Between 1999 and 2008, de-industrialization has led to an increase in the external deficits of peripheral countries in the context of the absence of public money flows and of transfers between surplus countries and deficit countries which led to the accumulation of external debt and to crisis; especially that there was no support for job creation or reindustrialization in favor of countries in difficulty. Structural problems remained so despite the establishment of economic and monetary zone.

Consider the automotive industry as an example of the process of productive specialization within the euro area. This is obviously an example which can be verified in many areas. In the mid-1980s, Germany was producing 38% of European automobiles when France was

producing 31% (Krugman, 1993). After the monetary union, between 2000 and 2012, car production fell sharply in France, while it increased in Germany. In 2011, Germany produced more than 6 million vehicles on its territory against just over 2 million in France. Half of the vehicles manufactured in the euro area are German against 35% in 2000. Germany has strengthened its specialization in the automotive industry. Germany has strengthened its leading exporter position in the automotive industry thanks to specialization in high-end models enjoying from an advantage of non-price competitiveness. The cars sale allows thus generating much more margin.

The evolution of labor costs in France was not in favor of keeping car production on French soil. Unit labor costs in France are now higher than the unit labor costs in Germany when it was lowest before the introduction of the euro area. This difference is not only caused by the disparity of unit labor costs. Indeed, the French net salary is lower than the German one. This is explained by divergent fiscal policies implemented in the two countries: during the 2000s Germany increased the VAT and decreased social contributions of companies, which has reduced unit labor costs.

Furthermore, German manufacturers, positioned in the high-range which is not penalized by the cost of labor and the strong Euro, have developed a localization strategy. They kept the final assembly in Germany and outsourced the production of spare parts to Eastern Europe Czech Republic, Poland, where labor is relatively skilled but less expensive. They are therefore committed to the path of "segmentation of the value chain. This enables German manufacturers to realize significant margins even if the euro appreciates, while maintaining the essential of the production part with an important added value contribution on its soil. The costs control in Germany is accompanied by measures that avoided the resorting to massive layoffs. For example, during the 1992 crisis, Volkswagen workers have agreed to wage concessions. Thereafter, the nominal wage losses were offset by increases due to the healthy group. Volkswagen has granted wage increases in 2011 and 2012 and all its employees received bonuses og participation of more than 7,000 Euros in 2012 and 2013. This catch-up of wage concerned the whole of the German automotive industry. German performance comes at this level largely explained by the cohabitation between macroeconomic and microeconomic policies and measures (Gravet, 2014).

On the other side, since the outbreak of the crisis, the troubled countries experience a decline in their wage rates and an improvement of their competitiveness. But this competitiveness improvement and the rebound of current accounts is associated with a drop in activity and rising unemployment. Indeed, the decline in domestic demand and thus the induced recession has led to a sharp rise in corporate bankruptcies or massive decline in investment of companies that succeeded to resist.

The sovereign debt crisis has exposed the limits of European monetary integration and sparked a revival of economic debate between proponents of re-launch by public debt and advocates of rigour policy favorable to deleveraging of states, businesses and households. But anyway, heterogeneous reactions of different countries to the use of budget instrument make the problem of economic policy coordination between members states more complex (Mazier and Saglio, 2004).

Other explanatory elements that were not included in the principal components analysis that should play an important role in explaining the heterogeneity as forms of wage negotiations in the various countries of the euro area (Estevez-Abe et al. 2001), or institutional barriers, the very incomplete mutual recognition of diplomas and qualifications, the differences between unemployment insurance regimes and non-transferability of rights acquired under the national health insurance and pension schemes. In addition, the legal conditions are different in the different countries of the area, especially when it comes to the financial relationship between the production system and the banks; the financing conditions in themselves differ from one country to another. Many other factors lead to suggest that, in addition to economic fundamentals, political will is required to reduce the heterogeneity of the area.

### **5** Conclusion

The rules and institutions of the euro area are based on the idea of the homogeneity of the area's countries; now the various heterogeneities are incompatible with these rules and institutions. Following the intervened developments since the creation of the Euro, the finding of an exploded Eurozone becomes evident.

Since the recent crisis has its roots in macroeconomic imbalances that have developed in the euro area, it is essential for the proper functioning of the European Union to reduce the sources of heterogeneity among member states. However, this is not necessarily the monetary policy spring. The ECB conducts a monetary policy for the entire euro area by setting a single interest rate, which does not allow it to take into account the heterogeneity that characterizes the Union.

The main problem in the euro area is the growing heterogeneity of member countries, important part of which is related to the productive specialization of regions.

A series of measures is needed to reduce heterogeneities and consequently to maintain economic and monetary zone. Otherwise the abandonment of monetary sovereignty becomes unsustainable for a significant number of countries in the euro area. Beyond the urgent economic measures, institutional reform allowing for the financing of external deficits of deficit countries is required instead of debt. This institutional development will take many years. In the short term, it seems that the maintenance of public funding mechanisms for deficit countries is necessary.

The idea that has been defended by Frankel and Rose advocating that the properties of a monetary zone evolve over time is checked, but this development is in line with a growing

disparity. The Eurozone fuels a dynamic of endogenous divergences. The heterogeneous economic structures amplify the asymmetric shocks and distort the symmetric shocks whose effects become asymmetric. The relationship between Germanic countries is the strongest among intra euro area relationships given their historical, economic and cultural background. It may therefore be early to judge the optimality of the euro area.

# Part II

This part is intended to study the euro behavior, thus two complementary chapters were developed around this subject. It is composed of the two chapters three and four.

The disparities of price levels have implicated that despite the fact that euro area countries share the same currency; the real effective exchange rate is divergent between Eurozone countries. In fact, the real effective exchange rate is a measure of competitiveness. It corresponds to the nominal exchange rate index deflated by the prices index and adjusted by the trade-weight of each country against its trading partners. Hence, it fluctuates differently between countries even if the exchange rate is irrevocably fixed.

Chapter three is an investigation of the determinants of real effective exchange rate according to their exchange rate regimes allowing the capturing of the currency union exchange rate regime and the transfer effect on exchange rate evolution. A special attention is paid to the transfer effect on the real effective exchange rate since that contrary to the general wisdom an increase in the net foreign assets generates a depreciation of the real effective exchange rate.

The fourth one focuses on the behavior of exchange rate regime compared to an equilibrium level computed since the estimated model of exchange rate determinants. The equilibrium exchange rate is determined according to the behavioral equilibrium exchange rate. The BEER approach tries to explain the behavior of the exchange rate by considering the origins of the cyclical and temporary movements of the real exchange rate and also by taking the given values not necessarily at the full employment values of the fundamental determinants of the real exchange rate. The chapter shows specially that the behavior of real effective exchange rate depends on the consideration or not of the exchange rate regime. The chapter also puts forward the heterogeneity of the euro area.

## Chapter III: The Transfer Effect: A Comparative Perspective between the European Monetary Union Regime and Fixed and Floating Regimes

### 1. Abstract

In this chapter <sup>11</sup>we examine the determinants of the real effective exchange rate for several countries over the 1980-2007 period according to their exchange rate regime. Based on panel cointegration techniques, we estimate the long run relationship between the exchange rate and a number of fundamental variables, often considered by the theoretical and empirical

<sup>&</sup>lt;sup>11</sup> Bouchoucha M., The transfer effect: A comparative perspective between the European monetary union regime and fixed and floating regimes, Economie Internationale 1/2011 (n° 125), p. 105-131

literature as important exchange rate determinants, namely relative productivity, net foreign assets and terms of trade. Our results show that the exchange rate regime influences the real exchange rates determinants, and that the "European Monetary Union" fixed exchange rate regime type differs substantially from the "traditional" fixed exchange rate regime and the floating one. In particular, we show evidence that an accumulation of foreign assets, contrary to conventional wisdom, is associated with real depreciation.

JEL Classification: C33, F36, F41

Keywords: real effective exchange rate, exchange rate regime, panel data, cointegration.

### 2. Introduction:

There is an extensive literature on the determinants of real exchange rate behaviour (Froot and Rogoff, 1996), (Stein and Allen, 1997), (MacDonald and Stein, 1999). However, there is relatively little empirical work that addresses the influence of exchange rate regimes on the determinants of exchange rates, particularly to assess the quantitative significance of the transfer effect.

Indeed, the relationship between international payments and real exchange rates is an important question in international economics. In the current debate concerning the choice of exchange rate regimes by emerging market economies, the existence of a powerful transfer effect may suggest a preference for nominal exchange rate flexibility in order to allow the real adjustment to take place as smoothly as possible (Lane and Milesi Ferretti, 2004). Otherwise, there is a major role played by the transfer effect in different "new open-economy macroeconomic" models that highlight the importance of the net foreign asset position as a variable that can generate persistent effects even in the case of temporary shocks (Obstfeld and Rogoff 1995), (Lane, 2000).

Our objective in this paper is to provide a comprehensive investigation of the empirical importance of the transfer effect in relation to exchange rate regimes. A second motivation for this study is to highlight the role of the net foreign assets in the Eurozone viewed as a particular fixed exchange rate regime. This issue is particularly important in the actual situation of the Eurozone given its important level of heterogeneity.

Furthermore, if the current account of the Eurozone is balanced on average, intra-European balance is not achieved. Actually, since the mid-1990s, southern European countries have been experiencing a sharp deterioration in their current accounts (Graph 3.2), with deficits reaching 10% of GDP on average. On the contrary, the northern countries have accumulated surpluses.

In fact, the euro has increased the structural differences among eurozone countries. The appreciation of the euro has increased this heterogeneity. For example, only France and Germany have a positive net foreign asset position (NFA) (Graph 3.1).

Against this background, we study in this paper the determinants of exchange rates with respect to exchange rate regimes from a comparative perspective. Indeed, in theory, it is widely accepted that the constraints associated with relative price adjustments differ according to exchange rate regimes.

However, this conclusion does not hold in the empirical literature which excludes the differentiation of exchange rate regimes (Lane and Milesi-Ferretti, 2004), (Ricci et al., 2008).

Analysing exchange rate evolutions according to the exchange rate regime is even more important given the proposition that the exchange rate regimes which are announced are not necessarily implemented. For example, Calvo and Reinhart (2002) show that emerging countries intervene actively in FOREX markets to avoid high volatility of exchange rates. Reinhart and Rogoff (2004) argue that the use of market-determined rates would give a different version of the history of exchange rate policies.
Levy-Yeyati and Sturzenegger, 2005) propose a new classification for exchange rate regimes which differs considerably from the classification presented by the IMF<sup>12</sup>.

This paper is organized as follows. The first section discusses the role of the exchange rate as an adjustment mechanism according to the exchange rate regimes, focusing on the impact of the abandonment of exchange rate as a tool for regulation in a monetary union. In section two we present the determinants of the exchange rate. The third section deals with the econometric methodology. Section four deals with the estimation results and the fifth section is devoted to ensuring the robustness of our results. The final section is a conclusion.

# 3 Adjustments in the European Monetary Union: Exchange Rate vs. Relative Prices.

It is well known that while a country with a floating exchange rate regime has the ability to make adjustments using the exchange rate to improve competitiveness and rebalance the current balance, imbalances cannot be corrected using the exchange rate in the Eurozone countries.

In addition to the previous constraint, whereas exchange rate misalignments, that can largely explain these imbalances, can be corrected by variations in nominal exchange rates and / or adjustments in the fundamental determinants in relative prices, the situation of countries in a monetary union is different. Indeed, the international trade of euro member countries is no longer affected by fluctuations in the nominal exchange rate, leaving the task of adjusting the real exchange rate to the fundamentals.

<sup>&</sup>lt;sup>12</sup> The foreign exchange market is a worldwide decentralized over-the-counter financial market for the trading of currencies.

The European case is very interesting for different reasons. Indeed, the fixity of the European exchange rate is irrevocable and very rigid, even in comparison with a fixed exchange rate regime outside the monetary union, which still preserves the possibility of devaluation.

Since the exchange rate as an adjustment mechanism has been definitively abandoned in the euro area, other mechanisms have been implemented. In this respect, we can cite the mobility of production factors, as labour, which is considered as a potential method of adjustment by traditional theories of optimum currency areas (Mundell, 1961), (McKinnon, 1963), (Kenen, 1969). At the same time, wage and price flexibility are also advocated as means of intervention at the regional level.

The high stakes associated with these types of adjustments depend on the asymmetry of shocks and structural changes affecting the functioning of the European Union. That said, with the disappearance of the national currency and interest rates, these types of adjustment cannot replace the exchange rate as an adjustment variable and compensate for its disappearance (Mazier et al., 2002).

As for adjustment by price flexibility, it has been argued that it can only provide an incomplete and very slow rebalancing. Furthermore, the responses to a shock of similar magnitude differ greatly from one country to another within the monetary union, especially because of the advantage of non-price competitiveness enjoyed by the economies of the center (Mazier and Saglio, 2004).

For labour mobility, the barriers remain significant (the language barrier, segmentation of the credit market ...), which represents an obstacle to necessary adjustments of the European economy. Also, the differences in labour market institutions may induce a cost in the Monetary Union.

Regarding physical capital mobility, it can only be expected to play the role of labour mobility in the long run. Indeed, it may be successful in reducing regional disparities across countries over time, rather than accommodating temporary shocks. Indeed, the installation of plant and equipment requires a long period of time and flows of physical capital are not able to induce fast redress of less developed areas (Sarno and Taylor, 2002).

The recent crisis in Europe in 2010 might be a good illustration of the differences in the evolution of different economies.

So, for instance, even though the euro has appreciated since 2000 (Appendix A), as a whole, the evolution of price-competitiveness for the countries of the euro area, measured by the real effective exchange rate REER differed between European countries. Germany, for example, has gained competitiveness since 1994, and has maintained its REER relatively constant since 1999. On the contrary, Portugal has been more affected by the appreciation of its real exchange rate (Appendix B).

In terms of inflation, for example, countries that joined the European Union are constrained by a maximum inflation rate, given the importance of price stability in a fixed exchange rate monetary union type. Therefore, when some countries are required to reduce their overall level of prices, others are instead called upon not to intervene against the drift of prices.

In addition to the previous specificities and because of the European Union borders, it is interesting to study the factors that determine the real exchange rate for this group of countries. Indeed, given the constraints associated with belonging to the Union, we should expect the classical determinants of the real exchange rate to act in a different way.

#### 4 Determinants of real exchange rates

Theoretically, the determination of the real exchange rate is associated with financial factors in the short-term and with real factors in the longer term. We can cite two theoretical approaches for the analysis of the determinants of exchange rates (Plihon, 2006). The first one determines the exchange rate by the goods and services the situation of the current account balance, the Purchasing Power Parity and relative prices while the latter is determined according to the financial approaches of the real exchange rate the influence of monetary and financial variables<sup>13</sup>, the instability of exchange rates<sup>14</sup>.

These different theories for exchange rate determination may be unable to correctly predict the evolution of exchange rates in the short term. To find the determinants of exchange rates in the longer term, theories of equilibrium exchange rates have therefore emerged. These theories identify a number of determinants of the exchange rate considered as fundamentals.

We can define three equilibrium exchange rates corresponding to a temporal classification (Bénassy-Quéré et al., 2009).

Firstly, the purchasing power parity approach, though relevant in the very long run, does not provide any insight of exchange-rate adjustments that would be consistent with world imbalances being unraveled. In fact, in general, conclusions of empirical work indicate non-verification of the PPP (Rogoff, 1996). Secondly, the approach of the Behavioral Equilibrium Exchange Rate (BEER) (Clark and MacDonald, 1998) holds a set of fundamental variables that can influence the real exchange rate, such as the long-term terms of trade, the

<sup>&</sup>lt;sup>13</sup>1) The flexible price monetary model, 2) portfolio choice models and 3) efficient markets theory.

<sup>&</sup>lt;sup>14</sup>1) Rational speculative bubbles model, 2) exchange rate overshooting theory, mimicry and behavioral heterogeneity approaches and 3) currency crises models.

price of oil, labor productivity, or net foreign assets. Finally, the Fundamental Equilibrium Exchange Rate (FEER) (Williamson, 1985) is an approach that focuses on the medium term. This exchange rate is defined as the real exchange rate designed to maintain medium-term economic activity at the highest possible level, taking into account the constraints of the internal balance inflation and unemployment as well as those of the external one balance of basic balance.

For this article, we selected three variables considered both as fundamental in the economic literature and as long-run determinants of the exchange rates in several empirical studies (Bénassy-Quéré et al., 2009), (Lopez-Villavicencio and Mignon, 2009), (Coudert et al., 2008), (Clark and MacDonald, 1998), (Égert et al., 2007), (Lane and Milesi-Ferretti, 2004), (MacDonald, 1998). The theoretical effects of these fundamentals on the real exchange rate are discussed below.

First, through the ratio of net foreign assets relative to GDP, we study one aspect of the relationship between international payments and the real exchange rate.

This relationship is a classic debate in international economics, particularly over the last decade, due to an increase in the liberalization of international markets. Theoretically, one would expect a real appreciation to be associated with the accumulation of net foreign assets in the long term and vice versa. Empirical results (Lane and Milesi Ferretti, 2004) show a strong cross-sectional correlation between changes in real exchange rates and changes in net foreign assets too, in both industrial and developing countries.

For instance, a deficit in the current account creates an increase in the net foreign debt of a country, which has to be financed by internationally diversifying investors. However, for the associated adjustment of their portfolio structure, they demand a higher yield. At given

interest rates, this can only be accomplished through a depreciation of the currency of the debtor country (Maseo et al., 2001).

Moreover, if current account imbalances are important, even if growth potential is high, risks related to the sources of financing current account deficits, the stability of the financial system or government policies arise. Shocks to the domestic or foreign economies can make the financing of the current account difficult, so that sudden adjustments of the current account may become necessary. This correction can be achieved most easily with a real depreciation. In general, countries with higher growth potential can benefit from running current account deficits for some time; however, these have to correspond to their growth prospects. Otherwise, an adjustment of the real exchange rate becomes necessary. At the same time, a rise in foreign debt as a result of current account deficits puts pressure on the real exchange rate to depreciate in the long run (Égert et al., 2007).

At the same time, if one refers to a Keynesian framework, countries with net external liabilities need to make significant trade surpluses in order to reduce their deficit, which would require a depreciation of the real exchange rate.

In addition, as part of an intertemporal optimization model, transfer effects can have an effect in two cases (Lane and Milesi- Ferretti, 2004). Firstly, in the case of the presence of a national preference for domestic exports, or through the impact of wealth effects on labor supply (Buiter, 1989). In the former case, a transfer from the home to the foreign country implies a decline in global demand for home goods, and hence necessitates a fall in their relative price. In the latter case (Obstfeld and Rogoff, 1995), a transfer from the home to the foreign country reduces domestic wealth and hence raises labor supply and the supply of exportables, affecting their relative price. Secondly, in the context of a Ricardian model, where a range of goods is not traded due to transport costs, a transfer from the home to the foreign country raises spending on foreign nontradables: foreign wages rise, the foreign export sector declines and the home export sector expands. The foreign terms of trade improve and the foreign real exchange rate appreciates.

From an empirical point of view, in their pioneering work, Lane and Milesi-Ferretti (2004) found that a correlation between changes in exchange rates and changes in net foreign assets exists both for developing and industrialized countries. A significant transfer effect is also found in the estimation of fixed effects panel. Furthermore, it is shown that the magnitude of transfer varies with country characteristics, such as the open rate or country size.

Second, the "Balassa-Samuelson" effect, introduced by Balassa (1964) and Samuelson (1964), refers to the distortion in the purchasing power parity PPP due to international differences in relative productivity between tradable and non-tradable sectors. Balassa and Samuelson showed that high productivity leads to a reduction in the relative cost of production and in the relative price of these goods relative to non-tradables, and thus involves an appreciation of the REER (MacDonald and Ricci, 2002). But, we can theoretically expect an increase in productivity that leads to a depreciation of the REER. Indeed, in the presence of home bias, productivity gains in the open sector have a negative effect on the price of home-produced tradables when compared to the price of foreign-produced goods, which yields a real depreciation of the real exchange rate of the open sector through the terms-of-trade channel (Égert and al., 2007).

The question of the Balassa-Samuelson effect arises and it is even more important in the new European situation since the euro area includes countries whose economic fundamentals remain weak, like Portugal, Spain and Greece compared with other European Union countries like Germany or France.

It is therefore legitimate to ask: what are the impacts of heterogeneity on the European Union countries level of development and therefore the impact of the difference in productivity on the real effective exchange rate of these countries?

Finally, there is no consensus regarding the effects that a variation in the Terms of Trade has over the REER (Bénassy-Quéré et al., 2009), (Bénassy-Quéré et al., 2008), (López-Villavicencio and Mignon, 2009), (MacDonald, 1997). Indeed, on the one hand, an improvement in the terms of trade can lead to an income effect due to an increase of the national income. On the other hand, a substitution effect arises due to the appreciation of the exchange rate which, in turn, leads to an increase in the consumption of imported goods and a reduction in the consumption of goods in the sheltered sector. As a result, the demand of non-tradable goods decreases and the real exchange rate depreciates.

Even though the three previous fundamentals are important, in this paper we focus mainly on the effects that the cumulative deficits or surplus in the current account i.e. an increase or decrease of the NFA position have over the real exchange rate. In particular, we are interested in showing that the constraints imposed by the single currency lead to a negative relationship between the accumulation of deficit and the REER, invalidating the classical view. In this sense, the Terms of Trade is seen as a control variable in the analysis.

#### 5 Data Description

As mentioned above, our study focuses on a comparison of the determinants of exchange rates according to exchange rate regimes. In order to carry out this comparison, we consider annual data for the period 1980-2007 for 24 countries (see table 3.1). We classify the countries according to their exchange rate regimes as: i) fixed exchange rate regimes, ii) pegged float regime and crawling peg regime as one regime intermediate regime, iii) independently floating regime and iv) Exchange rate regime with no separate legal tender: eurozone.

However, in addition to a comparison of exchange rate determinants according to exchange rate regimes, we also divide the euro area into two periods: i) The period 1980-1993, characterized by a floating exchange rate system for various European countries and ii) the period from 1994 to 2007 in order to capture the effects of the European Monetary Union on the determinants of exchange rates. The choice of splitting the sample between the pre and post 1993 periods reflects the fact that it was in this year that the European Union was established and the financial and economic integration of its countries began<sup>15</sup>.

It is important to note that the aim of this paper is to compare the determinants according to their exchange rate regime. Thus, the more important results are those comparing the European fixed exchange rate regime with other exchange rate regimes because even before 1993, the Eurozone countries exchange rate operated in fluctuation bands. Yet, we tried to detect the regime change which, a priori, is visible after the last devaluation. But it is not

<sup>&</sup>lt;sup>15</sup> For comparative purposes, we also estimated the model by dividing the panel on two sub-periods [1980-1998] and [1999-2007] to compare the determinants of exchange rates before and after the introduction of the euro see Appendix 5.

illogical to think that it is difficult to capture a regime change for the whole period (1980-2007).

Moreover, the choice of countries was done by referring to the Levy-Yeyati and Sturzenegger, (2005) classification. This classification (Table 3.1) is not conclusive for some countries which are referred to in the classification of Reinhart and Rogoff (2004). The choice of countries was focused on countries that are characterized by a stable exchange rate regime over the period (1980-2007).

Countries	Independently floating regime	Intermediate exchange rate regimes	Fixed exchange rate regime	Exchange rate regime with no separate legal tender: Eurozone
	Australia Canada Chile Japan united Kingdom united states	China Algeria Egypt India	Hong Kong Argentina Denmark Morocco Tunisia	Germany Austria Spain Finland France Ireland Italy Netherlands Portugal Greece

Table 3.1: Classification of countries by exchange rate regimes

Source: Levy-Yeyati and Sturzenegger 2005

The impact of net foreign assets (NFA) has been seized through the ratio NFA / GDP; with the two variables collected from the database Lane and Milesi-Ferretti (2007). Finally, the Terms of Trade were obtained from IFS.

Regarding the real effective exchange RATE, it corresponds to the nominal exchange rate index (2005 = 100) deflated by the consumer prices index (2005 = 100) and adjusted by the

trade-weight of each country against its trading partners. All the data was collected from the IMF.

REER<sub>i</sub> = 
$$\prod_{i}^{j} \left[ CPI_{ij} * XR_{ij} \right]^{weight}$$

Where REER is real effective exchange rate, CPI the consumer price index and XR the nominal exchange rate and weight is the trade weight of each country relative to partners. An increase decrease in a country's index indicates an appreciation (depreciation).

The relative productivity, which is expected to follow the BALASSA-SAMUELSON doctrine, is computed as the relative GDP per worker, obtained from the Total Economy Database from The Groningen Growth and Development Centre.

 $\frac{GDPperwor \ker_{i}}{weighted sum of GDPperwor \ker_{i}}$ 

Where *weighted sum* =  $sum(GDPperwor \ker^* weight)_j$  with j: partner and weights the trade weight of each country relative to partners.

#### 6 Results

As it was mentioned before, for the empirical part of this paper, we used panel data techniques in order to analyse the determinants of the REER for different countries according to their exchange rate regime. In this sense, the first step consists in panel unit root test, we conducted Maddala and Wu (1999) test on all variables.

Given that our panel includes countries that are likely to share many characteristics, as in Coudert et al. (2012), we rely also on second-generation panel unit root tests particularly the Pesaran (2007) CIPS test which is based on Dickey-Fuller-type regressions augmented with the cross-section averages of lagged levels and first differences of the individual series. As shown in Appendix 2 of the thesis, most of the tests conclude in favour of the null hypothesis, meaning that our three considered series are I (1).

Turning to panel cointegration tests, we apply the cointegration tests developed by Westerlund (2007). The tests are based on the null hypothesis of no cointegration and are robust to both cross-sectional dependence and unknown heterogeneous breaks in the intercept and/or the slope of the cointegrating regression.

The test is sufficiently general to allow for a large degree of heterogeneity, both in the longrun cointegration relation and in the short-run dynamics (Persyn and Westerlund 2008).

Results (Apendix 3 of the thesis) show that the null is generally rejected, confirming that the cointegrating relationship is robust to potential level and regime shifts.

On the whole, the currency union has not changed the long-run relation of real exchange rates to their fundamentals. The stability of the relation does not preclude that the time for real exchange rates to adjust to their fundamentals has not lengthened since monetary union. Indeed, the adjustment delay is likely to have increase because the nominal exchange rate cannot adjust anymore and prices are rigid in the short-run. The consequence would be growing currency misalignments within the euro area, as we will see below.

In a third step, we estimated the long-run relationship between the REER and the three fundamental variables mentioned before. Since the unit root tests and cointegration tests concluded that the variables are integrated and cointegrated, the use of certain methods of cointegration<sup>17</sup>, such as the Pooled Mean Group (PMG) estimator developed by Pesaran et al. (2004), the Dynamic Ordinary Least Square (DOLS) developed by Kao and Chiang (2000) and Mark and Sul (2003) and the Fully Modified Ordinary Least Square estimator (FMOLS) developed by Pedroni (1996, 2000, 2001) is necessary. Given its advantages, in this work, only the PMG methodology is retained<sup>18</sup>. Indeed, the Pooled Mean Group can be presented as the intermediate model where the fixed effects, the short-run coefficients and error variances may differ between groups. On the contrary, it imposes the constraint that the long-term coefficients have to be identical. This is explained by the fact that in the long term we can assume an equilibrium relationship between variables.

<sup>&</sup>lt;sup>17</sup> Descriptions of different methodologies, based on the Reference articles, are available in the appendix 1 of the thesis.

<sup>&</sup>lt;sup>18</sup> DOLS and FMOLS are also performed. The results of the estimations are reported in the appendix of this chapter (Appendix G...Appendix P)

Our estimated equation is the following one:

$$\log(REER)_{i} = \mu_{i} + \alpha_{i}NFA + \beta_{i}\log(PROD) + \theta\log(TOT) + \varepsilon_{it}$$
(A)

Where REER is the real effective exchange rate, NFA is the net foreign assets as percentage of the GDP, PROD is the relative productivity and TOT is the terms of trade. All variables are taken in logarithms, except the net foreign asset position.

Tables 3.2 and 3.3 present the estimate coefficient of the long-run relationship for the entire period and for the two sub periods, respectively.

	Independently floating exchange rate regime	Intermediate and fixed exchange rate regimes	Exchange rate regime with no separate legal tender : Eurozone
Number of countries	6	9	10
NFA	0.688	0.617	-0.062
	(4.060)	(21.110)	(-2.720)
PROD	1.073	1.191	0.161
	(4.400)	(49.400)	(3.370)
TOT	0.959	-0.417	0.200
	(11.600)	(-4.110)	(2.490)

Table 3.2: Comparison between exchange rate regimes over the period [1980 – 2007]

Notes:

1/floating exchange rate regime: Australia, Canada, Chile, united Kingdom, Japan, united states

2/ fixed and intermediate exchange rate regimes: China, Algeria, Egypt, India, Hong Kong, Denmark, Morocco, Tunisia, Argentina.

3/ Eurozone exchange rate regime: Austria, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, and Greece.

4/T-stat in parentheses.

5/Data are cross-section demeaned

6/AIC was used to select de lag orders for each group; the maximum lag was 2 for the period 1980-2007; 1 for the period 1980-1993 and 1 for the period 1994-2007 following the rule minimum T i - max lag.

7/The long-run parameters were restricted to be the same across groups.

8/The mean group estimates was used as initial estimates.

	Eurozone Regime	Eurozone Regime	Eurozone Regime
	[1980-2007]	[1960-1995]	[1994-2007]
NFA	-0.062	0.203	-0.036
	(-2.72)	(3.400)	(-3.040)
PROD	0.161	0.081	-0.210
	(3.370)	(3.010)	(-2.930)
ТОТ	0.200	0.180	0.133
	(2.490)	(2.330)	(1.450)

Table 3.3: Comparison between the determinants of exchange rate over the period before the establishment of the European Union [1980-1993] and the successor period [1994-2007]

Notes

1/ Eurozone exchange rate regime: Austria, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, and Greece.

2/T-stat in parentheses.

3/Data are cross-section demeaned

4/AIC was used to select de lag orders for each group; the maximum lag was 2 for the period 1980-2007; 1 for the period 1980-1993 and 1 for the period 1994-2007 following the rule minimum T i - max lag.

5/The long-run parameters were restricted to be the same across groups.

6/The mean group estimates was used as initial estimates.

7/La Back-substitution method was used to compute the log-likelihood function.

From the previous results we can conclude that the determinants of exchange rates cannot be analyzed outside of exchange rate regimes. Indeed, as seen by the estimated coefficient associated to the NFA, the restrictions imposed by the various regimes are not without consequences on capital movements. Furthermore, it is clear that the monetary union can be considered as a particular exchange rate regime.

In particular, in the floating exchange rate regime, the signs of the coefficients of the different variables are positive and significant, corresponding well with theoretical expectations. Indeed, an accumulation of the net foreign assets, as well as an improvement in the productivity or in the terms of trade generate an appreciation of the real exchange rate.

In the case of fixed and intermediate exchange rate regime, only the terms of trade are associated with a negative sign. This can be explained by the fact that an increase in the terms of trade determinates the external competition. In order to overcome this lost of competitiveness, the country who experiences the increase in the export prices has to depreciate. If we look closer to our sample, most of the countries that have fixed or intermediate regime relied heavily on price competitiveness.

In contrast, in the fixed exchange rate regime of the European Monetary Union, the coefficient of net foreign assets is, contrary to conventional wisdom, negative. On the one hand, it could be explained by the catching-up process in some of the less developed countries of the eurozone. So, as demonstrated in a previous study (Égert et al., 2007), this sign could be explained by the fact that in these countries that started their economic transformation with less important current account deficit growth prospects are improved thanks to the European integration. Their market became more open to capital flows. We can understand that the pressure toward currency depreciation may be reduced thanks to the new situation of these economies, especially due to European integration that reduced substantially the risks of failure and distrust before the crisis.

In a previous important work (Blanchard and Francesco, 2002), the authors focused on savings-investment differentials. They found that savings-investment correlations fell significantly especially with the adoption of the single currency. This result was interpreted as a consequence of the increased financial integration in the euro area. They demonstrated that the current account balances of the member states increased with per capita income. This shows that capital migrates from the more advanced to the less advanced euro-area partners, and reflects the scope that existed within the euro-area periphery for catch-up and convergence. Other papers confirm this tendency (Lane, 2010). In fact, they confirm that intra-euro-area capital flows from high- to low-per-capita-income countries.

But, a closer look at the reality of things at this level leads us to argue that it would be more appropriate to say that capital immigrates to countries where domestic distortions excessive budget deficits, and unrealistic expectations concerning the growth perspectives are most severe and structural reforms are least severe (Holger et al., 2009), (Helge and Nitsch, 2010).

This, then, was an example of a tolerable imbalance of countries with attractive investment opportunities and good growth perspectives after the monetary union and the financial integration that followed. This situation implied additional investment in these countries, tapping foreign saving by running current account deficits while at the same time boosting their consumption reducing their own saving to reflect the positive permanent income effect of faster growth and the positive wealth effect of lower interest rates on both counts.

The opposite effects were to be expected in the more advanced euro-area core: less investment given the opportunities afforded abroad, more savings since interest rates were higher, and larger current account surpluses on both counts. But considering that the more advanced economies of the euro-area core were already deeply integrated into much larger global capital markets, one would expect these effects to be less visible.

The upward pressure on interest rates that began in the euro-area core would encourage capital to flow there from the rest of the world, moderating the increase in the cost of capital and the impact on saving and investment rates. So, for example, Germany or the Netherlands, with its highly-developed, financially-sophisticated banks, could borrow from and run current account deficits vis-à-vis the rest of the world and, being currently free from currency risk and transactions costs thanks to the introduction of the European currency, on-lend to Portugal or Spain and Greece. Given the slower development of financial systems at the periphery, this

was the euro-area core acting as financial intermediary between the periphery and the rest of the world (Eichengreen, 2010).

But the supposedly efficient financial system and financially-sophisticated banks at the center of the financial intermediation process, which funded themselves globally in order to load up on Greek, Spanish and Portuguese bonds, turned out to be dangerously over-leveraged institutions stretching for yield and taking on excessive risk, owing to a combination of skewed managerial incentives, the intensification of competition, and the expectation of being protected enough by the European system not to fail (Eichengreen, 2010).

So, going back to 1999, we can see that the peripheral economies were facing a new situation, lower domestic interest rates and the elimination of any possibility of devaluation of their currencies. This led to a series of large macroeconomic effects that were not correctly anticipated: i) a strong stimulation of the credit as a result of lower interest rates, ii) a positive wealth effect as a consequence of higher value of the bonds, iii) an inflow of foreign capital with the disappearance of the risk of devaluation, iv) The long-term capital inflows also pushed up property prices and, to a lesser extent, the prices of risky financial assets. In turn, increases in asset prices multiplied the initial wealth effect. The main effect of this situation was that domestic demand grew at a significant rate. Germany, on the contrary, did not receive any monetary stimulants, without being penalized by the monetary union. Indeed, the real interest rates in Germany have not been significantly affected by the euro since the interest rates in the European Monetary Union converged to German rates, not to an average of past rates, which was also a crucial condition for the implementation of EMU. There was therefore no reason to assume that growth could be severely unbalanced. Yet that is what happened: German domestic demand virtually stagnated between 1999 and 2007 at a rate of 0.8% per year, while domestic production increased twice as fast.

On the other hand, differences in growth rates across countries may lead to trade balance problems for the fast- growing countries, whose imports tend to grow faster than their exports; the problem is accentuated by the impossibility of depreciation<sup>19</sup> to gain competitiveness. To overcome this constraint, governments try to find different combinations of debt and monetary financing of the government budget deficit (Sarno and Taylor, 2002), especially with the weaknesses and limitations of the adjustment mechanisms implemented to remedy the irrevocable fixing of exchange rates of the euro vis-à-vis all the European currencies. As can be seen clearly (Graph 3.1), only Germany and France have a positive ratio NFA / GDP. In other countries of the Eurozone the deterioration of their net foreign assets is associated with a real exchange rate appreciation.

In a more detailed manner, for exemplification, the evolution of the NFA ratio to GDP from Germany and Portugal yields interesting features. First of all, it may be noted that foreign assets in Portugal did not evolve in the same direction as the net foreign assets of Germany See (Graph 3.1). In this sense, we can focus on the case of Germany, which has a large trade surplus see (Graph 3.2). Even if we consider the loss of competitiveness of the euro against the dollar due to the appreciation of the exchange rate of the former, Germany was able to consolidate its trade balance due to intra-European trade. On the other hand, if we look at the Portuguese case, we can notice that the trade balance deteriorated See (Graph 3.4). This worsening of the NFA in Portugal can no longer be reversed using the exchange rate as an instrument as predicted by the theory. Put in another way, the REER will depreciate as a result of cumulative deficits in the current account if and only if the nominal exchange rate depreciates. Given the constraints of the euro country members, this is clearly not the case.

<sup>&</sup>lt;sup>19</sup> A deflationary policy will constrain the growth process.



Graph 3.1: Net Foreign Assets: Germany, Portugal [1980-2010]

Source:

1/Database online Philipe Lane 2007 for the NFA.

2/IMF-WEO for current account and GDP.

Notes:

1/For the years 2008.2009 and 2010 NFA were calculated by adding the value of the current account and dividing by GDP.

2/ Forecast for the year 2010 for GDP and current account.



Graph 3.2: Current Account: Germany, Portugal [1980-2010]

In fact, due to lower wages in real terms, Germany has managed to regain its price competitiveness. Indeed wages have increased only slightly in recent times, thus succeeding to lower the unit labor cost. Yet, if we consider the unit labor costs in Germany by taking into account developments in the euro / dollar exchange rate, it was penalized by the appreciation of the euro. On the contrary, although German trade and competitiveness are affected by the strong euro outside the euro area, the increase in its trade balance has been achieved mainly through trade with its European partners. German trade surplus supply, therefore, the trade imbalances in the euro area, because the counterpart of this German surplus is, in part, the deficit of other European countries.

Source: IMF-WEO





Source: IMF-IFS

Theoretically, an increase in productivity in the tradable sector could lead to a depreciation of the real exchange rate of the open sector through the terms-of-trade channel. Indeed, unless domestic traded goods firms have no pricing power in home and foreign markets, a rise in productivity in the domestic sector will also lower the price of home-traded output relative to that abroad. In this sense, Benigno and Thoenissen (2003) on the basis of calibrated coefficients, show that an increase in productivity in the open sector yields an overall depreciation of the real exchange rate because of its negative impact on the real exchange rate in the open sector depreciation.

In the European case, we can also argue that the negative signs associated with productivity can be explained by the fact that changes in the productivity of some of the countries vis-à-vis their trade partners is not automatically reflected in movements in the real exchange rate (Appendix C). In other words, instead of observing a Balassa-Samuelson effect for countries whose productivity is decreasing, these countries see their exchange rate appreciate.

Moreover, we can see that there was a change in the signs between the first and second period for the countries in the fixed European regime. Indeed, before 1993, these countries behaved as countries in a floating exchange rate regime, and all the signs of the coefficients of the variables were positive. On the contrary, along the second period when restrictions on the exchange rate were actually imposed, negative signs were associated with NFA and relative productivity, which changed signs between the first and second period. These negative signs are then explained by the fact that European countries are in a situation where their exchange rate appreciates, while the net foreign assets and the productivity trend move downward. On the other hand, with the structural heterogeneity among the countries of the European Union, we can expect a shift in the opposite direction between the variables and the European exchange rate. Indeed, only the European central countries, especially, Germany and France may claim a correlation between the appreciation of the euro and the evolution of their economic fundamentals.

If integrating the European Union is associated with several requirements for peripheral countries, these constraints can not circumvent the structural differences that have been increased by the appreciation of the exchange rate, causing the decrease of the exports of several countries which cannot maintain their competitiveness because of a soaring euro. It is also worth noting that the estimated coefficient on the terms of trade during the second period is not significant, meaning that they do not seem to weigh heavily in determining the real effective exchange rate in Europe after the establishment of the Union.

We can also see that the impact is substantially different in magnitude according to exchange rate regimes. Thus, in the monetary union regime, we note that the three variables are associated, in absolute terms, with coefficients whose values are very different compared to those of the other exchange rate regimes. Indeed, we note that these values are particularly low compared to other exchange rate regimes, particularly relative productivity with a value greater than 1 for the floating exchange rate, the fixed exchange rate regime and the intermediate one, but, only of 0.16 for the Eurozone fixed exchange rate. The situation is similar for the NFA whose coefficient is equal to 0.06 in absolute terms in a monetary union.

#### 7 Robustness of the results:

Given that the accumulation of foreign assets, contrary to conventional wisdom, is associated to a real depreciation, in this section, we deepen the study of the determinants of the euro exchange rate to ensure that the sign associated with the net foreign assets is negative. This result was unexpected and contrary to theoretical expectations.

In order to assess the role of Net Foreign Assets in the eurozone, we compare the previous model, which we call Model A, with two simpler models<sup>20</sup>. The first one is based on net foreign assets and relative productivity, and referred to as Model B, while the second one is based only on net foreign assets and is referred to as model C.

$$\log(REER)_i = \mu_i + \alpha_i NFA + \beta_i \log(PROD) + \varepsilon_{it}$$
(B)

$$\log(REER)_i = \mu_i + \alpha_i NFA + \varepsilon_{it}$$
(C)

<sup>&</sup>lt;sup>20</sup> For comparative purposes, we also estimated the model by dividing the panel on two sub-periods [1980-1998] and [1999-2007] to compare the determinants of exchange rates before and after the introduction of the euro (Appendices E, F, H, K, M).

Where REER is the real effective exchange rate, NFA is the net foreign assets as percentage of the GDP, PROD is the relative productivity and TOT is the terms of trade. Tables 3.4 and 3.5 present the estimate coefficient of the long-run relationship for the entire period and for the two sub periods, respectively.

Table 3.4: The determinants of exchange rate in the Eurozone over the period

	Model B	Model C
Number of countries	10	10
NFA	(-0.095)	-0.055
	(-3.347)	(-1.720)
PROD	0.143	
	(2.231)	

```
[1980 - 2007]
```

Notes:

1/ Eurozone exchange rate regime: Austria, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, and Greece.

2/T-stat in parentheses.

3/Data are cross-section demeaned

4/AIC was used to select de lag orders for each group; the maximum lag was 2 for the period 1980-2007; 1 for the period 1980-1993 and 1 for the period 1994-2007 following the rule minimum T i - max lag.

5/The long-run parameters were restricted to be the same across groups.

6/The mean group estimates was used as initial estimates.

	Model B			Model C		
	Eurozone Regime	Eurozone Regime	Eurozone Regime	Eurozone Regime	Eurozone Regime	Eurozone Regime
	[1980- 2007]	[1980- 1993]	[1994- 2007]	[1980- 2007]	[1980- 1993]	[1994- 2007]
NFA	-0.095	-0.165	-0.042	-0.055	-0.174	-0.121
	(-3.347)	(-7.040)	(-4.210)	(-1.720)	(-7.365)	(-8.123)
PROD	0.143	0.010	-0.277			
	(2.231)	(0.312)	(-6.333)			

Table 3.5: Comparison between the determinants of exchange rate over the period before the establishment of the European Union [1980-1993] and the successor period [1994-2007]

Notes:

1/ Eurozone exchange rate regime: Austria, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, and Greece.

2/T-stat in parentheses.

3/Data are cross-section demeaned

4/AIC was used to select de lag orders for each group; the maximum lag was 2 for the period 1980-2007; 1 for the period 1980-1993 and 1 for the period 1994-2007 following the rule minimum T i - max lag.

5/The long-run parameters were restricted to be the same across groups.

6/The mean group estimates was used as initial estimates.

7/La Back-substitution method was used to compute the log-likelihood function.

These results show that the accumulation of net assets generate the depreciation of real effective exchange rate.

Since the introduction of the euro, the adjustments in the monetary union to counteract the asymmetric shocks or asymmetric evolution have become more complex due to the setting of intra-European parities. However, the differences in the evolution of the European economies were higher than expected (growth, inflation ...) and the adjustment recommended to replace the exchange rate do not seem to be enough against these asymmetries. At the same time, the real effective exchange rates of the countries in the euro area appreciate without reflecting the fundamentals of these economies. The evolution of exchange rates in the European Monetary Union is becoming increasingly disconnected

from the evolution of the eurozone economies, especially the economies of southern countries like Spain, Portugal or Greece.

#### 8 Conclusion:

In this paper we study the determinants of exchange rates of a panel of 37 countries, from 1980 to 2007 in a comparative perspective based on their exchange rate regimes. To investigate the impact of the European Union on the determinants of the real effective exchange rate for the eurozone countries, we divided the panel of European countries into two groups by referring to the time dimension. The determinants of exchange rates were estimated for periods ranging from 1980 to 1993 and from 1994 to 2007.

Theoretically, we expected that the signs of NFA, productivity and terms of trade would be positive and significant, implying that an appreciation is related to gains in productivity, in the terms of trade and in the accumulation of a surplus in the current account. However, our results show that this is not the case in our panel of European Union countries. Indeed, in this case, a negative sign is associated with the NFA. Based on this result, we concluded that the exchange rate of the single European currency behaves in a manner that does not reflect the fundamentals of all countries in the area. The structural heterogeneity of countries in the region is well highlighted.

Our results show that the exchange rate regimes determine as well as the economic fundamentals the exchange rate. Indeed, this comparative study shows that the determinants of exchange rates differ according to classifications. Therefore, the exchange rate regime is an essential factor for the study of the exchange rates determinants. The choice of the exchange rate regime is not without consequences on the economy of a country and influences directly and indirectly the behavior of the exchange rate.

Finally, it would be pertinent to ask if the previous fundamental variables are the only determinants of the real exchange rate of the euro members or if we should take into

consideration other factors previously ignored in the literature. This is an important question that deserves further attention.

## **9** Appendices

#### 9.1 Appendix A:

Real Effective Exchange Rate: united states, Eurozone [1980-2010]



Source : IMF-IFS

Note: an increase decrease indicates an appreciation depreciation.

#### 9.2 Appendix B:



Real Effective Exchange Rate: Germany, Portugal and Eurozone [1980-2010]

Note: an increase decrease indicates an appreciation depreciation.

#### 9.3 Appendix C:

RELATIVE PRODUCTIVITY: GERMANY, FRANCE, IRELAND AND PORTUGAL [1980-2010]



Source: total economy database- Groningen University, Author's calculation

Source : IMF-IFS, Author's calculation.

### 9.4 Appendix D:



TERMS OF TRADE: GERMANY, FRANCE, IRELAND AND PORTUGAL [1980-2010]

Source: banque de France.

#### 9.5 Appendix E:

Table 3.6: Comparison between the determinants of exchange rate over the period before the establishment of the European Union [1980-1998] and the successor period [1999-2007]

Model (A)

	Eurozone Regime [1980-2007]	Eurozone Regime [1980-1998]	Eurozone Regime [1999-2007]
NFA	-0.029	-0.118	-0.014
	(-2.500)	(-6.400)	(-7.410)
PROD	0.088	0.080	-0.123
	(4.270)	(2.500)	(-2.560)
ТОТ	0.209	0.210	0.440
	(6.320)	(3.010)	(17.610)

#### Notes

1/ Eurozone exchange rate regime: Austria, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, and Greece.

2/T-stat in parentheses.

3/Data are cross-section demeaned

4/AIC was used to select de lag orders for each group; the maximum lag was 2 for the period 1980-2007; 1 for the period 1980-1998 and 1 for the period 1999-2007 following the rule minimum T i - max lag.

5/The long-run parameters were restricted to be the same across groups.

6/The mean group estimates was used as initial estimates.

#### 9.6 Appendix F:

TABLE 3.7: Comparison between the determinants of exchange rate over the period before the establishment of the European Union [1980-1998] and the successor period [1999-2007] Models (B) and (C)

		Model B			Model C	
	Eurozone Regime	Eurozone Regime	Eurozone Regime	Eurozone Regime	Eurozone Regime	Eurozone Regime
	[19802007]	[1980 1998]	[1999 2007]	[1980 2007]	[1980 1993]	[1994 2007]
NFA	-0.095	0.014	-0.076	-0.055	0.343	-0.086
	(-3.347)	(0.364)	(-3.028)	(-1.720)	(4.289)	(-13.763)
PROD	0.143	0.081	0.026			
	(2.231)	(1.603)	(1.745)			

Notes

1/ Eurozone exchange rate regime: Austria, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, and Greece.

2/T-stat in parentheses.

3/Data are cross-section demeaned

4/AIC was used to select de lag orders for each group; the maximum lag was 2 for the period 1980-2007; 1 for the period 1980-1998 and 1 for the period 1999-2007 following the rule minimum T i - max lag.

5/The long-run parameters were restricted to be the same across groups.

6/The mean group estimates was used as initial estimates.

#### 9.7 Appendix G

Table 3.8: Comparison between the determinants of exchange rate over the period before the establishment of the European Union [1980-1993] and the successo period [1994-2007]:

	Eurozone Regime	Eurozone Regime	Eurozone Regime
	[1980-2007]	[1980-1993]	[1994-2007]
NFA	-0.162	0.124	-0.025
	(-3.889)	(2.679)	(-2.077)
PROD	-0.146	-0.026	-0.009
	(-1.363)	(2.136)	(-1.078)
ТОТ	0.424	0.004	0.408
	(5.799)	(7.659)	(3.397)

FMOLS methodology (Model A)

Notes

1/ Eurozone exchange rate regime: Austria, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, and Greece.

2/T-stat in parentheses.

3/Data are cross-section demeaned

4/AIC was used to select de lag orders for each group; the maximum lag was 2 for the period 1980-2007; 1 for the period 1980-1998 and 1 for the period 1999-2007 following the rule minimum T i - max lag.

5/The long-run parameters were restricted to be the same across groups. 6/The mean group estimates was used as initial estimates.

#### 9.8 Appendix H

Table 3.9: Comparison between the determinants of exchange rate over the period before the establishment of the European Union [1980-1998] and the successor period [1999-2007]: FMOLS Methodology (model A)

	Eurozone Regime [1980 2007]	Eurozone Regime [1980 1998]	Eurozone Regime [1999 2007]
NFA	-0.162	0.136	-0.017
	(-3.889)	(3.256)	(-1.830)
PROD	-0.146	-0.031	-0.011
	(-1.363)	(2.136)	(-1.680)
ТОТ	0.424	0.302	0.601
	(5.799)	(1.720)	(2.976)

Notes

1/ Eurozone exchange rate regime: Austria, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, and Greece.

2/T-stat in parentheses.

3/Data are cross-section demeaned

4/AIC was used to select de lag orders for each group; the maximum lag was 2 for the period 1980-2007; 1 for the period 1980-1998 and 1 for the period 1999-2007 following the rule minimum T i - max lag.

5/The long-run parameters were restricted to be the same across groups.

6/The mean group estimates was used as initial estimates.
#### 9.9 Appendix I

# Table 3.10: The determinants of exchange rate in the Euro Zone over the period [1980 – 2007]: FMOLS Methodolgy

	Model (B)	Model (C)
Number of countries	10	10
NFA	-0.298	-0.186
	(-3.014)	(-2.863)
PROD	-0.460	
	(-3.687)	

Notes

1/ Eurozone exchange rate regime: Austria, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, and Greece.

2/T-stat in parentheses.

3/Data are cross-section demeaned

4/AIC was used to select de lag orders for each group; the maximum lag was 2 for the period 1980-2007; 1 for the period 1980-1998 and 1 for the period 1999-2007 following the rule minimum T i - max lag.

5/The long-run parameters were restricted to be the same across groups.

6/The mean group estimates was used as initial estimates.

## 9.10 Appendix J

Table 3.11: Comparison between the determinants of exchange rate over the period before the establishment of the European Union [1980-1993] and the successor period [1994-2007]:

FMOLS Methodology

	Model B			Model C		
	Euro Zone Regime					
	[1980 2007]	[1980 1993]	[1994 2007]	[1980 2007]	[1980 1993]	[1994 2007]
NFA	-0.298	-0.113	-0.115	-0.186	-0.165	-0.068
	(-3.014)	(-0.898)	(-3.881)	(-2.863)	(-0.327)	(-5.543)
PROD	-0.460	-0.152				
	(-3.687)	(2.231)				

Notes

1/ Eurozone exchange rate regime: Austria, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, and Greece.

2/T-stat in parentheses.

3/Data are cross-section demeaned

4/AIC was used to select de lag orders for each group; the maximum lag was 2 for the period 1980-2007; 1 for the period 1980-1998 and 1 for the period 1999-2007 following the rule minimum T i - max lag.

5/The long-run parameters were restricted to be the same across groups.

6/The mean group estimates was used as initial estimates.

#### 9.11 Appendix K

Table 3.12: Comparison between the determinants of exchange rate over the period before the establishment of the European Union [1980-1998] and the successor period [1999-2007]:

		Model B			Model C	
	Euro Zone Regime					
	[1980 2007]	[1980 1998]	[1999 2007]	[1980 2007]	[1980 1998]	[199 2007]
NFA	0.298	0.194	-0.050	-0.186	-0.099	-0.1199
	(-3.014)	(1.934)	(-4.325)	(-2.863)	(-1.113)	(-3.464)
PPRO	-0.460	-0.538	-0.132			
D	(-3.687)	(-5.014)	(-0.64)			

FMOLS Methodology

Notes

1/ Eurozone exchange rate regime: Austria, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, and Greece.

2/T-stat in parentheses.

3/Data are cross-section demeaned

4/AIC was used to select de lag orders for each group; the maximum lag was 2 for the period 1980-2007; 1 for the period 1980-1998 and 1 for the period 1999-2007 following the rule minimum T i - max lag.

5/The long-run parameters were restricted to be the same across groups.

6/The mean group estimates was used as initial estimates.

## 9.12 Appendix L

Table 3.13: Comparison between the determinants of exchange rate over the period before the establishment of the European Union [1980-1993] and the successor period [1994-2007]:

	Eurozone Regime [1980 2007]	Eurozone Regime [1980 1993]	Eurozone Regime [1994 2007]
NFA	-0.201	0.205	-0.169
	(-2.976)	(6.062)	(-3.640)
PROD	-1.167	-1.371	-1.060
	(-4.363)	(-5.103)	(-2.686)
ТОТ	0.394	0.321	0.527
	(3.399)	(2.982)	(2.317)

DOLS Methodology

Notes

1/ Eurozone exchange rate regime: Austria, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, and Greece.

2/T-stat in parentheses.

3/Data are cross-section demeaned

4/AIC was used to select de lag orders for each group; the maximum lag was 2 for the period 1980-2007; 1 for the period 1980-1998 and 1 for the period 1999-2007 following the rule minimum T i - max lag.

5/The long-run parameters were restricted to be the same across groups.

6/The mean group estimates was used as initial estimates.

#### 9.13 Appendix M

Table 3.14: Comparison between the determinants of exchange rate over the period before the establishment of the European Union [1980-1998] and the successor period [1999-2007]:

	Eurozone Regime [1980-2007]	Eurozone Regime [1980-1998]	Eurozone Regime [1999-2007]
NFA	-0.201	0.166	-0.057
	(-2.976)	(3.256)	(-1.830)
PROD	-1.167	-1.189	-1.023
	(-4.363)	(2.136)	(-1.680)
ТОТ	0.394	0.208	0.414
	(3.399)	(1.720)	(2.976)

DOLS Methodology (model A)

Notes

1/ Eurozone exchange rate regime: Austria, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, and Greece.

2/T-stat in parentheses.

3/Data are cross-section demeaned

4/AIC was used to select de lag orders for each group; the maximum lag was 2 for the period 1980-2007; 1 for the period 1980-1998 and 1 for the period 1999-2007 following the rule minimum T i - max lag.

5/The long-run parameters were restricted to be the same across groups.

6/The mean group estimates was used as initial estimates.

#### 9.14 Appendix N

#### Table 3.15: The determinants of exchange rate in the Euro Zone over the period

	Model (B)	Model (C)
Number of countries	10	10
NFA	-0.301	-0.207
	(-2.347)	(-3.301)
PROD	-1.060	
	(5.384)	

#### [1980 - 2007]: DOLS Methodolgy

Notes

1/ Eurozone exchange rate regime: Austria, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, and Greece.

2/T-stat in parentheses.

3/Data are cross-section demeaned

4/AIC was used to select de lag orders for each group; the maximum lag was 2 for the period 1980-2007; 1 for the period 1980-1998 and 1 for the period 1999-2007 following the rule minimum T i - max lag.

5/The long-run parameters were restricted to be the same across groups.

6/The mean group estimates was used as initial estimates.

## 9.15 Appendix O

Table 3.16: Comparison between the determinants of exchange rate over the period before the establishment of the European Union [1980-1993] and the successor period [1994-2007]:

#### DOLS Methodology

		Model B			Model C	
	Euro Zone Regime					
	[1980 2007]	[1980 1993]	[1994 2007]	[1980 2007]	[1980 1993]	[1999 2007]
NFA	-0.301	-0.197	-0.203	-0.207	-0.134	-0.112
	(-2.347)	(-1.256)	(-5.255)	(-3.301)	(-1.690)	(-2.658)
PROD	-1.060	-1.264				
	(5.384)	(2.358)				

Notes

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1/ Eurozone exchange rate regime: Austria, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, and Greece.

2/T-stat in parentheses.

3/Data are cross-section demeaned

4/AIC was used to select de lag orders for each group; the maximum lag was 2 for the period 1980-2007; 1 for the period 1980-1998 and 1 for the period 1999-2007 following the rule minimum T i - max lag.

5/The long-run parameters were restricted to be the same across groups.

6/The mean group estimates was used as initial estimates.

## 9.16 Appendix P

Table 3.17: Comparison between the determinants of exchange rate over the period before the establishment of the European Union [1980-1998] and the successor period [1999-2007]:

#### DOLS Methodology

		Model B			Model C	
	Euro Zone Regime					
	[1980 2007]	[1980 1998]	[1999 2007]	[1980 2007]	[1980 1998]	[1999 2007]
NFA	-0.301	0.173	-0.131	-0.207	-0.188	-0.124
	(-2.347)	(2.112)	(1.998)	(-3.301)	(-4.251)	(-4.201)
PROD	-1.060	-0.822	-0.701			
	(5.384)	(-3.854)	(-4.524)			

Notes

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1/ Eurozone exchange rate regime: Austria, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, and Greece.

2/T-stat in parentheses.

3/Data are cross-section demeaned

4/AIC was used to select de lag orders for each group; the maximum lag was 2 for the period 1980-2007; 1 for the period 1980-1998 and 1 for the period 1999-2007 following the rule minimum T i - max lag.

5/The long-run parameters were restricted to be the same across groups.

6/The mean group estimates was used as initial estimates.

# Chapter IV: The BEER Approach: What Role for the Exchange Rate Regime?

#### 1. Abstract

This chapter examines the determinants of the real effective exchange rate for the Euro area countries between 1980 and 2011. Based on panel co-integration techniques, a long-term relationship between the exchange rate and a number of variables considered important determinants of the exchange rate, namely the net foreign assets, the relative productivity and the terms of trade, were estimated. The panels are defined according to their exchange rate regime. Two sub-periods are thus retained. The results show that exchange rate regimes

influence largely the determinants of exchange rates and, therefore, influence the Behavior Equilibrium Exchange Rate and the exchange rate misalignments.

Key Words: Real Effective Exchange Rate, Exchange Rate Regimes, Panel Data, Co-integration

Classification JEL: C33, F36, F41

#### 2 Introduction

The exchange rate is both an indicator of price competitiveness and a rebalancing variable. As a rebalancing variable, the exchange rate is related to the concept of equilibrium exchange rates. Indeed, the direction and the magnitude of adjustments depend on the value of the exchange rate at its equilibrium level (Durand and Lopez, 2012).

The determination of the exchange rate for the euro area countries has a great interest, especially given its specific exchange rate regime, but not only for this reason. Indeed, for the countries of the Eurozone, despite the convergence criterion concerning price stability, inflation rates have diverged in the euro area, hence making of the unique exchange rate in nominal terms multiple exchange rates in real terms in the different countries.

The real effective exchange rate is an extension of intra euro area disparities and studying its dynamics is related to an important concept in the economic literature that focuses on the economics of exchange rates: the equilibrium exchange rate. The exchange rate is then compared to its equilibrium level, that is to say, a reference level to be estimated in line with the economic fundamentals of the concerned country in order to measure any potential misalignment.

There are several approaches to the equilibrium exchange rate and these can be classified into two groups: i) the methods that indirectly deduce the misalignment of the exchange rate from a relationship with the current account "macroeconomic equilibrium" and " external sustainability " approaches; ii) and those that estimate it directly using information on the relative prices "behavioral equilibrium" and "purchasing power parity" approaches (Durand, 2012).

This chapter focuses on the approach of behavioral equilibrium exchange rate BEER in a comparative perspective, integrating the change of regime for countries in the Eurozone. Indeed, if at the theoretical level it is established that the constraints associated with relative price adjustments conducting to the adjustment of real exchange rates differ according to the exchange rate regimes, this is not the case for the empirical literature on the subject (Milesi-Ferretti and Lane, 2000), (Milesi-Ferretti, Ricci and Lee, 2008).

To do this, a study of the long-run relationship between the real effective exchange rate and a number of fundamentals is established. The exchange rate of behavioral equilibrium BEER is calculated from the estimation of the latter relationship. Our goal is to specifically study the importance of the exchange rate regime as a determinant of the exchange rate and its impact on the estimation of the behavioral equilibrium exchange rate.

We show that the evolution of the real effective exchange rate is disconnected from the fundamentals of the different countries of the Eurozone and that the exchange rate regime influences the determinants of the exchange rate and therefore the calculation of the equilibrium exchange rate and of the misalignments resulting from the difference between the latter two. We conclude that the BEER methodology does not consider significant structural changes.

After an introduction, the chapter is organized as follows: a first section examines price disparities and intra Eurozone imbalances; the second one highlights the euro area exchange rate regime. The third and fourth sections present successively the methodology and the data and the results; and a last one concludes.

## 3 Price Disparities and Intra Eurozone Imbalances

The convergence criterion of the Maastricht Treaty related to price stability has made of the convergence of inflation rates a condition to join the monetary union. The common monetary policy had to complete this process of convergence.

Three main factors could not be accurately known in the ex-ante studies. First, the extent and nature of asymmetric shocks; secondly, the evolution and potential convergence of monetary transmission mechanisms (Angeloni et al, 2002); finally, how conflicts of interest would be resolved in the decision-making process of the European Central Bank (Dixit and Jensen, 2002).

Regional asymmetries represented since the beginning a major challenge to the success of the Euro, especially with the lack of the ability to adjust the nominal. The bilateral real exchange rates movements between the Eurozone members coincide with the relative inflation differentials: the real appreciation is generated by the higher inflation average and vice versa.

From a theoretical point of view the regional inflation differentials may also have an impact on the ECB's policy (Honohan and Lane, 2003). Regional asymmetries combined with the variation in the severity of nominal rigidities in the euro area require that the ECB targets the inflation rate of regions with high levels of price / wage rigidities in order to facilitate the adjustment of relative prices with the lowest costs in terms of social welfare (Benigno, 2000). It was also suggested that the existence of significant inflation differentials should prompt the ECB to raise its inflation target to allow countries that need real depreciation to avoid absolute deflation (Sinn and Reutter, 2001). Since the beginning of 1999, the price level between countries has been diverging, but differences have widened. In particular, Ireland and the peripheral countries had high inflation when German inflation was below average in the euro area (Honohan and Lane, 2003).

Inflation differentials are attributable to differences in economic cycles (Andersson et al., 2009). They might also have been compounded by differences related to the transmission of monetary policy due to the heterogeneity of the goods market structures (Bulir and Hurnik, 2008). More fundamentally, inflation was driven by wage increases as well as increases in real estate prices in the catching-up countries while it remained well under control in Germany thanks to structural reforms to limit wage.

At the beginning of the monetary union, southern countries still had levels of income and lower prices than those at the heart of the Eurozone countries. An economic catch fed higher inflation and the appreciation of the real exchange rate in the country in question, as provided for the Balassa-Samuelson effect. Indeed, during the development process, productivity tends to rise faster in the tradable goods sector than in services. The prices of tradable goods are set by international competition; an increase in productivity in this sector will lead to higher wages. This increase in wages being distributed to all of the economy, the result is a rise in relative prices in the non-tradable sector where productivity has not increased in parallel. The price index is an average between the two sectors. There is an increase in the prices of domestic goods relative to those abroad. This translates, by definition, into an appreciation of the real exchange rate. However, the Balassa-Samuelson effect is not confirmed in the following years. It would explain a small part of inflation differentials. The relative productivity of tradables has made in fact little progress in the southern countries (Bulir and Hurnik, 2008). Similarly, the negative relationship between inflation and the initial price level is difficult to establish (Beck et al., 2009). The Balassa effect does not seem decisive to

explain inflation in individual countries such as Spain (Rabanal, 2009) or Ireland (Honohan and Lane, 2003).

The Balassa effect is purely a "supply" effect; demand plays no role in the formation of relative prices. The "Baumol-Bowen"<sup>21</sup> effect also explains the rise in the relative price of non-tradable goods by involving consumer demand: the income elasticity of demand for services is greater than the goods demand, the share of services in demand increases during the development process. The relative price of services also tends to increase to balance supply and demand in the non-tradables sector. This results in an appreciation of the real exchange rate, internal and external. In reality, the growth of relative prices of services not only come from lower productivity of the sector, as provided Balassa effect, but also a growing demand during development (De Gregorio et al, 1994). The upward trend in the relative prices of the services expected by the Balassa-Samuelson is then accompanied by another major trend phenomenon which is the increase in the share of services in value added (Coudert, 2004).

Furthermore, one of the problems related to the process of adjustment in a monetary union is the pro-cyclical interaction between regional inflation and real interest rates. Since any variation in the intra-area real exchange rate can only be achieved by inflation differentials, a thriving economy that shows relatively high inflation will also have disproportionately low real interest rates.

The increased financial integration that took place following the introduction of the euro and the low nominal and real interest rates in the peripheral countries have favored debt and have

<sup>&</sup>lt;sup>21</sup> Baumol, William J. and William G. Bowen 1966, Performing Arts: The Economic Dilemma, New York: The Twentieth Century Fund.

boosted demand in peripheral countries while discouraging saving. This situation was then perceived as beneficial because capital flows were expected to fund "good imbalances" in the sense that they allow the efficient allocation of resources within the area. It seemed normal that the catching-up countries with lower per capita income have current account deficit; this was the case in the Eurozone (Blanchard, Giavazzi, 2002) (Schmitz, Von Hagen, 2009).

These results raise the question of a possible overvaluation of peripheral countries' real exchange rate.

# 4 The Euro: the Unique Nominal Exchange Rate, the Multiple Real Exchange Rates and the Equilibrium Exchange Rate

The euro is faced with a dilemma which we will call the dilemma of double exchange rate regimes: The fixed exchange rate regime at the intra-European level on the one hand, and the floating exchange rate regime vis-à-vis foreign currencies on the other.

At the intra-area level, the recourse to changes in exchange rates is definitely abolished but the European currency in real terms remains sensitive to Eurozone imbalances. The question of changes in exchange rate parities is no longer relevant but the deterioration of identifiable economic fundamentals and inflationary or deflationary pressures generated by the various imbalances have redressed the issue of exchange policy.

Concerning the value of the euro vis-à-vis other currencies, it results from supply and demand in the foreign exchange market, therefore from how the inputs and outflows do balance (Bénassy -Quéré and Coeuré, 2010). A simple and general way to describe the determination of the exchange rate is to refer to the portfolios choice model. The euro appreciates if markets observe or anticipate a rise of the interest rate of the area against the rest of the world, an improvement in the net foreign asset position of the euro area, lower net capital outflows or reduction in official foreign exchange reserves (Bénassy-Quéré and Coeuré, 2010).

The Euro-dollar exchange rates have followed an upward trend, interrupted by short downturns since 1999. Exchange rate movements are important in influencing European inflation rates, and it is well-known that a given Euro-dollar exchange rate change translates into differing effective exchange rate movements for different member states. Lane (2004) argued that dollar movements have had an important role in influencing the dispersion of EMU inflation rates. More precisely, Lane (2004) claimed that the strength of the dollar had been an important contributor to Ireland's inflationary surge and that the deceleration in Irish inflation is a consequence of the very sizable depreciation of the US dollar and the relatively high exposure of the Irish economy to non-EMU trade.

Thus, since its entry into circulation, the euro is often accused of damaging the pricecompetitiveness of the euro area countries. The loss of competitiveness that follows has increased the current account deficits of several countries in the Eurozone Ireland, Portugal, Italy, Greece, Spain. But the real appreciation of the exchange rate is not the issue itself. Indeed its importance depends on the phenomena at the origin of the price increase. If this reflects improving economic fundamentals such as labor productivity or the external position, appreciation reveals a catching up of the price level. But if this is not the case, the real appreciation contributes to the loss of competitiveness and to widening external deficits that have accumulated in the country.

It is a question of verifying if the appreciation of the real effective exchange rate has led to an overvalued real exchange rate relative to their equilibrium levels.

Briefly put, when we talk about the "equilibrium exchange rate" as something different from the current rate, we usually mean two things: First, that the equilibrium real exchange rate at some time in the future will be foreseeably different from today's real exchange rate; second, that the policy toward the nominal exchange rate can somehow facilitate the adjustment toward this future real exchange rate (Krugman, 1990).

Several studies have examined this question using different approaches to the equilibrium exchange rate (Williamson, 1985), (Clark and MacDonald, 1998), (Cline and Williamson, 2011); (Carton and Hervé, 2012), (Coudert et al., 2012, 2014), (Rusek, 2012).

The equilibrium exchange rate estimation faces a number of difficulties. The choice of the concept to retain is the first of these difficulties.

The equilibrium exchange rate approaches have different time horizons (Bénassy-Quéré et al., 2009).

The very long term approach to purchasing power parity PPP may be relevant. Proposed by Cassel (1918), the measure of misalignment of the exchange rate based on relative prices is one of the oldest. It postulates that the exchange rate between two countries is adjusted to offset the effect of the gap between their inflation rates over time, but gives no information about the exchange rate adjustments that would be required to reduce global imbalances.

In the medium term, the fundamental equilibrium exchange rate approach FEER (Williamson, 1985) could be used. In this macroeconomic approach, the fundamental equilibrium exchange rate FEER is explicitly compatible with the internal and external balance of the economy. In the medium term, the economy is expected to be at full employment internal balance and the balance of foreign trade is characterized by a sustainable current account level vis-à-vis other countries external balance.

Between these two approaches appears the rate of behavioral equilibrium exchange BEER (Clark and MacDonald, 1998). This methodology refers to a long-term analysis horizon (Bénassy-Quéré et al., 2009) that is compatible with the following econometric study. The BEER is a composite econometric model. Unlike previous approaches that were intended to explain the determination of the equilibrium effective exchange rate from a theoretical model, the BEER primarily reports its evolution empirically.

In this approach, the impact of external imbalances in exchange rates is estimated directly, and not indirectly as in the case of the FEER approach, through the reversal of the trade balance equation. The concept of the behavioral equilibrium exchange rate is based on the idea that a limited net external position implies lower interest rates or net payments higher interest in the long term. Productivity differentials compared to the rest of the world in turn explain the relative price between tradable and non-tradable goods. As explained above, an increase in productivity in the tradable sector compared to the rest of the world leads in principle to an increase in the relative price of non-tradables relative to tradable for two reasons: i) the non- tradables benefit less from the productivity growth while wages in these sectors are monitoring those in the tradable goods sector (Balassa, 1964), (Samuelson, 1964), ii) income from productivity gains is spent on both tradable and non-tradable goods but the supply of non-tradable goods is limited by domestic demand, which causes the increase in their prices (Schnatz et al., 2003).

This chapter proposes to estimate the equilibrium exchange rate for a panel of countries in the euro area. To reach this end, we seek to identify long-term relationships (cointegration) between the real effective exchange rate and variables considered fundamental by the economic literature (MacDonald, 1998), (Clark and MacDonald, 1998), (Lane and Milesi-

Ferretti, 2004), (Égert et al., 2007), (Bénassy-Quéré and al., 2008), (Coudert et al., 2008) (López-Villavicencio and Mignon, 2009).

Specifically, net foreign assets, relative productivity and terms of trade are particularly chosen in order to study the determinants of the exchange rate and its equilibrium level (Didier et al., 2008). It is also believed that the exchange rate regime is also an important determinant. The differentiation according to the exchange rate regime is often omitted, introducing significant bias in the study of the dynamics of exchange rates (Table 4.1). Thus, failing to consider regime change can lead to a miscalculation of the behavioral equilibrium exchange rate BEER (Tables 4.2, 4.3). Particular attention is paid to the effect of transfers, taken into account through the net external assets since despite the appreciation of the euro over a significant period since the introduction of the single currency net assets of most countries in the euro area continue to deteriorate (Graph 2.5).

The study of the determinants of exchange rate shows that the latter has a particularly unexpected effect on the evolution of the real effective exchange rate (Table 4.1). An increase in net foreign assets is associated with the depreciation of the exchange rate since 1994, the date when starts changing the exchange rate regime in the Eurozone. Indeed, the Maastricht Treaty signed in 1992 and entered into force in 1993, establishes the national policy coordination principles. During this phase, the conditions of the future transition to the single currency are specified and the single market is completed by the establishment of the economic and monetary union.

#### 5 Methodology and Data

As mentioned above, the equilibrium exchange rate is derived from the estimated long-run relationship between the real effective exchange rate and its determinants (MacDonald, 1997)

(Clark and MacDonald, 1998). In this work, taking into account the structural changes due to exchange rate regime changes following the signing of the Maastricht Treaty, we highlight the importance of the consideration of regime change in the assessment of the extent of exchange rate misalignments.

In this perspective, three periods are considered: i) from 1980 - 2011, ii) 1980 -1993 and iii) 1994-2011. The 1994-2011 period is characterized by an exchange rate regime change and the consideration of the change captures the monetary union effects on the determinants of exchange rates. The Maastricht treaty, which entered into force in November 1993, marked a radical turn in the European community.

After the storm of the EMS crisis, the goal was to strengthen the building through advancing towards the second stage of monetary union. The transition to the second phase before the final fixing of the exchange rates began on January 1<sup>st</sup>, 1994. During the second stage, the status of central banks has been revised.

As of January 1994, a temporary organization, the European monetary institute EMI, replaced the committee of covernors of the central banks of the member states of the European economic community EEC and the European monetary cooperation fund (EMCF). The EMI will become the European Central Bank (Leboutte, 2008).

In accordance with the Treaty, the EMI is responsible for strengthening coordination between national monetary policies, monitoring the functioning of the European monetary system and preparing the instruments of the single monetary policy. In addition, this date is marked by the beginning of the prohibition of privileged access of the public sector to financial institutions and by increased convergence of member economies (Longueville and Satini, 1994).

Two steps are necessary to obtain the equilibrium exchange rate.

The first step is to estimate the long-run relationship between the real effective exchange rate and its fundamentals. To reach this end, we used panel co-integration techniques (Kim and Korhonen, 2005), (Lopez, 2006 BénassyQuéré et al., 2009), (Ricci et al, 2008), particularly the Pooled Mean Group<sup>22</sup> (Pesaran et al., 1995.1999), in order to estimate the following model:

$$Log REER_i = \mu_i + \alpha_i NFA + \beta_i log PROD_+ \theta_i log TOT + \varepsilon_{it}$$
(A)

Where REER is the real effective exchange rate, NFA measures the transfer effect, Prod is the relative productivity and TOT is the terms of trade.

This model (A) is estimated over the period from 1980 to 2011. As mentioned above, the analysis is developed in a comparative perspective. The same model is then estimated over periods that span from 1980 to 1993 (A-1) and from 1994 to 2011 (A-2).

The second step is to assess the equilibrium exchange rate. The BEER is obtained from the results of the estimation of the long-run relationship between the real effective exchange rate and its determinants.

Misalignments BEER-REER are calculated as the differences between the observed values of the real effective exchange rates and the values estimated by the model. A positive negative sign indicates an undervalued overvalued rate. Thus, the real exchange rate of a country can become overvalued for two reasons whether because it simply appreciated or because the exchange rate depreciated as a result of fundamental degradation in the country. The exchange rate overvaluation may therefore come from several factors. Some causes of the

<sup>&</sup>lt;sup>22</sup> See chapter 3

appreciation of real exchange rate in a currency union: i) the appreciation of the euro against third currencies, ii) higher inflation in a country relative to partners, iii) improving fundamentals. Others are related to its depreciation: iv) a decrease in relative productivity, v) a deterioration in its net external position usually resulting from the accumulation of foreign deficits and vi) or the deterioration of the terms of trade (Coudert et al., 2012).

#### 6 Results

Table 4.1 summarizes the results of the model estimation A over the three periods. The results show that the impact of the various determinants of the exchange rate on its evolution changes between the first period whose estimate is denoted (A-1) and the second period whose estimate will be noted (A- 2).

As explained above, we consider that the regime changing took place in 1994 with the establishment of institutions that will ensure convergence prior to the introduction of the Euro.

The major result of the estimation of the determinants of the exchange rate is the change of sign of the net external assets coefficient that, contrary to expectations, is negative in the second period (Table 4.1). These results are consistent with the results obtained in chapter 3.

The deterioration in the net external position facing the appreciation of the euro partly explains the overvaluation of the Euro. The appreciation of the euro against the dollar explains another.

The coefficients of the estimation are an aggregate result that hides significant heterogeneity between countries in the euro area. Indeed, Germany, for example, does not suffer from the accumulation of deficits. This explains, in part, why the real effective exchange rates are overvalued for the southern countries (Greece in particular) of the euro area and Ireland since the regime change.

On average in the euro area, exchange rate misalignments have increased since the establishment of the monetary union and became more persistent especially in peripheral countries (Coudert and al., 2012).

	Eurozone Regime [1980-2011]	Eurozone Regime [1980-1993]	Eurozone Regime [1994-2011]
NFA	-0.059	0.203	-0.012
	(-1.928)	(3.400)	(-2.531)
PROD	0.146	0.081	-0.300
	(2.933)	(3.010)	(-3.703)
ТОТ	0.316	0.180	0.339
	(4.420)	(2.330)	(7.775)

# Table 4.1: Comparison between the determinants of the real exchange rate over theperiod, before regime change [1980-1993] and after [1994-2011]

Source : author estimation

The impact of regime change on the real effective exchange rate has consequences on the calculation of BEER. The exchange rate regime is an important variable in the study of the dynamics of the exchange rate.

Misalignments obtained from the estimated model (A) differ from misalignments obtained respectively from models (A-1) and (A-2). The calculation of the average of misalignments on the different periods in a comparative perspective is summarized in the following tables (Tables 4.2, 4.3).

	Computation using model A	Computation using model A-1
Austria	1.818	-0.033
Finland	-9.096	0.353
France	-2.636	-0.006
Germany	-0.271	0.185
Greece	10.504	0.217
Ireland	2.297	-0.032
Italy	-5.538	0.009
Netherlands	0.317	-0.031
Portugal	6.831	0.294
Spain	-2.979	0.557

 Table 4.2 Comparison of exchange rate misalignments average between 1980 and 1993

 between the estimated model over the whole period and the first period specific model

Source : Author's computations

Notes:

1/ Misalignment= BEER-REER

2/ The table compares the average of the BEER misalignments between 1980-1993 based on a model estimated over the period A and considering only the values of BEER between 1980 and 1993, and the average BEER obtained from estimating the specific model A-1 to the period [1980-1993]

	Computation using model A	Computation using model A-1
Austria	-0.845	-0,054
Finland	6.242	-0,033
France	1.904	-0.289
Germany	0.037	-0.612
Greece	-8.676	0.455
Ireland	-2.271	0.087
Italy	3.954	-0.177
Netherlands	-0.332	-0.123
Portugal	-6.293	0.110
Spain	2.033	-0.147

 Table 4.3 Comparison of exchange rate misalignments average between 1994 and 2011

 between the estimated model over the whole period and the second period specific model

Source : Author's computations

Note : Misalignment = BEER-REER

The table compares the average of the BEER misalignments between 1980-1993 based on a model estimated over the period A and considering only the values of BEER between 1994 and 2011, and the average BEER obtained from estimating the specific model A-2 to the period [1994-2011]

The averages of misalignments successively over the periods 1980-1993 and 1994 -2011 (Tables 4.2, 4.3) are used to highlight the impact of the exchange rate regime on the calculation of the equilibrium exchange rate. The BEER presents a weakness concerning the integration of structural changes. This pushes assuming that this methodology is less relevant in assessing the equilibrium exchange rate for countries that have undergone major structural changes and/or crisis.

The differences of the results can be explained on the one hand by the BEER methodology itself and on the other hand by specific effects to the euro area. Indeed, empirical performances of the BEER are to judge in relation to the lack of an explicit theoretical model, which could limit the rigor (Bouveret and Sterdyniak, 2005). Furthermore, empirically, the BEER approach can generally lead to relatively limited exchange rate misalignments because

this model consists of a calculated econometric relationship as close to the observed exchange rate (Bénassy-Quéré et al., 2008).

The BEER approach does not explicitly incorporate the dynamics of the exchange rate. Although fundamentals of the long-term relationship are expected to exercise a restoring force on the current exchange rate in order to converge to its equilibrium value. This mechanism is mainly statistics since the convergence property comes from the statistical model and not from the theoretical model. This statistical model implicitly assumes that the real exchange rate converges monotonically towards its long-term value. But the theoretical analysis shows that this property is obtained only in very special cases (Feroldi and Sterdyniak 1984). The estimated relationship to the past, by construction, does not take account of any institutional or structural breaks.

The BEER, a methodology corresponding to a long-term horizon of analysis, describes a world in which the net external positions would be stabilized at an equilibrium level resulting from the econometric estimation of a single equation that does not describe the exchange rate and the net external position adjustment process (Bénassy-Quéré et al., 2008).

In the long term, the net external position in each country should stabilize at a level consistent with its level of development and its demographic structure (Bénassy-Quéré and al., 2009). The external position of countries in the Eurozone is marked by a strong heterogeneity. This negative or decreasing external position in almost all countries of the Eurozone is disconnected from the upward trend in the exchange rate. Even if we assume that the external position of each country is consistent with its level of development, that position is not consistent with the evolution of its price-competitiveness. This inconsistency was reflected in the negative sign of net foreign assets in the estimation of models A and A-2.

In such situations, the stability of the net external position requires an increase in the trade balance through a depreciation of the real exchange rate. But the euro exchange rate had appreciated for long phases since its establishment without any possibility of devaluation, causing an increase of intra-euro area current imbalances that coexisted with a balanced current account of the area in aggregate terms.

The misalignments (Graphs 4.1 and 4.2) provide information on both the importance of the consideration of structural changes in the calculation of BEER (Graphs 4.1.1 and 4.1.2) and (Graphs 4.2.1 and 4.2.2) and also on the importance of regime change in the behavior of the real effective exchange rate of the euro area countries (Graphs 4.1.2 and 4.2.2).

Graph 4.1: Comparison between exchange rate misalignments obtained from estimated model over the whole period and exchange rate misalignments obtained from the first period specific model

Graph 4.1.1 Exchange rate misalignments over the first period obtained from the model estimated over the period 1980-2011



Source : author's computations

Note : Misalignment = BEER-REER (overvalued exchange rate if misalignment <0 and undervalued exchange rate if misalignment >0)





Source : author's computations

Notes : 1) Misalignment = BEER-REER (overvalued exchange rate if misalignment <0 and undervalued exchange rate if misalignment >0)

Graph 4.2: Comparison between exchange rate misalignments obtained from estimated model over the whole period and exchange rate misalignments obtained from the second period specific model

Graph 4.2.1 Exchange rate misalignments over the second period obtained from the model estimated over the period 1980-2011



Source : author's computations

Note : Misalignment = BEER-REER(overvalued exchange rate if misalignment <0 and undervalued exchange rate if misalignment >0)





Source : author's computations Note : Misalignment = BEER-REER (overvalued exchange rate if misalignment <0 and undervalued exchange rate if misalignment >0)

The evolution of the exchange rate misalignments and current account balances of the various countries studied are consistent with the deterioration of their competitiveness and of their export performance (Graph 4.3). The deterioration in the current account of these countries is associated with an overvalued exchange rate the curves are decreasing.

The export performance purged of specialization effects seems to be unfavorable for Finland and France (Gaulier and Vicard, 2012).

The poor export performances of Finland are due – in addition to the drop in international demand – to a loss of price-competitiveness of Finnish products. In fact, unit labor costs in Finland have grown steadily in recent years and increased by over 30% since 2000, a much faster pace than its main competitors which are Sweden and Germany. This effect was

amplified in 2010 with the generous wage agreement negotiated by the social partners that weighed heavily on labor costs.

Furthermore, the economic impact of the 2008 crisis has been strong in Finland with a decline in GDP of over 8% in two years, which is double the decline recorded in the euro area. Foreign trade has shown a limited dynamic and this is mainly due to exports. Finnish exports have fallen more in 2009 and increased less in the recovery phase of world trade than in the Eurozone (Bayik, 2014).

France appears to suffer from an export performance problem reflecting price and non price competitiveness deterioration (Durand and Vicard, 2012). The graph 4.3 shows that France's current account deteriorated continuously over the period regardless of the path of the exchange rate misalignments.

The strategies of multinational enterprises may have played a role in the collapse of part of France's export market. Indeed, to ensure access to world markets, French multinationals seem to have favored foreign direct investment. It is not easy to define to what extent these choices were determined by the lack of the cost-competitiveness of their establishments in France. In the French current account, FDI income partially offset the drop in net export revenues, thus mitigating the deterioration in the net external position.

In Greece, Portugal, Italy and Spain, the trade deficit has been driven by both price and nonprice competitiveness over the period 1999-2010.

In Portugal and Spain, export growth was significantly reduced by trade flows directed to low-growth markets the rest of the euro area and products e.g. clothing for Portugal. Portugal and Spain, and to a lesser extent Italy, are consistently at the bottom of the competitiveness ranking, no matter how this is measured, pointing indeed to a relative technological disadvantage and a less favorable institutional environment, compounded by unfavorable market access (Di Mauro and Forster, 2008).

Portugal, Italy and Greece were penalized by their sectoral specialization textile, competition from emerging economies. The bulk of the market share losses of Portugal and Italy is attributed thus to unfavorable specializations that restrict exports and increase the difficulty of balancing the trade balance for a given dynamic domestic demand, but own export performance of these countries do not appear to reflect a deteriorating competitiveness (Durand and Vicard, 2012).

Greece, Portugal, and to a lesser extent, Italy appear to specialize rather strongly in the lowand medium-technology sectors textiles, etc., suggesting that these countries are more directly exposed to competition from low-cost countries, and in particular from China. Such observations are also consistent with the significant market share losses of Greece, Portugal and Italy since 1999. Moreover those countries have been retreating very slowly from the production of goods with lower technological content, probably pointing to persistent adjustment costs in the future. Spain has continued to increase its specialization in traditional sectors, such as textiles, leather and footwear, but also agricultural products, in terms of both total and extra-euro area exports.

The improvement in the current account of Germany, the Netherlands and Austria is linked to the fact that these countries have managed to control their labor costs. In addition, Germany has excelled in exporting high technology goods and the Netherlands is an important logistics center for ICT exports to other European countries (Di Mauro and al, 2005).



Graph 4.3: The misalignment of the exchange rates and the current accounts 1994-2012 Austria, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain


# 7 Conclusion

The monetary union was meant to stabilize the exchange rate of the member countries by setting their bilateral nominal exchange rates. However, the real exchange rate continued to diverge because of inflation differentials between countries: higher inflation rates in the peripheral countries.

The purpose of the chapter was to determine misalignments of real exchange rates of member countries according to regime change. The assessment of the equilibrium exchange rate for all member countries by using the behavioral equilibrium exchange rate approach BEER along with obtained misalignments permitted the comparison of the misalignments between member countries in terms of magnitude.

The choice of exchange rate regime is not without consequences for the economy of a country and has direct and indirect influences on the behavior of the exchange rate. Thus, for the BEER approach, the exchange rate regime must be retained as a fundamental variable that can influence the calculation of equilibrium exchange rates and currency misalignments.

# Part III

Shortly after the introduction of the Euro, the single currency has continued to appreciate against the dollar. Despite some downturns, the Euro remains at a high level and is often openly accused of being one of the factors causing the deterioration of competitiveness. Faced with a heterogeneous currency union, the impact of this appreciation cannot have the same impact on all countries in the euro area.

The exchange rate determines, at some point, the price of domestic goods and services relatively to foreign ones. Exchange rate depreciation temporarily improves the competitiveness of exporters, which may increase their margins and / or gain market share. But the question is to what extent the exchange rate behavior impacts the exports performances.

The answer depends on the type of exports, importers and the orientation of investment in the concerned countries. The upgrading of exports is often presented as a way to hedge against foreign exchange fluctuations since premium products are less sensitive to price changes.

But in the following chapters we argued that the competitiveness structure evolved and the new competitors amongst emerging countries imposed price-competitiveness constraints even on relatively high-tech exports. Similarly, concerning low-tech exports, Eurozone countries are lagged by emerging countries.

According to the results presented and interpreted in the latter chapters, the exchange rate impact is greater with higher competitiveness. Its importance comes from the need to differentiate similar products. Along these chapters we have emphasized the role of the real exchange rate in both the total trade and the intra-Eurozone trade. We also showed that, being

important as it is, the exchange rate is not the only explanatory factor of the deterioration of the Eurozone exports. The investment is also a key variable.

# Chapter V: An Investigation of the Determinants of Eurozone Exports

#### Abstract

In this article, we examine the price and non-price determinants of European exports to trading partners since the introduction of the single currency in 1999.

Based on panel co-integration techniques, we estimate the long run relationship between the volume of exports and a number of variables, often considered by the theoretical and empirical literature as important exports determinants, namely real effective exchange rate, foreign demand and investment.

Our results show that price-competitiveness is a determining factor for both northern and southern countries. We will also show that exports react differently to changes in various determinants.

JEL Classification: C22, F15, F36, F41.

Keywords: Exports, real effective exchange rate, Eurozone, PMG, DOLS, FM-OLS

#### 1. Introduction

Export growth and / or variation in the current account are significant indicators of economic performance and competitiveness. But it is an indicator that can be judged as short-termist if considered independently of its causes. Exports may increase thanks to temporary factors an unexpected increase in prices or following an increase in demand or a devaluation. This last possibility is excluded in the Eurozone because of the specificity of the euro area exchange rate regime.

The study of the economies of the euro area is particularly important because these countries have constraints shared with several economies in the world such as the oil price dependence, the necessity of investment in research and development, the revival of public and private investment and a specific constraint, namely irrevocable fixity exchange rate since 1999.

The aim of this chapter is to assess the importance of both price and non-price competitiveness in determining the volume of exports. This article shows that exports depend on both the level of development of the exporting countries and the level of development of the importers. We also show that the market for high-technology goods is experiencing very important constraints related to price-competitiveness.

Thus, since the creation of the Euro, the imbalances within the euro area have continued to increase. 'Two Europes,' going at two speeds, are opposed to each other (Artus, 2011). More in detail, the growing current account deficits in southern countries corresponded to increasing surpluses in Germany, the Netherlands and Austria (Graph 2.4). These sustainable current account imbalances have played a key role in the current crisis in the Eurozone (Lane and Milesi-Ferretti, 2011). External imbalances in the Eurozone periphery exceeded predicted levels based on current account fundamental determinants, with the gap possibly attributable

to financial integration and to the periphery's relative loss of competitiveness (Jaumotte and Sodsriwiboon, 2010). After the crisis, efforts undertaken by the Southern countries particularly in terms of control of unit labor costs have improved competitiveness and straightened the current account.

The beginning of the 2008 financial crisis has highlighted the problems of divergent external imbalances within the Economic and Monetary Union EMU and the role of persistent losses in competitiveness although the pre-crisis trends have ended up by being reversed. The trade balance of Spain has thus improved significantly to become surplus in 2012. It is the same with Italy since 2011 while the trade deficit in France has stabilized since the end of 2008. Finally, the continuous improvement of the German trade balance was interrupted from 2008 (Borey and Quill, 2013). The current account of the euro area remains balanced on average (Graph 5.1).



Graph 5.1: Current account of several regions in the world [1980-2013]

Deficits and current account surpluses can also inform about the performance of exports of the euro area. But, this is not systematic. Nonetheless, current account deficits and surpluses cannot be in themselves indicators of economic performance or vulnerability and, for a long time, their gradual build-up in the euro area was ignored (Giavazzi and Spaventa, 2010). Imbalances may be "good" or "bad", depending on whether they reflect convergence factors, i.e. capital flows within the European union EU from the rich countries to the poorer catchingup countries, or misallocation of capital. Lane and Pels (2012) confirm that, in the European Union, the introduction of the euro has led to capital flows from rich to poor countries in which growth expectations were higher.

This does not change the problem of exports performances of Eurozone countries. On the one hand, in a currency area, the restoring force for countries in difficulty cannot be devaluation. Indeed, having lost definitely the weapon of exchange rates, price-competitiveness is completely dependent on fundamentals. The price-competitiveness would have largely been worsened by the appreciation of the exchange rate of the euro.

On the other hand, like most other advanced economies, the euro area has also been increasingly challenged by emerging economies, as reflected in the experienced loss of export market share. While this may point to an increasing importance of structural factors, further adjustment also seems to be needed with regard to the export specialization of the euro area. Compared to other advanced economies, the euro area remains more specialized in labor-intensive categories of goods and has been showing only a few signs of stronger specialization in research intensive goods – a trend that is much more pronounced in other advanced countries and among competitors from emerging economies such as China (Di Mauro and Forster, 2008).

Maintaining a high level of price / cost competitiveness helps a country to defend its market share. Germany is the best known example to have completed a successful policy of competitive disinflation. France has also established and managed, for a period, its strategy of competitive disinflation (Debonneuil et al., 2003). This strategy cannot ultimately substitute for an approach in terms of innovation, product renewal, quality of products and related services. Price competitiveness is only one component of competitiveness. In particular, with globalization radically altering the environment in which firms operate over the past decade, the way to maintain and to enhance competitiveness has become one of the prime concerns in most countries

Changes in price-competitiveness fail to take full account of variations in market share (Debonneuil and Fontagné, 2004). The non-price aspects of competitiveness should be privileged to the extent that the existence of rents attached to innovation or to the perception of the quality of products by consumers has indeed a positive impact on the terms of trade (Helpman and Krugman, 1985).

This chapter is organized as follows. The first section discusses the Eurozone competitiveness. In section two, we present the data and the methodology. The third section deals with the estimation results. The final section is a conclusion.

#### 2 Eurozone Competitiveness: A Brief Overview

Against the background of increasing competition and other significant structural changes implied by globalization, maintaining and enhancing competitiveness has evolved into one of the prime concerns in most countries. Euro area firms have taken advantage of the new opportunities offered by globalization and have at the same time been increasingly challenged by emerging economies.

The concept of competitiveness can be assessed using two complementary approaches. The first approach called the ex-post competitiveness focuses on outcomes (Debonneuil et al.,

2003). But this approach can be misleading because it does not take into account the differences in initial conditions nor the rebalancing mechanisms (Jacquemin and Pench, 1997). The second approach, called the *ex-ante* competitiveness, focuses on the ability to achieve high levels of competitiveness *ex-post*, and therefore on its determinants.

Regarding the price competitiveness definition, two categories of indicators can be mentioned: i the wide range of real effective exchange rate indicators based on various cost and price measures, such as consumer prices and unit labor costs. Such indicators include firms' pricing-to-market strategies. The real effective exchange rates are presumably the most direct ways of measuring a country's underlying competitiveness, defined as its relative cost position; ii indicators are based on relative export prices (Di Mauro ad Forster, 2008).

The deterioration of price-competitiveness is often explained by the overvaluations which became visible in several deficit countries (Jaumotte and Sodsriwiboon, 2010).

Chen et al (2012) argued that the most important share of the real exchange rate appreciations was accounted for by the nominal appreciation of the euro against other currencies, even for the countries such as Greece and Portugal that entered EMU at a potentially overvalued real exchange rate. Especially in the spectrum of the currency war that has resurfaced (Bénassy-Quéré et al., 2014), (CEPII, 2014). While the Bank of Japan and the Federal Reserve have practiced aggressive policy of quantitative easing, which could lead to the depreciation of their currencies, the ECB has been much more timid in the matter. Under these conditions, the euro is often openly accused of being one of the factors behind the declining competitiveness of European industry.

One of the major problems of the eurozone is the divergence of the competitive positions that have built up since the early 2000s. This divergence has led to major imbalances in the Eurozone where the countries that have seen their competitive positions deteriorate, namely Portugal, Ireland, Italy, Greece and Spain. The southern countries have accumulated large current account deficits and thus external indebtedness matched by current account surpluses of the countries that have improved their competitive positions, particularly Germany.

The evolution of unit labor costs ULC in the whole economies of the countries of the euro area confirms the stall of some members. The ULC growth in Spain for example has increased between 2004 and 2007 more than 10%, while the euro area observed an average increase of 5% and Germany recorded a reduction of 5% over the same period. The French unit labor cost remains in the average of the Eurozone (Durand and Lopez, 2012).

Although this dispersion is broadly in line with that observed, for example, in the United States, the divergences are still considerable. Since higher unit labor cost growth rates are associated with strong wage growth and/or low productivity growth, wage moderation and appropriate policies to achieve higher productivity growth remain critical.

In order to correct these imbalances, the internal devaluation i.e. to reduce prices and wages relative to Germany and the other core countries is recommended as a solution due to the impossibility of correction by variations in nominal exchange rates. However, the costly measure tends to reduce aggregate demand and domestic production. This in turn increases government budget deficits and deteriorates the fiscal position of the concerned countries (De Grauwe, 2012). Finally, the policies of internal devaluation implemented in the periphery aimed at promoting external competitiveness may have had only limited effectiveness in restoring the external balance to equilibrium (Diaz Sanchez and Varoudakis, 2013).

Be that as it may, the crisis has led to some correction of the gaps of evolution of the ULC, particularly in the manufacturing sector. In particular, the ULC increased in Germany in connection with the end of the period of wage moderation, while they sharply decreased in Spain under the effect of productivity gains resulting from job losses and partly of a sectoral recomposition. In France, ULC continued to increase although they remained contained in the manufacturing sector where productivity gains have been substantial. Furthermore, changes in competitiveness, measured by real exchange rates or unit labor costs, have played a less important role. Demand shocks have contributed more to current account balance dynamics in the Eurozone periphery than in the core, whereas competitiveness has been a less prominent factor in the periphery, but relatively more important in the core (Diaz Sanchez and Varoudakis, 2013).

The improved cost competitiveness due to the decline in the unit labor costs since 2008 is being transferred to prices (Castillo and Prairie, 2013).

Prices, costs, wages and exchange rates are important factors in determining competitiveness in international markets, particularly in the short run. Whether economies manage to successfully adjust to the sizable changes implied by globalization also depends on other factors. One important element is the ability to adapt their export specialization into line with comparative advantages when new low-cost players enter world trade (Di Mauro and Forster, 2008).

Following its introduction in 1999, the euro experienced an alternation between phases of appreciation and phases of depreciation. Such exchange rate movements are broadly reflected, though to a less volatile extent, in euro area relative export prices.

Until the outbreak of the crisis, price competitiveness deteriorated by around 10%. By contrast, over the same period, Japan and the United States for example recorded gains in price competitiveness. As in the euro area, all these developments broadly corresponded to movements in nominal exchange rates. Across individual euro area countries, relative developments in competitiveness have been heterogeneous since 1999. While some countries like Germany, Finland, the Netherlands, and to a lesser extent France experienced limited losses in price competitiveness, Italy, Spain, Portugal, Ireland and Greece recorded a marked decrease in their price-competitiveness.

Developments in domestic costs and prices appear to have been the main drivers of the changes in the relative competitive position of each individual euro area country.

Facing this background, the growing concerns about the dispersion and deterioration of the price-competitiveness across euro area countries appear to be justified, especially because of their impact on export performance.

The change in price-competitiveness is in line with developments in market gains in some Eurozone countries. Most notably, the increase in Germany's market share seems to be closely associated with improvements in price competitiveness; and the opposite appears to be true of Italy's market share losses. On the other hand, there are also a number of countries, such as France, that recorded losses in export market shares despite an improvement in price-competitiveness.

Price and cost competitiveness and demand both internal and external are only some of the key determinants of trade performance. Structural indicators of competitiveness may also help to explain export performance (ECB, 2005). These include, among others, human capital, infrastructure, product market regulations, legal and institutional frameworks and taxation.

Factors affecting non-price competitiveness may have contributed to the imbalances ECB, 2012. Structural/non-price competitiveness indicates the ability of an economy to stand out from the competition through means other than price (Flam and Helpman, 1987). The increasing importance of non-price factors competitiveness explains the export performance of the euro area. In fact, the losses as well as the gains in export market share may therefore not necessarily be due to developments in price competition (Krugman, 1979) have highlighted the growing importance of non-price determinants in international competitiveness. According to the so-called new trade theory, exporters and importers are bigger, more productive, innovate more and pay higher wages (Melitz, 2003). Of course, all these variables are directly or indirectly related to productivity, but are treated separately.

The euro area export specialization did not change much over this period. In fact, the exports structure show that the expected shift towards a more research intensive production did not happen thus the specialization in labor intensive products was still important. The euro area specializing in medium-high-tech has been most active in sectors such as chemicals and motor vehicles which have been growing significantly amongst trade partners (Di Mauro and Forster, 2008).

Over the last decade, non-price competitiveness effects contributed largely to the trade surplus in some countries. However, for some southern European countries the trade balance was driven by both price and non-price factors. The decomposition of the trade balance into components driven by price and non-price factors is important because policies aimed at reducing nominal rigidities and in general improving the business climate may be more effective than cost-side measures in countries where the deficit is dominated by structural, non-cost factors (Dieppe et al., 2012). The country analysis raises the heterogeneity question and shows important differences in the extent to which euro area countries specialize in high-tech goods, whereby the northern countries seem to have been benefiting much more from the change in the composition of world demand towards high-tech products. By contrast, southern countries appear to specialize rather strongly in the low and medium-technology sectors textiles, etc., suggesting that these countries are more directly exposed to competition from low-cost countries, and in particular from China.

Other factors like sectoral export specialization or differences in internationalization strategies, for example, appear to have played a larger role. Baumann and Di Mauro (2007) show that the increasing global trade integration of China in global trade, which has also led to a rise in intra-regional trade between Asian countries, seems to be the main counterpart of this non-price related fall in euro area export market share. The rise of China displaced several countries exports from their foreign markets (Di Mauro et al. 2010), (Tressel et al., 2014).

Going more into details, Germany's trade surplus appears to have been driven by both price and non-price competitiveness of its exports. Ireland, Finland and the Netherlands also display large non-price trade surpluses although in the Netherlands this may be an outcome of transit trade. Finland is another country with a large non-price trade surplus, but the economic impact of the euro crisis was very important in Finland where recovery was lower than in Germany or even in France (Bayik, 2014). Since the onset of the Eurozone crisis, the low dynamism of foreign trade is mainly explained by the decrease of exports. France and Italy also show a positive non- price contribution to the trade balance which however has declined in the past few years and was broadly counterbalanced by a negative price contribution. Spain exhibited overall small deficits, with negative goods trade contributions both from price and non-price factors counterbalanced by net services exports. Services trade helped to counterbalance the large goods deficits of Greece and Portugal which appear to be supported by both price and non-price factors. In Greece, Portugal and Spain, the trade deficit has been driven by both price and non-price factors since 1999. For Ireland, the high share of medicinal and pharmaceutical products and chemicals sectors in Irish exports could explain the non-price dominance (Dieppe et al., 2012).

The possibility to offset the deterioration of price competitiveness by the improvement of non-price cost competitiveness is limited by the fact that the loss of price-competitiveness overwhelms, in the more or less long term, the investment in order to enhance the non-price competitiveness innovation, etc. so that the two types of competitiveness are linked (Gaulier and Vicard, 2012).

Many variables are considered by the theoretical and empirical literature as a proxy for assessing non-price competitiveness and domestic spending on research and development is a proxy to measure non-price competitiveness widely used in the literature (Fagerberg, 1988) (Magnier and Toujas-Bernate, 1994), (Blot and Cochard, 2008), (Hummels and Klenow 2002). Other proxies are used as patents (Amable and Verspagen, 1995), the share of high and medium technology sectors in total production of the country (Barrell and Pomerantz, 2007), or the effort investment (Erkel-Rousse, 1992).

In order to study the exports determinants, three models are estimated: the first one is dedicated to the exploration of the determinants of the Eurozone, the second one is that of the core countries and the last one aims to capture exports determinants of peripheral countries. The real effective exchange rate (REER) is the chosen variable to measure the price-competitiveness and the gross fixed capital formation to gross domestic product (GFCF) is

taken as a proxy of non-price competitiveness. The weighted GDP represents the foreign demand in the model.

#### 3 Data and Methdology

As mentioned above, our study focuses on a comparison of the determinants of volume of exports between the core countries of the Eurozone and the peripheral ones. In order to carry out this comparison, we consider annual data for the period 1980-2013 for 10 countries (Table 5.1). We classify the countries according to economic performances revealed by the crisis and adopted by economic literature as: i) core countries: Austria, Finland, France, Germany and Netherlands; ii) peripheral countries: Greece, Ireland, Portugal, Italy and Spain.

As mentioned before, the statement emphasizing divergence of competitiveness within the Eurozone has been a central theme in post crisis debates (Wyplosz, 2013). The EU Commission's scoreboard for the surveillance of macroeconomic imbalances has put forward the changes in two indicators directly measuring price competitiveness: i) the real effective exchange rate and ii) the unit labour costs (EU Commission, 2012). To take into account these variables, the real effective exchange rate REER retained as determinants of volume of exports was deflated firstly by the consumer price index CPI and secondly by unit labour cost ULC<sup>23</sup>. While CPI-based real effective exchange rate REER are useful to document the evolution of final consumption prices relative to trading partners, ULC-based REER help gauge the evolution of production costs relative to trading partners.

The deterioration of competitiveness puts pressure on profit margins. In the medium to long term, the lowering of profit margins may nonetheless affect the ability of national companies

<sup>&</sup>lt;sup>23</sup> direct quotation

to invest in non-price competitiveness and, ultimately, reduce the size of the export sector as a result of firms exiting the sector. In order to explore the impact of investment on exports, the ratio of the gross fixed capital formation to GDP (GFCF) was retained as a proxy of non-price competitiveness. The GFCF covers a wide spectrum in the factors which reflects the importance of infrastructure and its improvement over time.: land improvements fences, ditches, drains, and so on; plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. These investments affect the production and its degree of sophistication that would, in turn, boost exports and change their structure, specially that a higher quality of products or differentiation from competitors ensure that the initial improvement in price competitiveness achieved through relative price adjustment is sustained over time.

Exports depend on domestic as well as foreign economic performance, thus the capacity of importing trade partners is an important exports determinant. World demand was an important pull factor. Export demand from the rest of the world provided strong contributions to export performance (Di Mauro et al., 2005), (Tressel et al., 2012), (Tressel and Wang, 2014). The weighted GDP was chosen in order to capture the effect of the demand on volume exports.

Data were obtained from World Bank, OECD and IMF databases

For the empirical part of this chapter, we used panel data techniques in order to analyze the determinants of the EXPORTS for Eurozone countries. In this sense, the first step consists in panel unit root; we conducted Maddala and Wu (1999) and Pesaran (2007) CIPS test . Given

that series are I (1), we proceed to co-integration test namely Westerlund (2007) cointegration  $\text{test}^{24}$ .

In a third step, we estimated the long-run relationship between the EXPORTS and the three fundamental variables mentioned before. Since the unit root tests and co-integration tests concluded that the variables are integrated and co-integrated, the use of co-integration methods is necessary. As in chapter 3, the Pooled Mean Group estimator developed by Pesaran et al. (2004) is retained <sup>25</sup>.

The results obtained allow us to have the long-run relationship between exports and the explanatory variables.

Our estimated equation is the following one:

$$\log(Exports)_{i} = \mu_{i} + \alpha_{i}\log(REER) + \beta_{i}\log(GDP_{weighted}) + \theta\log(GFCF) + \mu_{i} + \varepsilon_{it}$$
(A)

Where EXPORTS is the volume of Exports,  $GDP_{weighted}$  is the foreign demand and GFCF is the ratio of GFCF to GDP. All variables are taken in logarithms.

All regressions also include an EMU dummy variable that equals 1 from 1999, and 0 otherwise. The EMU dummy is therefore only indicative of the impact of increased integration on price elasticities and may also capture other structural changes taking place around the same time period.

<sup>&</sup>lt;sup>24</sup> The unit root tests and cointegration tests are available in Appendices 2 and 3 of the thesis.

<sup>&</sup>lt;sup>25</sup> The Dynamic Ordinary Least Square (DOLS) estimator and the Fully Modified Ordinary Least Square estimator FMOLS developed by Pedroni (1996, 2000, 2001) are also performed (Appendices A, B, C)

Tables 5.2 and 5.3 and 5.4 present the estimate coefficient of the long-run relationship successively for the countries of the entire Eurozone, the countries of the core of the Eurozone and finally for the peripheral countries.

## 4 Results

As explained above, the objective of this chapter is twofold: i) to analyze the impact of the variables, in particular those related to competitiveness on volume of exports; and ii) to compare their impact between core and peripheral countries.

	REER CPI_based	REER
		ULC_based
REER	-1.540	-1.065
	(4.476)	(-2.600)
Foreign demand	2.388	-2.369
	(7.166)	(-10.502)
Investment	0.552	0.488
	(2.305)	(3.580)

 Table 5.1: Determinants of Exports: Eurozone Countries

	REER CPI_based	REER
		ULC_based
REER	-0.593	-0.370
	(1.911)	(-2.290)
Foreign demand	1.094	0.923
	(3.624)	(1.981)
Investment	0.259	1-732
	(2.450)	(5.657)

#### Table 5.2: Determinants of Exports: Eurozone core countries

Note countries: Austria, Finland, France, Germany and Netherlands

	REER CPI_based	REER ULC_based
REER	-1.058	-1.008
	(-7.420)	(3.391)
Foreign Demand	1.409	1.058
	(8.822)	(7.115)
Investment	1.997	1.568
	(8.397)	(3.262)

#### Table 5.3: Determinants of Exports: Eurozone Peripheral countries

Note countries: Greece, Ireland, Italy, Portugal and Spain

The coefficients signs are in line with the theoretical expectations in the sense that the appreciation of real effective exchange rate has a negative impact on exports; the increase in foreign demand and the increase in GFCF % GDP have a positive impact on the volume of exports.

But contrary to the conventional wisdom, the impact of price-competitiveness is as important in the core countries as in the peripheral countries. Indeed, if traded goods into Eurozone tend to be similar to each other, they might be close substitutes, strengthening the impact of price differences (Bayoumi et al., 2011).

The competitiveness of peripheral countries was severely eroded in the process since their wages and prices rose excessively over the 1period. To overcome the crisis, Greece, Italy, Portugal and Spain need to depreciate in real terms, i.e. reduce wages and prices compared to their trading partners, a painful process that requires harsh austerity programs, straining the social fabric and causing significant political turmoil (Sinn, 2011).

The real effective exchange rate impact in core countries is explained by changes in competitiveness structure as even high technologies are submitted to price competitiveness pressure. Since the late 1990s, most advanced economies have experienced a significant fall in their export market share, reflecting the emergence of new competitors, most notably China. It is true that China was specialized in labor-intensive goods, although more recently it has also shown a marked increase in its specialization in research intensive production. The latter, however, may also be due to foreign firms outsourcing the labor intensive parts of their research intensive production to China. Nevertheless, a similar trend towards a greater specialization in research intensive production has also been recorded for other emerging Asian countries. As the competitive environment is changing rapidly, there may, however, be an increasing need for adjustment going forward. Although China and other emerging countries continue to specialize in low- and medium-low-technology industries, these countries have also shown growing revealed comparative advantages in easy-to-imitate research intensive production coupled with a decline in raw materials intensive sectors. These developments are also apparent in the specialization by technology content, showing an

increasing Chinese specialization in high-technology industries in recent years and a corresponding lower specialization in low-tech industries. Similarly, Brazil, Chile, Turkey and India show noticeable improvements in their price and non-price competitiveness (Benkovskis and Wörz, 2013).

These losses have been more limited for some countries. Many factors could help explain these differences. The most commonly mentioned are: i) the degree of product specialization; ii) the extent to which geographical structure is oriented towards fast-growing destinations; and iii) competitiveness patterns. Those factors should explain the resistance of German production for example. Hence, the higher income in oil-producing countries, together with the rise of China, generated strong demand for machinery and equipment exported by Germany (IMF, 2011). German firms continued their outwards integration by setting up production platforms in emerging Europe, boosting its competitiveness and exports to the deficit economies, which by contrast attracted little foreign direct investment (IMF, 2013).

Euro area exporters largely specialized in capital intensive, research intensive and labor intensive goods, the latter in contrast with other industrialized countries. Both Japan and the United States were relatively more specialized in research intensive goods with Japan also specializing in capital goods exports.

The impact of domestic investments on exports which remain important in core countries even less important than in peripheral countries could be explained by the catching-up process in the latter countries. In fact, the southern countries are investing in infrastructure roads, railways... given the catch-up process. This kind of investment represents a heavy burden that has to be amortized over several years before being transformed in productive investment. The investment activity in Europe and in the euro area is very heterogeneous. Before the debt crisis, investment as a share of GDP clearly diverged from one country to another. In some countries, such as Germany or the Netherlands, investment activity in the pre-crisis period was extremely restrained; measured against macroeconomic conditions, rates of investment would have been expected to be two to three percentage points higher than the values that were actually observed. However, some other countries, for instance, Spain, Ireland, or Greece, witnessed significant investment. Thus, considerable overcapacities developed here, primarily financed by investment capital from abroad. In Greece, Italy, Ireland, Portugal and Spain, the investment rate had already started to increase in the end of the 1990s. The positive trend for gross fixed investment was to a large extent driven by an increase in construction investment. In these countries, considerable over-investments could be observed before 2008. In particular, residential investment rates are considered as having been too high. However, investment in equipment also increased considerably before the crisis (Baldi et al., 2014).

The investment rate decreased from 24% on average in 2008 to only 16% in 2013. The decrease in gross fixed capital formation was especially strong in Greece and Ireland -60%, but also in Spain and Portugal -40%, and to a lesser extent in Italy -30% (Artus, 2014). In the southern countries of the euro area Italy, Spain, the sovereign debt crisis has led to a productive capital stock damaged by slowed years of investment and by a massive increase in unemployment (Dell et al., 2014). This explains the significant decline in exports after the crisis despite the depreciation of the euro.

Finally, the capital migrates from the more advanced to the less advanced Euro-area partners, and reflects the scope that existed within the euro-area periphery for catch-up and convergence (Blanchard and Giavazzi, 2002), (Lane, 2010). The capital inflow and the foreign domestic investment in the southern Eurozone countries could feed the investment

process. In the economies in transition, that ratio of FDI to GFCF has indeed tended to be higher than the world average and has increased over time (Kalotay, 2010).

#### **5** Conclusion

Although the global trade downturn was generalized, Eurozone exports were particularly hit with stronger losses in market shares than those of other main advanced economies. Partly owing to structural competitiveness problems that predated the crisis may have been the most important cause. Understanding the nature of those problems and the differences in competitiveness across Eurozone countries is an important input into the rebalancing debate.

To do that, three models were estimated. The aim of that estimation is to compare the Eurozone exports determinants to Eurozone peripheral countries on the one hand and to the core countries on the other hand. The results show that price-competitiveness is as important for peripheral countries as for core countries. Concerning non-price competitiveness, GFCF reported to GDP is a more important determinant for core countries than for peripheral countries.

This chapter argues that while the importance of restoring competitiveness and rebalancing current accounts is now widely recognized, there is also a need to take a broader view focusing not only on price-competitiveness, but also on structural performance.

# **6 A**PPENDICES

#### 6.1 Appendix A

	DOLS methodology		FMOLS methodology	
	REER CPI_based	REER ULC_based	REER CPI_based	REER ULC_based
REER	-1.600	-0.860	-1.340	-0.708
	(-5.740)	(-7.410)	(-7.260)	(-7.130)
Foreign demand	2.200	3.657	2.230	3.367
	(10.440)	(11.730)	(17.130)	(15.070)
Investment	0.740	0.913	0.660	0.790
	(5.330)	(5.910)	(7.599)	(8.580)

#### **Table 5.4: Determinants of Exports: Eurozone Countries**

### 6.2 Appendix B

Table 5.5: Determinants of Exports:	<b>Eurozone core countries</b>
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	DOLS methodology		FMOLS methodology	
	REER	REER	REER	REER
	CPI_based	ULC_based	CPI_based	ULC_based
REER	-0.420	-0.280	-0.270	-0.172
	(-2.190)	(-4.730)	(-1.830	(-2.530)
Foreign demand	1.650	2.17	1.610	1.908
	(16.440)	(14.800)	(21.590)	(14.072)
Investment	0.350	0.480	0.295	0.350
	(2.710)	(3.620)	(2.590)	(3.110)

Note countries: Austria, Finland, France, Germany and Netherlands

# 6.3 Appendix C

	DOLS methodology		FMOLS methodology	
	REER	REER	REER	REER
	CPI_based	ULC_based	CPI_based	ULC_based
REER	-0.850	-0.260	-1.030	-0.477
	(-1.980)	(-1.340)	(-3.280)	(-2.930)
Foreign demand	2.590	3.030	2.880	3.596
	(6.650)	(5.250)	(13.288)	(9.640)
Investment	1.320	1.428	1.050	1.148
	(6.760)	(6.540)	(8.860)	(9.650)

#### **Table 5.6: Determinants of Exports: Eurozone Peripheral countries**

Note countries: Greece, Ireland, Italy, Portugal and Spain

# Chapter VI: The euro Effect on the Eurozone Exports

#### 1. Abstract:

In this chapter<sup>26</sup>, we examine the impact of the real effective exchange rate for several countries in the euro area over the period before and after the introduction of the Euro. Based on ARDL modeling techniques, we estimate the long-run and short-run relationships between exports volumes and a number of key variables, namely Real Effective Exchange Rate, weighted GDP and Output Gap.

This article is particularly oriented towards the study of long-term relationships between the exchange rate and global exports performance, on the one hand; and between exchange rates and intra-European exports performance, on the other. Two measures of exchange rate are considered: a global real exchange rate to investigate the impact of exchange rates on overall exports and an intra European real exchange rate calculated to detect its effect on intra-European trade.

<sup>&</sup>lt;sup>26</sup> Bouchoucha, M., 2015. The Euro Effect on Eurozone Exports. International Economic Journal.

The study shows that there is a big difference between the impact of exchange rates on exports before and after the establishment of the European Monetary Union, on the one hand; and between the impacts of exchange rates on intra-European global exports, on the other hand.

JEL Classification: C22, F15, F36, F41.

Key words: Exports, Real Effective Exchange Rate, EuroZone, ARDL model.

#### 2. Introduction

There is an extensive literature on the relationship between exchange rates and trade (Glick and Rose, 2000), (Bun and Klassen, 2007), (Baldwin et al, 2005), (Campbell, 2012). However, there is relatively little empirical work that addresses the influence of intra European exchange rate on the trade. This article focuses on this aspect and contrary to expectations shows that the impact of exchange rate on the intra European trade is much more important than the impact of exchange rate on global trade of the eurozone countries. Using different real effective exchange rate indicators for the euro area, we demonstrated that measures of real effective exchange rate play a key role in the determination of the price competitiveness impact.

In a context of the rigidity of prices and wages, the exchange rate is an efficient instrument of economic policy to manage the macroeconomic consequences of problems of international competitiveness. Belonging to a monetary union implies renouncing the use of this instrument. At the same time, sharing a single currency would boost trade between member countries and would accelerate trade integration (Rose, 2000). In addition, increased trade integration is likely to promote a convergence process of production structures and of exports (Baldwin and Forster, 2008).

Since the crisis in the euro area, the euro exchange rate and the single currency are accused of playing a role in the deterioration of the competitiveness of eurozone countries. At this level, it must be noted that the competitiveness of Germany was not affected by the appreciation of the exchange rate, which refocuses the debate on the role of exchange rates in the improvement or the deterioration of competitiveness, especially in the European case.

This issue is particularly important in the actual situation of the eurozone given its important level of heterogeneity. In reality, if the current account of the eurozone is balanced on average, intra-European balance is not achieved. It is well known that the volume of exports depends negatively on the exchange rate.

The action to reduce a substantial current account deficit usually requires increasing exports or decreasing imports. This is generally accomplished directly with the import restrictions through quotas or duties although these measures may indirectly limit exports as well, or with exports promotion through subsidies, custom duty exemptions, etc.; or indirectly by influencing the exchange rate to make exports cheaper for foreign buyers which would limit the current accounts deficits.

In this paper, in order to study the impact of exchange rates on Exports for European countries, we estimate the sensitivity of exports to exchange rate fluctuations before and after the introduction of the single currency. In order to achieve this objective, two models are studied to detect the exchange rate effects on intra-zone trade as well as its effect on global trade.

This paper is organized as follows: The first section, discusses the relationship between exchange rate, competitiveness and the eurozone trade. In section Two, we present the determinants of exports. The third section deals with the econometric methodology. The fourth section deals with the estimation results. The final section is a conclusion.

#### 3 Exchange Rate, Trade and the Eurozone: Current Situation

Exchange rate volatility and multiple currencies may cause the depression of trade. In this sense, Mundell (1960) argues that for two nations forming a currency union, microeconomic gain grows with the development of trade.

An extensive literature has been developed to measure the effect of the single currency. Thus, Frankel and Rose (1998) confirm that monetary union promotes trade integration among member countries, and reduces the risk of asymmetric shocks in the future.

Rose (2000) found that both exchange rate stability and a common currency were powerful stimulants to trade. He shows that countries in a currency union traded 3 times more with each other than one would expect. Rose (2000) suggested in this article that a currency union would increase trade by 200%, on top of the large and positive effect of eliminating exchange rate volatility. However, other studies showed that Rose's result (2000) was entirely due to an econometric mistake Pakko and Wall 2001, Persson 2001. Micco et al. 2003 find that the trade effects of currency unions induced 6% more trade among eurozone members 8% with other specifications. Bun and Klaassen (2002) find quite similar results. In another study, Baldwin et al. 2008 confirm that the euro has significantly promoted trade, with the aggregate impact being in the range of about 5%. The findings of Flam and Nordstrom (2003) suggest that the trade effects of currency unions are 8%.

Following its introduction in 1999, the euro experienced four main phases: First, strong depreciation until 2001, then appreciation until 2004, afterward a period of variability within a relatively narrow range up to the end of 2005, and lastly a prolonged appreciation.

It remains that the loss of price competitiveness experienced by the euro area since the early 1990s was relatively modest, which is partly due to the large depreciation of the euro's exchange rate up to 2001. This could show a limited effect of the real effective exchange rate if the study of the evolution of exports covers a relatively long period. The effect of the appreciation of the euro would be absorbed. The heterogeneity of the euro area must also be taken into consideration. Therefore, the impact of the exchange rate appreciation depends on the sensitivity of exports to changes in price competitiveness.

Relatively bad export performance of French companies, coinciding with the rise of the euro against the U.S. dollar from 2001. Paradoxically, at the same time, Germany showed remarkable performance in terms of foreign trade.

As a matter of fact, German exports are generally considered less sensitive to changes in relative prices than French exports: it is estimated that a 1% decrease in price competitiveness in the exportation of German products leads to a long-term decline of 0.3 points in the volume of exports, against 0.7 in the French case (Cachia, 2008).

These differences can be explained particularly by differences in non-price competitiveness: German products have a better brand image than French products. This allows them to more easily support an increase in their export prices. But this does not only concern the French case since Italy and Spain have recorded losses in price competitiveness compared to France (Gaulier and Vicard, 2012).

The situation seems to be more difficult in the southern euro area and even France is sometimes included in this group of countries (Bennett et al. 2008). The common pattern of real exchange rate appreciation observed during recent years in Greece, Italy, Portugal, and Spain was in the center of many studies (Papademos, 2007). It is argued that the real

appreciation is associated with a loss of international competitiveness and could lead to a persistent period of slow growth (Blanchard, 2006).

In fact, faced with growing surpluses in Germany in addition to the Netherlands and Austria, countries in crisis have experienced growing current account deficits. Spain and Italy experienced an improvement in their price competitiveness in the early 1990s due to the depreciation of the Peseta and the Lira over this period. However, the improvement in competitiveness for Italy did not last a long time due to rapidly increasing export prices. Indeed, Italy is losing in market shares as a result of the product and of the market specialization of its exports, as well as due to poor price and non-price competitiveness since its exports suffered from competitiveness.

Spanish exports have been favorably affected by the integration effects related to Spain's accession to the European Union as well as relatively low levels of export prices and labor costs compared with competitors. Despite the fact that Spanish export prices were growing, their growth rate was not as fast as that of their competitors (Di Mauro et al. 2005).

More generally, the sensitivity to the price competitiveness in the euro area is uneven between different countries, but remains broadly important. In a comparative perspective with the developed countries, eurozone countries are specialized in labor intensive categories of goods. For example, concerning technological competitiveness, the intensity of Research and Development in manufacturing in the United States and Japan is about 50% higher than in the euro area.

#### 4 Determinants of Exports and Data

There are many factors influencing exports volume. Determinants of exports can be actually classified into two groups (Smith, 2004): 1) supply side determinants: i) capacity (inputs, productivity, weather, stocks, expected profitability, world export rates, exchange rate); ii) Alternative uses: Domestic market and 2) demand side determinants: i) foreign demand (market size, foreign income, population, preferences, world export prices, exchange rate) ii) trade barriers (tariffs, quotas, regulatory constraints) iii) competitiveness (input costs, productivity, exchange rate, transport costs).

Trade intensity depends not only on these factors. Two competing forces determine the intensity of trade between countries: the attractive forces income and size and resistance forces distance and the various barriers to trade (Fontagné et al, 2002).

In this article, three variables are retained and are often considered in the literature as fundamental, namely: the exchange rate, the output gap for each country and the foreign demand trade partners.

Exports are modeled primarily as a function of foreign demand and some measure of price competitiveness (Capet and Gudin De Vallerin, 1993), (Di Mauro et al. 2005), (Bayoumi et al. 2011). These variables can in fact explain in a considerable extent the export developments. In other words, the growth of world demand is the most important determinant of export growth in the eurozone over the sample period 1992-2003 (Di Mauro et al, 2005). Price competitiveness still remains a major determinant of export market shares.

For our study, the price competitiveness measured by real effective exchange rate, is the key determinant. First of all, the high relevance of the real effective exchange rate as a measure of

competitiveness is reflected by its inclusion in the scoreboard of the European Union Macroeconomic Imbalance Procedure that was adopted in December 2011 (Schmitz et al., 2012). Secondly, the deterioration of the eurozone competitiveness because of the single currency is in the center of the debate. Thirdly, in the short term, physical constraints such as inputs of capital and labor and pre-arranged contractual obligations affect the ability of exporters to respond to price changes and changes in demand conditions (Smith, 2004) by cons prices operate immediately. Finally, the role played by exchange rate in a monetary union is unique due to the fact that the fixity of the European exchange rate regime is irrevocable and very rigid.

And that is the whole point of our study. Indeed, the European Union is supposed to present a frame in which all tariff and non-tariff barriers to trade are abolished and the exchange rate is fixed without any possibility of devaluation. So what would be the impact of that situation on trade performances? The conventional wisdom predicts that as relatively large shares of exports of European countries are sold in Europe and particularly in the eurozone, the evolution of the exchange rate of the euro does not automatically affect the demand for exports because eurozone countries depend only partially on the parity of euro-foreign currencies.

To verify this assumption, two exchange rate measurements are considered: intra-European exchange real exchange<sup>27</sup> rate and global real exchange rate. Otherwise, we use the trade weighted GDP as a measure of foreign demand and the output gap as a measure of supply conditions.

<sup>&</sup>lt;sup>27</sup> Appendix A
It should be noted that there are two types of output gaps: positive and negative. A positive output gap occurs when actual output is more than the full-capacity output. Economic theory suggests that positive output gap will lead to inflation as production and labor costs rise. Negative output gap occurs when actual output is less than full-capacity output. Indeed, a negative gap means that there is spare capacity, or slack, in the economy due to weak demand. As mentioned above, our paper focuses on a study of the relationship between exports and real effective exchange rate. In order to do so, we consider quarterly data for the period 1980-2012 for four countries of the Eurozone namely France, Germany, Spain and Italy. We divide the period (1980-2012) into two sub-periods: i) The period from 1980 to 1998, characterized by a floating exchange rate system for various European countries and ii) the period from 1999 to 2012 in order to capture the effects of the European Monetary Union on the Exports for each country.

Exports correspond to the volume of exports of goods and services (2005=100) obtained from OECD databases. Regarding the Real Effective Exchange Rate, it corresponds to the nominal exchange rate index (2005 = 100) deflated by the consumer prices index CPI or by the unit labor cost ULC and adjusted by the trade-weight of each country against its trading partners. The impact of foreign demand has been seized through the trade-weighted GDP which is trading partners GDP in volume adjusted by the trade weights. Data were collected from the IMF databases.

In order to study the impact of exchange rate on intra European trade as well as its effect on global trade, we consider the export ratio of each country to its partners in the euro area in relation to its total exports to developed countries. We also calculated intra effective exchange rate which corresponds to the nominal exchange rate index (2005=100) of each country

against the Deutsche Mark, deflated by the consumer prices index CPI or the unit labor cost ULC and adjusted by the trade-weight of each country against its eurozone trading partners. The trade-weighted GDP is adjusted by intra European trade weights. An increase decrease in real effective exchange rate indicates an appreciation (depreciation).

Finally, the Output gap, which is the difference between actual GDP or actual output and potential GDP, is obtained with Hodrick Prescott filter methodology (1997). It is used in this article as a control variable.

### 5 Methodology

An autoregressive distributed lag (ARDL) cointegration framework is used to examine the long run and short-run<sup>28</sup> characteristics of the impact of the REER on Exports. For this reason, we based our empirical study on a basic model that includes the real exchange rate, the weighted GDP and output gaps.

$$\log(Exports)_{i} = \mu_{i} + \alpha_{i} \log(REER) + \beta_{i} \log(GDP_{weighted}) + \theta \log(OutputGap) + \varepsilon_{it}$$
(1)

Unit root tests have shown that output gap is stationary<sup>29</sup> while the other variables are not. Since the equation mixes I (0) and I (1) variables then there is no evidence of a long-run relationship. Pesaran et al. (2001) develop an ARDL bounds testing approach for testing the existence of a cointegration relationship that is applicable irrespectively of whether the underlying series are I(0), I(1). Thus, the bounds test eliminates the uncertainty associated with pre-testing the order of integration. Secondly, it can be used in small sample sizes, whereas the Engle–Granger and the Johansen procedures are not reliable for relatively small samples (Narayan, 2004).

An ARDL model is a general dynamic specification that uses the lags of the dependent variable and the lagged and contemporaneous values of the independent variables, through which the short-run effects can be directly estimated, and the long-run equilibrium relationship can be indirectly estimated.

<sup>&</sup>lt;sup>28</sup> See Appendix B for Dynamic multipliers over the period [1980-2012], [1980-1998] and [1999-2012]

<sup>&</sup>lt;sup>29</sup> See Appendix 2 of the thesis for the unit root tests

The bounds tests (or cointegration) can be performed with two steps. The first step is to examine the existence of a long-run relationship among all variables in the equation under examination. Conditional upon co-integration is confirmed, in the second stage, the long-run coefficients and the short-run coefficients are estimated using the associated ARDL and ECMs. To test for co-integration in model (1) by the bounds test, a conditional Unrestricted Error Correction Model UECM is constructed:

$$\Delta Exports = \alpha + \sum_{i=1}^{i=4} \beta_i \Delta Exports_{t-i} + \sum_{i=1}^{i=4} \delta_i \Delta GDP weighte \ d_{t-i} + \sum_{i=1}^{i=4} \theta_i \Delta OutPutGap_{t-i} + \sum_{i=1}^{i=4} \lambda_i REER_{t-i} + \varphi_1 Exports_{t-1} + \varphi_1 REER_{t-1} + \eta_1 GDP weighte \ d_{t-1} + \rho_1 OutPutGap_{t-1}$$

The bounds test methodology implies investigating two statistics: the first one named the  $t_{BDM}$ , a test for the null of no significance of the error correction term; and the second one implies the examination of the null hypothesis of no co-integration through a joint significance test of the lagged variables  $Exports_{t-1}$ ,  $REER_{t-1}$ ,  $GDPweighted_{t-1}$ ,  $OutPutGap_{t-1}$  based on the F-statistics<sup>30</sup>:

H<sub>0</sub>: 
$$\varphi_1 = \phi_1 = \eta_1 = \rho_1 = 0$$
  
H<sub>1</sub>:  $\varphi_1 \neq \phi_1 \neq \eta_1 \neq \rho_1 \neq 0$ 

If the computed F-statistic for a chosen level of significance lies outside the critical bounds, a conclusive decision can be made regarding the co-integration of the regressors and the next step is to estimate the ARDL where  $-\phi_1/\phi_1, -\eta_1/\phi_1, -\rho_1/\phi_1$  are the long-run elasticities. The

<sup>&</sup>lt;sup>30</sup> Appendix 3.2

results are shown in the next section. The coefficients of the short run elasticities which are non-significant are dropped (Hendry et al., 1984).

### 6 Results

In this section, we present the estimation results focused on estimating the equation (1) presented in the previous section. Results are organized as follows: Tables 6.1, 6.2, 6.3 and 6.4 present the estimate coefficient of the long-run relationship for the entire period and for the two sub-periods, respectively, for three different periods, over the period (1980-2012), before and after the introduction of the single currency for the global model based on model (1). Tables 6.5, 6.6, 6.7 and 6.8 present the estimate coefficient of the long-run relationship for the entire period and for the two sub periods, respectively, for three different periods, for three different periods, over the period (1980-2012), before and after the introduction of the single currency for three different periods, over the period (1980-2012), before and after the introduction of the single currency for three different periods, over the period (1980-2012), before and after the introduction of the single currency for three different periods, over the period (1980-2012), before and after the introduction of the single currency for the single currency for the intra-European model based on model (1).

#### 6.1 Global Model

	REER CPI Based			REER ULC Based		
Period	1980-2012	1980-1998	1999-2012	1980-2012	1980-1998	1999-2012
Exports (-1)	N-C	-0.277	-0.571	-0.131	-0.158	-0.648
		(-3.701)	(-3.609)	(-3.289)	(-3.335)	(-3.429)
REER(-1)		-0.790	-0,444	-0.824	-0.781	-0.601
		(-3.476)	(-2,753)	(-16.707)	(-10.175)	(-4.378)
GDPweighted (-1)		1.742	1,440	1.824	1.780	1.600
		(23,194)	(8,997)	(35.643)	(20.800)	(11.620)
Outpugap (-1)		0.001	-0,013	-0.053	-0.066	-0.0007
		(-0.970)	(-1,389)	(-2.926)	(-4.090)	(-0.173)

#### Table 6.1: Long Run coefficients estimates: France [1980-2012]

Notes:

1/ Exports -1 is the error correction parameter

2/ T-BDM in parentheses is the BDM t-statistic testing the null hypothesis: the coefficient associated to exports

1 =0 indicate that the statistic lies above the 0.1 upper bound

3/N-C: Cointegration not verified according to F-test or to t BDM test statistic

	REER CPI Based			REER ULC Based		
Period	1980-2012	1980-1998	1999-2012	1980-2012	1980-1998	1999-2012
Exports (-1)	N-C	-0.532	N-C	-0.136	-0.165	-0.179
		(-4.285)		(-3.802)	(-3.450)	(-3.391)
REER(-1)		-0,673		-0.522	-0.423	-0.009
		(-5,720)		(-7.115)	(-5.393)	(-0.031)
GDPweighted (-1)		1,713		1.498	1.438	0.987
		(12,955)		(20.371)	(17.554)	(3.402)
Outpugap(-1)		-0,0002		-0.021	-0.005	-0.001
		(-0,018)		(-1.039)	(-0.247)	(-0.048)

Table 6.2	: Long Run	coefficients	estimates:	Italy	[1980-2012]
	0				L J

Notes:

1/ Exports -1 is the error correction parameter

2/ T-BDM in parentheses is the BDM t-statistic testing the null hypothesis: the coefficient associated to exports -1=0indicate that the statistic lies above the 0.1 upper bound

3/N-C: Co-integration not verified according to F-test or to t BDM test statistic

Table 6.3: Long Ru	n coefficients	estimates:	Germany	[1980-20	12]
U				-	

	REER CPI Based			REER ULC Based		
Period	1980-2012	1980-1998	1999-2012	1980-2012	1980-1998	1999-2012
Exports (-1)	N-C	N-C	N-C	N-C	N-C	-0.198
						(-3.379)
REER (-1)						-1.726
						(-7.659)
GDPweighted (-1)						2.740
						(12.196)
Outpugap (-1)						-0.044
						(-3.177)

Notes:

1/ Exports -1 is the error correction parameter

2/ T-BDM in parentheses is the BDM t-statistic testing the null hypothesis: the coefficient associated to exports -1 =0indicate that the statistic lies above the 0.1 upper bound

3/N-C: Cointegration not verified according to F-test or to t BDM test statistic

	REER CPI Based			REER ULC Based		
Period	1980-2012	1980-1998	1999-2012	1980-2012	1980-1998	1999-2012
Constant	1.832			0.911		
	(3.922)			(3.790)		
Exports (-1)	-0.246	-0.338	-0.186	-0.098	-0.130	N-C
	(-4.072)	(-3.409)	(-3.695)	(-3.693)	(3.960)	
REER (-1)	-0.783	-1.320	0,017	-0.314	-2.508	
	(3.349)	(-5,077)	(0.014)	(-1.050)	(-7.632)	
GDPweighted (-1)	3.486	3.734	1.026	3.345	3.526	
	(38.93)	(23,338)	(0.861)	(20.571)	(9.907)	
Outpugap (-1)	0.036	0.0009	0.043	0.066	0.0002	
	(2.927)	(0,608)	(1.963)	(3.317)	(0.128)	

 Table 6.4: Long Run coefficients estimates: Spain [1980-2012]

Notes:

1/ Exports -1 is the error correction parameter

2/ T-BDM in parentheses is the BDM t-statistic testing the null hypothesis: the coefficient associated to exports-1=0indicate that the statistic lies above the 0.1 upper bound

3/N-C: Cointegration not verified according to F-test or to t BDM test statistic

For the first model, where the real effective exchange rate is based on consumer price index, the long run relationship over the period 1980-2012 is checked only for one country: Spain. Concerning the second model, where the real effective exchange rate is based on unit labor cost, co-integration relationship holds for most countries and periods. For Germany, the long run relationship is not verified over the first sub-period 1980-1998 while it is verified for the other countries: Italy, France, and Spain. The German exception is due to the fact that the first half of the 1990s was special due to the restructuring of the economy after reunification.

The exchange rate, in both models, has a greater impact during the first sub-period compared to the second one when the long run relationship is verified, showing that factors other than price competitiveness play a determinant role. Furthermore, over the period from 1999 to 2012, the real effective exchange rate is significant only for France and Germany. For southern countries, in this case Spain and Italy, the exchange rate is not significant when the long-term relationship is verified.

The results for the total volume of exports suggest that the real effective exchange rate deflated by ULC is a better indicator of price competitiveness than measures based on the CPI (Bayoumi et al. 2011). Indeed, the index of consumer prices is an index that encompasses a wide range of prices unlike the ULC index. The differences between the various indicators for each country raise questions about the assessment of the evolution of the external competitiveness based only on REER indicator.

Otherwise, the growth of world demand turns out to be the most important determinant of export growth over the sample period 1992-2003 (Di Mauro et al. 2005). Despite this, improvements in competitiveness especially in the second half of the 1990s had a role in explaining export performance for Germany and France.

Italy lost all of its competitiveness gains due to the exchange rate depreciation in the early 1990s, but price competitiveness can only partly account for the weak Italian export growth, indicating that factors other than price competitiveness may also play a role. The export flows are increasingly affected by the globalization of production as well as by rapid technological advances while on the demand side consumers are becoming increasingly more discerning with regard to quality.

The trade-boosting impacts of Spain's European Union membership gradually become weaker over time resulting in a levelling-off of Spain's market share towards the end of the 1990s. However, relatively low levels of labor costs and export prices in comparison to major competitors, combined with the ongoing process of convergence which may imply a continued movement towards a higher ratio of exports to GDP in line with other euro area countries, may also help explain Spain's ability to maintain relatively higher export share in recent years (Di Mauro et al. 2005).

Yet, the REER for the peripheral countries have only a limited argument about the fact that external competitiveness has significantly deteriorated since the adoption of the euro (Bayoumi et al. 2011).

The non-significance of the real effective exchange rate suggests that Italy and Spain have lagged behind their major competitors with regard to measures of technological and structural competitiveness in the sense that the real effective exchange rate can no longer favor the competitiveness of the southern countries of the euro area. Spain was less specialized in the highly contested sectors of textiles, clothes, and apparel and sustained relatively lower losses in manufactures which were concentrated in the key car sector while substantially increasing its share in services. The analysis of export unit values by product related to other world market participants indicates that most southern euro area countries have been able to moderately increase the quality of their exports, but not in relation to the eurozone countries (Bennett et al., 2008). This is consistent with the good performance corrected in terms of value. These two contradictory effects seem to have canceled the effect of real effective exchange rate which is postponing the problem of these countries at a deeper structural level. Note that these increases in unit values in countries such as Italy and Spain may also result from a lack of price competitiveness rather than from an improvement in quality.

Besides, in comparison to the other large euro area countries, Germany gained relatively more market share in response to the depreciation of the euro after its launch and managed to maintain its share despite the losses in competitiveness arising from the euro appreciation from 2002 onwards. Then, the export growth of Germany has been offset by a rather weak

export performance by some of the other euro area countries (30%-40% of Germany exports are sold on the market of the actual euro area). Finally, Germany in particular enjoys large shares in the high-tech sectors both for patents and R&D when euro area exports are relatively more specialized in medium-tech products.

But in recent years, even this market has been forced to confront new "low-cost" competitiveness, from emerging countries, even on its own market. Thus, the common wisdom ensuring that the euro area exports high tech products and imports low tech ones is no longer valid. The euro area countries must deal with the competitiveness imposed by emerging countries in sectors known to be away from price competitiveness.

Moreover, being related to the improvement of export performance thanks to structural reasons, the German export performance took place during a period of particularly weak domestic demand in Germany. But due to a spillover of substantial FDI activity, particularly in the new eurozone member states (Di Mauro et al. 2005), as well as to successful ongoing industrial restructuring, the fall of domestic demand was exceeded. The negative relationship between the real exchange rate deflated by unit labor cost in 1999 and exports can be explained by the increase in exports with gains in the competitiveness of Germany and France. The fact remains that Germany seems to have better export performance while France and Germany have several similarities.

Germany and France showed an increasing specialization in motor vehicles over the two periods, precisely after the entry into force of Maastricht Treaty (1993-1999) and then after Amsterdam Treaty (2000-2006), profiting from the particularly strong growth in world demand. More generally, the high-tech exports (percentage of manufactured exports) experienced several re-launches of the sector over (1996-2000), (2003-2006) and (20082010). But, Germany and France reduced their specialization in other fast-growing sectors such as chemicals, electrical machinery, rubber and plastic products, as well as in basic metals and fabricated metal products.

Considering extra-euro area exports only, France also seems to have specialized in radio, TV and telecommunication, while its extra-euro area aircraft and spacecraft exports are retreating. In contrast, Germany's specialization in aircraft and spacecraft exports became more pronounced as far as extra-euro area exports are concerned, while the shift away from the exports of pharmaceuticals appears even more distinct when only looking at global markets outside the euro area (Di Mauro and Forster, 2008). For the euro area, movements in extra euro area exports were similar to total exports (Di Mauro et al. 2005).

A question arises concerning the effect of exchange rates on intra-European trade. A second estimate is then performed for each country, taking into account European measures. The Intra euro Exports Volume is then explained by Intra euro REER, Intra-euro areaForeign Demand and the Output Gap of each country.

#### 6.2 Intra European Model

	REER CPI Based			REER ULC Based			
Period	1980-2012	1980-1998	1999-2012	1980-2012	1980-1998	1999-2012	
Exports (-1)	-0.102	N-C	-0.387	-0.177	-0.290	-0.561	
	(-3.945)		(-3.851)	(-3.886)	(-3.973)	(-3.782)	
REER(-1)	-0.116		-0.100	-0.094	-0.006	-1.151	
	(-2.919)		(-4.817)	(-4.016)	(-0.214)	(-2.906)	
GDPweighted (-1)	0.258		0.241	0.234	0.134	0.292	
	(6.085)		(11.550)	(9.292)	(3.857)	(5.609)	
Outpugap (-1)	-0.015		-0.004	-0.010	-0.008	-0.005	
	(-1.372)		(-2.362)	(-1.391)	(-1.032)	(-2.916)	

 Table 6.5: Long Run coefficients estimates: France [1980-2012]

Notes:

1/ Exports -1 is the error correction parameter

2/ T-BDM in parentheses is the BDM t-statistic testing the null hypothesis of the coefficient associated to

exports-1=0indicate that the statistic lies above the 0.1 upper bound

3/N-C: Cointegration not verified according to F-test or to t BDM test statistic

#### Table 6.6: Long Run coefficients estimates: Italy [1980-2012]

	R	REER CPI Based			REER ULC Based			
Period	1980-2012	1980-1998	1999-2012	1980-201	1980-1998	1999-2012		
Exports (-1)	-0.191	-0.148	-1.148	-0.298	-0.233	-1.174		
	(-4.600)	(-3.883)	(-8.791)	(-5.587)	(-4.352)	(-8.862)		
REER (-1)	0.036	0.023	-0.254	0.049	0.041	-0.846		
	(2.000)	(0.752)	(-7.939)	(2.799)	(1.570)	(-4.853)		
GDPweighted (-1	0.100	0.114	0.390	0.087	0.097	0.742		
	(5.318)	(3.354)	(12.226)	(4.827)	(3.519)	(4.267)		
Outpugap (-1	0.007	0.016	0.001	0.001	0.003	0.005		
	(1.714)	(2.292)	(2.063)	(0.578)	(0.740)	(1.438)		

Notes:

1/ Exports (-1) is the error correction parameter

2/ T-BDM in parentheses is the BDM t-statistic testing the null hypothesis of the coefficient associated to exports (-1)=0 indicate that the statistic lies above the 0.1 upper bound.

	REER CPI Based			REER ULC Based		
Period	1980-2012	1980-1998	1999-2012	1980-2012	1980-1998	1999-2012
Exports (-1)	-0.122	N-C	-0.655	-0.216	-0.190	-0.568
	(-3.628)		(-5.077)	(-4.654)	(-3.400	(-4.738
REER (-1)	-0.074		-1.576	-0.063	-0.078	-0.076
	(-2.433)		(-3.767)	(-2.383)	(-0.590	(-4.378
GDPweighted (-1)	0.200		-0.333	0.188	0.205	0.201
	(6.212)		(-1.940)	(6.740)	(1.432	(11.417
Outpugap (-1)	-0.004		0.0008	-0.007	0.005	-0.002
	(-0.988)		(0.619)	(-0.304)	(0.132	(-2.308

Tuble 6.7. Long Run esemicients estimates. Semianj [1966 2012
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Notes:

1/ Exports (-1) is the error correction parameter

2/ T-BDM in parentheses is the BDM t-statistic testing the null hypothesis: the coefficient associated to exports (-1)=0 indicate that the statistic lies above the 0.1 upper bound.

3/N-C: Co-integration not verified according to F-test or to t BDM test statistic.

Table 6.8: Long Run coefficients estimates: Spain [1980-2012]

	RE	REER CPI Based REER ULC I			ER ULC Base	ed
Period	1980-2012	1980-1998	1999-2012	1980-2012	1980-1998	1999-2012
Constant	0.099				0.691	
	(1.903)				(3.963)	
Exports (-1)	-0.181	-0.266	-0.439	-0.208	-0.466	-0.598
	(-3.680)	(-3.600)	(-3.541)	(- 4.094)	(-4.959)	(-4.442)
REER (-1)	0.028	0.323	-0.013	-0.117	0.165	-0.053
	(0.424)	(2.298)	(-0.480)	(- 2.284)	(2.404)	(-0.703)
GDPweighted (-1)	0.255	0.312	0.178	0.280	0.328	0.110
	(7.055)	(5.775)	(6.112)	(5.331)	(7.958)	(1.461)
Outpugap (-1)	0.0007	-0.006	-0.001	0.003	-4.48E-05	-0.002
	(0.169)	(-0.940)	(-0.718	(0.684)	(0.010)	(-1.423)

Notes:

1/ Exports (-1) is the error correction parameter

2/ T-BDM in parentheses is the BDM t-statistic testing the null hypothesis: the coefficient associated to exports

(-1)=0 indicate that the statistic lies above the 0.1 upper bound

The results from export equations suggest that intra-euro area trade is several times more sensitive to changes in relative prices since the inception of EMU, except for Spain and Germany for the second measure of the REER. But the coefficient of Real Effective Exchange rate is slightly smaller for the second period.

A monetary union reduces the uncertainty about the future exchange rate. This, in turn, could make trade more sensitive to changes in the exchange rate (Bayoumi et al, 2011). Other factors may explain the different price elasticities. For example, if the goods traded within the euro area tend to be more similar to each other, they could be substitutable, thus enhancing the impact of price differentials.

The same results suggest, as in the global model, that traditional real effective exchange rate indexes may provide a misleading picture of the effectiveness of euro depreciation in restoring exports growth in the euro area periphery. The pace of deterioration depends on the measure of relative prices used (Bayoumi et al, 2011). The difference in coefficients is potentially important as it is much more difficult to adjust relative prices to restore competitiveness within a currency union.

This result highlights the need for structural reforms to increase domestic wage and cost flexibility in euro area countries. This is consistent with Berger and Nitsch (2010) who find that EMU has led to larger and more persistent trade imbalances, which they in turn relate to rigidities in product and labor markets (Bayoumi et al. 2011).

Export performance of France and Germany moved globally closely together throughout the period, although German export performance has excelled compared to the others in recent years. Spain and Italy were different to the rest by over- and/ or under-performing compared

to this group of countries (Di Mauro, 2005) although the two countries have evolved differently. Indeed, in Italy, intra-zone trade was almost balanced in 1999 before becoming systematically deficient since. In Spain, the intra-euro area trade balance has more than doubled from 1999 to 2007.

Germanic countries, especially Germany, have gained competitiveness since 1994, and have maintained their REER relatively constant since 1999. France also seems to have depreciated within the euro area despite recently-expressed concerns about its competitiveness. But Germany seems to have been profiting much more from the change in the composition of the world demand (and therefore demand in Eurozone) towards high-tech products. As a consequence, German export performance has excelled compared to the other euro areacountries (Di Mauro et al. 2005). Indeed, the improvement of price competitiveness can be associated with loss of market share. France, for example, recorded losses in export market shares despite an improvement in price competitiveness. Other factors like sectoral export specialization appear to have played a larger role.

The German strategy to reduce costs helped offset the appreciation of the Euro. German companies were able to maintain their price competitiveness without systematically reducing their margin. Germany was able to stabilize its market share especially in the euro area after 2003. The German strategy is akin to a policy of competitive disinflation. France has another wage context. Given the appreciation of the Euro, French companies have chosen to adjust their margin which led to lost market share. This could explain the decrease in the number of exporting firms since 2001. This situation has worsened since the crisis. The surviving firms have managed to stay on the market by compressing their margins. These lower margins could be maintained only at the expense of investment and innovation which are key factors

for improving non-price competitiveness. The result is that French firms are less innovative than German ones, which explains the difference in export performance.

Countries that have seen their cost competitiveness deteriorated do not systematically go through losses of market share with respect to export surplus countries (Gaulier and Vicard, 2012). Spain's lost market share was rather moderate compared to that of France in the Eurozone in terms of the deterioration in competitiveness. The increasing integration of the Spanish economy in world and European trade since the mid-1990s helped to limit losses in market share despite less favorable price competitiveness. The steady decline in market share in Italy is more consistent with the deterioration of competitiveness, particularly with the less favorable positioning of Italian companies in terms of range or technological content, mainly those exposed to movements in relative prices (Blot and Cochard, 2010).

By contrast, Italy seems to specialize rather strongly in the low-and medium-technology sectors (textiles, etc.), suggesting that such countries are more directly exposed to competition from low-cost countries and new eurozone member states. Then, Italy's intra-euro area exports seem to have been displaced by increasing competitions from new EU-member states, partly because the latter countries also specialize in relatively low-tech products.

Overall, the medium-tech specialization of the euro area might pose a risk for the future, particularly if the high-tech sectors were to grow relatively faster and competition from new entrants in medium-tech products were to become greater, both in terms of costs and in terms of quality (Di Mauro et al. 2005). Such observations are also consistent with Italy's significant market share losses since 1999.

Spain's export performance resisted to some extent the disadvantage related to the appreciation of the real effective exchange rate whose evolution has not been stable over the

period. Spain has been favorably affected for an important period by integration effects related to Spain's accession to the European union as well as by relatively low levels of export prices and labor costs compared to competitors. Although Spain has seen a drift of their costs compared to Germany between 1999 and 2007 since the recovery from the crisis in Europe, it seems to show a mastery of this drift. These contradictory developments may cause the cancellation of the effect of the real exchange rate. Spain seems to suffer more from structural problems than price competitiveness problems. Despite the country's loss in price competitiveness since 1999, the real effective exchange rate is not significant.

Finally, imports have become more technology intensive, contrary to a common perception that highly advanced European Union countries are specializing in the production and exportation of high technology or highly capital-intensive products while importing predominantly low technology or labor intensive products. The decline in the share of low-tech imports has been strongest where their level was particularly high in 1988 France and Germany. The structure of imports by technology content has become more similar across the south euro area (Bennett et al. 2008).

### 7 Conclusion

In this paper we studied the real exchange rates on exports of 4 countries, namely France, Germany, Italy and Spain, from 1980 to 2012 in a double comparative perspective: First, the comparison between 4 countries belonging to the eurozone and whose economic evolution considerably differs; then, the comparison between two measurements of the effective real exchange rate.

To investigate the impact of the introduction of the euro on Exports of each of these countries, we divided the temporal series of the studied eurozone countries into two sub periods by referring to the time dimension. The determinants of exchange rates were estimated for periods ranging from 1980 to 1998 and from 1999 to 2012.

Our analysis finds that for our sample the real effective exchange rate impact on intra-euro area exports appears to be much more important than the impact of the real effective exchange rate on global exports. Theoretically, we expected that the real effective exchange rate impact on exports would be less important since 1999 at the intra eurozone level. However, our results show that this is not the case.

Our results confirm that price competitiveness and foreign demand can, to a considerable extent, explain export developments at the euro area level, but goods with high technological content are not protected any more against the competitiveness of emerging countries. The exports are henceforth subject to a double constraint: price and quality.

Otherwise, measures of exchange rate could influence the impact of the price competitiveness to a great extent.

## 8 Appendices:

#### 8.1 Appendix A: Intra European Measure: France, Germany, Italy, Spain

### [1980-2012]



Source own calculations

#### 8.2 Appendix B

## 8.2.1 Appendix B.1: Dynamic Multipliers: Response of the Real Effective Exchange Rate: Global Model\_REER CPI based



#### 8.2.2 Appendix B.2: Dynamic Multipliers: Response of the Real Effective

Exchange Rate: Global Model\_REER ULC based



#### 8.2.3 Appendix B.3: Dynamic Multipliers: Response of the Real Effective



Exchange Rate: Intra Eurozone Model\_REER CPI based

8.2.4 Appendix B.4: Dynamic Multipliers: Response of the Real Effective

Exchange Rate Intra Eurozone Model\_REER ULC based



# **General Conclusion**

The political decision to create a single currency for Europe could be seen as the logical corollary of the creation of the single European market, but also as a solution to the permanent tensions faced by the European monetary system: freedom of capital movement was not compatible with the autonomy of states concerning the exchange rate regimes and monetary and fiscal policies. The adoption of the single currency was also supposed to increase the strategic autonomy of Europe against the US dollar in the era of the increasing globalization of financial markets.

The creation of a single currency is the result of an irreversible process of nominal convergence of interest rates, inflation and lower public deficits, involving the creation of a European central bank, endowed exclusive competence for monetary policy and strengthened the coordination of national fiscal policies.

The risks related to the introduction of a single currency in what was not an optimal currency area could be predictable. But the conviction on the eve of the introduction of the single currency was that these risks can be overcome if the nominal convergence was accompanied with a strong action in favor of real convergence with the support of regional cohesion policies.

It is the monetary component that has been defined in detail while the economic component was confined primarily to the coordination of fiscal policies at the expense of other economic objectives such as growth. This clearly appears in the Treaty of Maastricht (1992) which establishes EMU, defines the statutes of the ECB and introduces the broad economic policies.

The almost exclusively monetary foundations of the EMU with a weaker economic component, neglecting the role of economic policies and employment policies and focusing primarily on the fiscal discipline that was not refined and accurate, led the euro area to face a systemic crisis with significant consequences ten years after the adoption of the single currency. This crisis was inevitable in a monetary area that suffers from an increasingly important heterogeneity in the absence of any policy to reduce the actual heterogeneity of the economies of the euro area.

The Eurozone construction appears unfinished due to the heterogeneity of income levels and prices, endowments of factors of production, workings of labor markets and situations of current account balances.

Due to the lack of an integrated comprehensive economic strategy, the countries of the Euro area are not developed at the same pace. The countries of southern Europe, which have failed to carry out the necessary reforms (labor market, pensions, improving competitiveness, organizing the collection of taxes ...) and to let wages rise much faster than productivity, have seen their competitiveness sharply declining over the last decade. If the trade balance of the Euro area was globally balanced, competitiveness of Greece, Ireland, Italy, Portugal and Spain fell significantly specially compared to Germany. Considering the bulk of the trade of

the member countries taking place within the euro area, southern European countries have accumulated large trade deficits which have had the effect of raising the issue of debt sustainability.

There are few options. The nominal devaluation, a medium customarily used by an overindebted country to restore their competitiveness and avoid "default", cannot be retained in a monetary union. A competitive disinflation, consisting of a sharp reduction in prices and wages, would require significant coordination within each country. Finally, a fiscal devaluation such as a VAT increase and a decrease in social contributions would require a significant increase of taxes in countries already often exposed to tax evasion.

The central problem of the Eurozone is the structural heterogeneity between countries in the Euro area. This is a consistent finding in all chapters. The absence of federalism implies that no public money flows, no transfer has been circulating between surplus countries to deficit countries to avoid the accumulation of foreign debt and the crisis. There is no support for the creation of jobs or for re-industrialization in favor of countries in difficulty. Unlike the US or Germany, the Eurozone has not provided an income redistribution system between States before the introduction of the euro.

The currency risk disappearance facilitated productive specialization of countries according to their comparative advantages, leading to a first de-industrialization of peripheral countries to countries in favor of the core of the Eurozone. This was provided for by Krugman (1993) who had defended a pessimistic position and showed how, in the American case, integration had increased productive specialization and thus exposure to asymmetric shocks which augured badly for EMU.

Since the Euro crisis, the most troubled countries have experienced a decline in their salaries and improved competitiveness. However, the level of unemployment in the Euro area remained at a very high level which fueled deflationary pressures, as confirmed by the latest inflation figures. The ECB is concerned about this situation without advancing concrete clue as to how to ease monetary policy and avoid the anchoring of expectations on deflationary path.

A significant decline in domestic demand was necessary to remove the external deficits and stabilize foreign debt. The decline in domestic demand, and the induced recession led to a sharp rise in corporate bankruptcies, a sharp deterioration in the situation of banks, combined with a high level of interest rates and thus a massive decline of business investment. As a result, industry production capacity fell violently in these countries. The concentration of industry in the Euro area core countries Germany has intensified rather than corrected. These problems were compounded by the failure and / or inability to implement adjustment mechanisms able to overcome the loss of monetary sovereignty.

This thesis has, amongst others, highlighted the impact of the heterogeneity of the Euro area.

The first chapter was dedicated to making an inventory of the theory and of the institutions of the Euro area. It particularly shows the optimality of the Eurozone which is defined through a number of criteria that have evolved over time: mobility of labor and price flexibility (Mundell, 1961), the degree of openness of economies (McKinnon, 1963), the diversification of production (Kenen, 1969), financial integration (Ingram, 1962) and the fiscal integration (Johnson, 1970). According to the traditional optimum currency area theory, satisfying these criteria is a prerequisite to integrate the ruro area. Frankel and Rose (1998) challenge this analysis, arguing that even if the satisfaction of optimality criteria is not proven *ex-ante* before

the unification of currencies, it is quite likely to be proven ex-post following the beneficial effects of the union.

The second chapter shows that the heterogeneity of the euro area is not only important, but it also intensified after the 2008 crisis. The question that can be asked: Has the euro area converged one day? Is the compliance with nominal criteria sufficient to ensure structural homogeneity? This chapter rebuts the endogenous theory of the Eurozone under which the single currency leads to a convergence of member countries. Contrary to what is provided by theoretical vision defended by Frankel and Rose (1998), according to the findings, the differences between Eurozone countries have widened. The results highlighted in this chapter were also a first element explanation of the evolution of the real effective exchange rate of the euro area countries.

The results obtained in the third chapter show that the real effective exchange rate does not reflect changes in Eurozone countries fundamentals. Thus, it was shown that the accumulation of net foreign assets was associated with the depreciation of the real effective exchange rate. In other words, if liabilities exceed assets vis-à-vis the outside world, the real exchange rate appreciates. This result is contrary to theoretical expectations. It can be explained by the rigidity resulting from the abandonment of monetary sovereignty, the question which arises: what is the impact of this disconnection between the exchange rate and fundamentals in the financial markets. The issue addressed in a brief manner in the first chapters was dealt with in greater depth in the latter chapter and the next one.

Chapters 5 and 6 were devoted to the analysis of the role of the Euro in the deterioration of the competitiveness of countries in the Euro area.

Competitiveness was considered by the European union as the ability of a nation to sustainably improve the living standards of its people and give them a high level of employment and of social cohesion in a quality environment. It can be assessed by the ability of a country to maintain and attract economic activities and the ability of companies to deal with their competitors. The peripheral countries of the European showed important signs of weakness since the early 2000s that result in market share losses particularly marked in the European area. That being said, the problem of competitiveness is a general problem in the countries of the european.

In this thesis, we have had the opportunity to demonstrate that the concept of competitiveness is no longer based on two axes: price-competitiveness and non-price competitiveness. It is, in fact, a non-price competitiveness where prices are a differentiation tool in the context of the emergence of several economies, especially the Asian countries that are able to have strong competitiveness prices while increasingly penetrating sectors that require a great effort for innovation and for the inclusion of new technologies.

The fourth chapter highlighted the limited role of real effective exchange rate as determinant of exports in both the core countries and peripheral countries. We argued that the real effective exchange rate is an important determinant in the sense that the latter differentiates goods with more or less the same level of technological content but it has relatively limited negative effect on exports performances compared to the structural factors. The investment is contrarily a determinant factor for exports. In fact, low tech-product markets are penetrated by emerging economies which are more able to maintain the price-competitiveness. In conclusion, the competitiveness structure has evolved given that price and non-price are complementary. The structural issues related to the upgrade of the production system, a more sustained effort of investment in Research and Development, and a review of corporate finance system are at least as important as the monetary constraints.

The last chapter was devoted to isolating the effects of the single currency on the exports of the Eurozone within and outside the community. The aim of this chapter was to focus on the role of price-competitiveness in the deterioration of the export performance of countries in the economic and monetary area. By comparing the sensitivity of intra-area exports of four countries of the Euro area to intra-Eurozone exchange rate and the sensitivity of total exports of the same countries to the global real effective exchange rate, it turns out that the price elasticities for intra-Eurozone exports are more sensitive to exchange rate than total exports.

This is a further demonstration of the need for structural reforms especially for peripheral countries, Italy and Spain being the two examples discussed in this chapter.

The countries of the Euro area are structurally different. The peripheral countries of the Eurozone must initiate major reforms to cope with the new international situation regarding competitiveness. The devaluation is no longer possible since the adoption of the single currency. The control of production costs is the only remaining way to control prices and counteract the appreciation of the euro. The countries of the euro area must also invest more in the production of high-technology goods now produced by countries whose unit labor cost is far less elevated than in countries in the Eurozone.

The experience of the Euro area has shown the limits of theoretical frameworks from which it emerged. The European experience highlights the limits of the nominal convergence criteria in the absence of real integration. Indeed, the heterogeneity in real terms of the levels of interest rates, of productivity and of economic structures has announced the crisis including the property crisis in Spain. The theory of optimum currency areas is based on criterion whose effects are contradictory in the absence of any common economic policy other than the monetary policy. Indeed, on the one hand, labor mobility itself can be dangerous if it is not accompanied by a redistribution structure between social systems (Coppola, 2013); (Krugman, 2013) and on the other hand, the trade openness may be harmful if it is not accompanied by labor mobility and fiscal federalism (Ricci, 2008). It therefore seems possible to conclude that the existence of a sufficient level of transfers between countries is a necessary condition for the effectiveness of the criteria of openness to trade and labor mobility.

The countries of the euro area face a significant price-competitiveness from developed countries given the aggressive policy of quantitative easing which led to the depreciation of the currencies of Japan and the United States. The ECB has been much more timid in the matter. Under these conditions, the euro remains at a high level and is often openly accused of being one of the factors behind the declining competitiveness. But can this accusation be moderate in front of the rising importance of non-price competitiveness?

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# Appendices

## **1** Appendix 1: Econometric Methodologies

#### 1.1 Fully Modified OLS<sup>3132</sup>

The Fully modified OLS (FMOLS) (Pedroni, 1996, 2000) is used for estimating and testing hypotheses forcointegrating vectors in dynamic time series panels. This methodology is able to accommodate considerable heterogeneity across individual members of the panel.

Consider the following cointegrated system for a panel of i = 1, ..., N members,

$$y_{it} = \propto_i + \beta x_{it} + \mu_{it} \tag{1}$$

and

$$\boldsymbol{x}_{it} = \boldsymbol{x}_{it-1} + \boldsymbol{\varepsilon}_{it} \tag{2}$$

Where the vector error process

 $\xi_{it} = (\mu_{it}, \varepsilon_{it})^{t}$  is stationary with asymptotic covariance matrix.

<sup>&</sup>lt;sup>31</sup> (Pedroni, 2000)

<sup>&</sup>lt;sup>32</sup> (Mignon et Hurlin, 2006)

Thus, the variables  $x_i, y_i$  are said to cointegrate for each member of the panel, with cointegrating vector  $\beta$  if  $y_i$  is integrated of order one. The term  $\alpha_i$  allows the cointegrating relationship to include member specific fixed effects. In keeping with the cointegration literature, we do not require exogeneity of the regressors. As usual,  $x_i$  can in general be an m

dimensional vector of regressors, which are not cointegrated with each other. In this case, we partition  $\xi_{it} = (\mu_{it}, \varepsilon_{it})'$  so that the first element is a scalar series and the second element is an m dimensional vector of the differences in the regressors  $x_{it} - x_{it-1} = \Delta x_{it}$  so that when we construct:

$$\Omega_i = \begin{array}{cc} \Omega_{11i} & \Omega'_{21i} \\ \Omega_{21i} & \Omega_{22i} \end{array} \tag{3}$$

then  $\Omega_{11t}$  is the scalar long run variance of the residual  $\mu_{tc}$  and  $\Omega_{22t}$  is the  $m^*m$  long run covariance among the  $\varepsilon_{ic}$  and  $\Omega_{21t}$  is an  $m^*1$  vector that gives the long run covariance between the residual  $\mu_{ic}$  it and each of the  $\varepsilon_{ic}$ .

The FMOLS estimator  $\hat{\boldsymbol{\beta}}$  of  $\beta$  is given by:

$$\hat{\beta} = \left(\sum_{i=1}^{N} \hat{L}_{22i}^{-2} \sum_{t=1}^{T} (x_{it} - \bar{x}_i)^2)^{-1}\right) \sum_{i=1}^{N} \hat{L}_{11i}^{-1} \hat{L}_{22i}^{-1} \left(\sum_{i=1}^{T} (x_{it} - \bar{x}_i) y_{it}^* - T\hat{\gamma}_i\right)$$
(4)

where

$$y_{it}^{*} = (y_{it} - \bar{y}_{i}) - \frac{\hat{L}_{zzi}}{\hat{L}_{zzi}} \Delta x_{it} + \frac{\hat{L}_{zzi} - \hat{L}_{zzi}}{\hat{L}_{zzi}} \beta(x_{it} - \bar{x}_{i})$$
(5)

and  $\hat{L}_{t}$  is a lower triangular decomposition of  $\hat{B}_{t}$  as defined in (3) above.

### **1.2** Dynamic OLS<sup>33</sup>:

The Dynamic OLS (DOLS) approach was first suggested by Saikkonen (1991) in the case of time series, and then adapted by Kao and Chiang (2000) and Mark and Sul (2003) to the case of panel data. This technique is to include advanced and lagged values of  $\Delta x_{it}$  in the

cointegration relationship, to eliminate the correlation between the explanatory variables and the error term:

$$y_{it} = \alpha_i + \sum_{k=-\infty}^{\infty} \partial_{ik} + \Delta x_{it+k} + \varepsilon_{it}$$
(6)

In practice, the infinite sum is obviously truncated to a relatively low value of the number of delays / advances and DOLS estimator is obtained by estimating regression (**6**) by OLS. The DOLS estimator has the same asymptotic distribution as the FM-OLS estimator.

<sup>&</sup>lt;sup>33</sup> (Mignon et Hurlin, 2006)

#### 1.3 Pooled Mean Group (PMG)<sup>34</sup>:

The Pooled Mean Group estilmator (PMG) is an intermediate estimator. The PMG involves both pooling and averaging.

Suppose that given data on time periods t=1,2,...T, and groups, i=1,2,...,N, we wish to estimate an ARDL (p,q,q,...q) model.

$$y_{ie} = \sum_{j=1}^{p} \lambda_{ij} y_{i,e-j} + \sum_{j=0}^{q} \delta'_{ij} x_{i,e-j} + \mu_i + \varepsilon_{ie}$$
(7)

Where where p and q are the autoregressive orders of the dependent and independent variable(s), respectively where p and q are the autoregressive orders of the dependent and independent variable(s), respectively.

Reparameterized as a vector error correction mechanism (VECM) the system can be expressed as:

$$\mathbf{y}_{it} = \mathbf{\theta}_{i} \, \mathbf{y}_{i,t-1} - \mathbf{\beta}_{i}' \mathbf{x}_{i,t-1} + \sum_{j=1}^{p-1} \lambda_{ij} \Delta \mathbf{y}_{i,t-j} + \sum_{j=1}^{q-1} \delta_{ij} \Delta \mathbf{x}_{i,t-j} + \mu_{i} + \varepsilon_{it}$$
(8)

Where y is the depedant variable,  $x_{i,t-j}$  is the (k\*1) vector of explanatory variables for group,

 $\beta_i$  are the long-run parameters,  $\lambda_{ij}$  and  $\delta_{ij}$  include the country-specific coefficients of the shortterm dynamics,  $\mu$  represents the fixed effects and  $\varepsilon_{it}$  is a white noise process. If  $\theta_i$  is significantly negative, there exists a long-run relationship between  $y_{it}$  and  $x_{it}$ .

 $<sup>^{34}</sup>$  (Peseran et al.2007)

# 2 Appendix 2: Unit root tests

REER_CPI	Model Specification	Maddala and Wu (1999)	Pesarn (2007) CIPS
All Countries	Specification without	34.461	-0.942
	trend	(0.023)	(0.173)
	Specification with trend	33.500	-1.3081
		(0.030)	(0.084)
Core Countries	Specification without trend	18.132	-0.395
		(0.053)	(0.346)
	Specification with trend	15.206	-0.633
		(0.125)	(0.263)
Peripheral Countries	Specification without	15.684	-1.228
	trend	(0.109)	(0.110)
	Specification with trend	13.580	-0.200
		(0.193)	(0.421)

#### Table 7.1: Panel unit root test: REER\_CPI

	Model Specification	Maddala and Wu (1999)	Pesarn (2007) CIPS
All Countries	Specification without	10.307	-0.645
	trend	(0.962)	(0.259)
	Specification with trend	20.033	0.198
		(0.456)	(0.579)
Core Countries	Specification without trend	8.045	-0.500
		(0.991)	(0.309)
	Specification with trend	14.431	-0.501
		(0.154)	(0.308)
Peripheral Countries	Specification without	5.451	-1.460
	trend	(0.859)	(0.072)
	Specification with trend	12.222	0.191
		(0.270)	(0.576)

#### Table 7.2: Panel unit root test: REER\_ULC

	Model Specification	Maddala and Wu (1999)	Pesarn (2007) CIPS
All Countries	Specification without	17.906	-0.668
	trend	(0.594)	(0.252)
	Specification with	9.085	1.514
	trend	(0.982)	(0.935)
Core Countries	Core Countries Specification without trend Specification with trend	2.042	-0.041
		(0.996)	(0.483)
		5.979	0.781
		(0.817)	(0.783)
Peripheral Countries	Specification without trend	15.864	-1.638
		(0.104)	(0.051)
	Specification with	3.106	0.224
	trend	(0.979)	(0.589)

#### Table 7.3: Panel unit root test: Exports

	Model Specification	Maddala and Wu (1999)	Pesarn (2007) CIPS
All Countries	Specification without	11.599	1.293
	trend	(0929)	(0.902)
	Specification with trend	5.210	1.100
		(1.000)	(0.864)
Core Countries	Specification without	4.588	1.336
	trend	(0.917)	(0.909)
	Specification with trend	3.598	1.526
		(0.964)	(0.936)
Peripheral Countries	Specification without	7.011	1.460
	trend	(0.724)	(0.928)
	Specification with trend	1.612	1.930
		(0.999)	(0.973)

#### Table 7.4: Panel unit root test: Weighted GDP

	Model Specification	Maddala and Wu (1999)	Pesarn (2007) CIPS
All Countries	Specification without	32.328	-0.725
	trend	(0.040)	(0.234)
	Specification with trend	21.585	0.825
		(0.120)	(0.803)
Core Countries	Specification without trend	17.005	-0.402
		(0.074)	(0.344)
	Specification with trend	16.313	2.167
		(0.091)	(0.985)
Peripheral Countries	Specification without	11.735	-1.228
	trend	(0.303)	(0.110)
	Specification with trend	13.580	-0.200
		(0.193)	(0.421)

#### Table 7.5: Panel unit root test: GFCF%GDP

	Model Specification	Maddala and Wu (1999)	Pesarn (2007) CIPS
Eurozone Countries	urozone Countries Specification without trend	21.378	1.522
		(0.375)	(0.936)
	Specification with trend	22.280	-0.387
		(0.326)	(0.349)

#### Table 7.6: Panel unit root test: Relative Productivity

#### Table 7.7: Panel unit root test: Terms of Trade

	Model Specification	Maddala and Wu (1999)	Pesarn (2007) CIPS
Eurozone Countries	rozone Countries Specification without trend	29.208	0.380
		(0.084)	(0.648)
	Specification with trend	16.532	-1.708
		(0.683)	(0.044)

#### Table 7.8: Panel unit root test: Net Foreign Assets

	Model Specification	Maddala and Wu (1999)	Pesarn (2007) CIPS
Eurozone Countries Specification without trend	Specification without	12.758	1.775
	trend	(0.888)	(0.962)
	Specification with trend	20.587	1.777
		(0.422)	(0.962)

# **3** Appendix 3: Cointegration Tests:

# 3.1 Westerlund panel cointegration test

Table 7.9: Cointegration test: REER, NFA, Relative Productivity and Terms of Trade

	Value	P-value
Gt	-2.238	0.049
Ga	-9.420	0.020
Pt	-6.529	0.036
Pa	-8.064	0.029

Note: Gt and Ga are group mean tests, Pt and Pa are panel mean tests.

	Model Specification	Value	P-Value
All Countries	Gt	-3.365	0.000
	Ga	-9.161	0.625
	Pt	-18.199	0.000
	Ра	-12.907	0.002
Core Countries	Gt	-2.484	0.045
	Ga	-7.245	0.580
	Pt	-9.870	0.007
	Pa	-9.531	0.026
Peripheral Countries	Gt	-4.881	0.000
	Ga	-11.452	0.311
	Pt	-15.353	0.000
	Ра	-14.035	0.008

#### Table 7.10: Cointegration test: EXPORTS, REER, weighted GDP and GFCF%GDP

Notes: Gt and Ga are group mean tests, Pt and Pa are panel mean tests.

# 3.2 Bounds Cointegration tests\_Fpss test: Exports, REER, Weighted GDP and Output Gap

Model	Country	Value	P-Value
Global Model	France	N-0	С
(REER_CPI)	Italy	N-0	С
	Germany	N-0	С
	Spain	5.092	0.0008
Global Model	France	6.157	0.0002
(REER_ULC)	Italy	4.495	0.0022
	Germany	N-0	С
	Spain	5.447	0.0005
Intra European Model	France	3.065	0.0192
(REER_ CPI)	Italy	6.169	0.0002
	Germany	3.575	0.0087
	Spain	3.810	0.0105
Intre European Model	France	4.263	0.0030
(REER_ULC)	Italy	7.929	0.000
	Germany	5.542	0.0004
	Spain	4.235	0.0031

#### Table 7.11: Bounds Cointegration tests: Fpss test [1980-2012]

Model	Country	Value	P-Value
Global Model	France	9.662	0.0000
(REER_CPI)	Italy	5.006	0.0014
	Germany	N	-C
	Spain	4.582	0.0010
Global Model	France	5.545	0.0009
(REER_ULC)	Italy	5.140	0.0015
	Germany	N-C	
	Spain	12.659	0.0000
Intra European Model	France	N	-C
(REER_CPI)	Italy	5.460	0.0007
	Germany	N-C	
	Spain	4.504	0.0028
Intra European Model	France	4.238	0.0042
(REER_ULC)	Italy	4.841	0.0018
	Germany	3.294	0.0164
	Spain	6.349	0.0002

## Table 7.12: Bounds Cointegration tests: Fpss test [1980-1998]

Model	Country	Value	P-Value
Global Model (REER_CPI)	France	9.159	0.0000
	Italy	N-C	
	Germany	N-C	
	Spain	7.578	0.0001
Global Model	France	5.374	0.0014
(REER_ULC)	Italy	5.074	0.0024
	Germany	9.007	0.0000
	Spain	N-C	
Intra European Model	France	4.170	0.0062
(REER_ CPI)	Italy	19.670	0.0000
	Germany	6.971	0.0002
	Spain	3.422	0.0163
Intre European Model	France	5.016	0.0026
(REER_ULC)	Italy	20.131	0.0000
	Germany	5.678	0.0011
	Spain	5.123	0.0023

## Table 7.13 Bounds Cointegration tests: Fpss test [1999-2012]